

Class [REDACTED] Book [REDACTED] v. 8





Electric Railway Review

FORMERLY THE STREET RAILWAY REVIEW

VOLUME XVIII

July 1 to December 31, 1907

THE WILSON COMPANY

160 Harrison Street

Chicago

GENERAL INDEX.

* An asterisk indicates maps, portraits or other illustrations. † A dagger indicates an editorial.

A		Advertising—		American Light & Traction Co.—	
A. B. C. Corporation	748	From Standpoint of the Street Railway Company. By A. W. Warnock	621	Dividends	115
Abilene Electric Railway, Track and Roadway	686	Promotion of Traffic	†916	Financial	114, 267
Abilene Street Railway, Power Plant	292	Publicity, Department of. By J. Harvey White, American Convention	620	American Locomotive Co.	28, 208, 351, 388, 452, 691, 776
Accidents. See Also Claims.		Signs on Cars, Denver City Tramway Co.	*930	Annual Report	295
Accidents—		Twin City Rapid Transit Co.'s Advertising Exhibit	*607	Electric Locomotive, Portland Railway Light & Power Co.	*959
Alighting from Cars	†181	Alken, S. C., Track and Roadway	143	American Mason Safety Tread Co.	477, 627, 628, 660, 662
At Spring Switches	†663	Air Brakes—		American Motor Car Interurban Railway Co.—	
Bonus Principle Safeguard Against	107	Allis-Chalmers	*608	Incorporated	23
Boston Elevated Railway	344	Alternating-Current-Direct-Current Apparatus	*149	Gasoline Motor Cars	*89
Central Illinois Traction Co., Near Charleston	743	Christensen	*452	Track and Roadway	89
Chicago City Railway	257	Westinghouse A.M. Equipment	505	American Multigraph Sales Co., Gam-	
Denver City Tramway	996	Westinghouse A.M. Equipment	631	meter Multigraph	477, 484, *544
Instructing Employees How to Avoid	917	Westinghouse S.M. Equipment	598	American Railway & Light Co., Power Plant	319, 688, 875
Interborough Rapid Transit Co., New York	79	Akron & Youngstown Railway, Incorporated	905	American Railway & Power Co., Incorporated	284
Lake Shore Electric Railway, Near Genoa	344	Akron Canton & Youngstown Railway, Track and Roadway	143	American Railway Tie Co.	147
Losses from	†300	Alaska Home Railway, Track and Roadway	234, 416	American Railways Co.—	
Manhattan Elevated, New York	110	Albany & Hudson Railroad, Track and Roadway	416	Annual Report	370
Mattoon City Railway, Near Charleston, Ill.	†272, 284, †300	Alberger Pump Co., Centrifugal and Turbine Pumps	*778	Dividends	238, 841
New York Central & Hudson River Railroad at Woodlawn	966	Albia, Ia., Track and Roadway	317	Earnings	419, 451, 775, 805, 940
New York City Reports	357, 872, 995	Albia Electric Light & Power Co.—		Financial	27
Omaha & Council Bluffs Street Railway	†879	Power Plant	875	Rolling Stock	388
Precautions, New Jersey & Hudson River Railway	†241, 244	Track and Roadway	873	Shops	268
Proper Handling of, Instructions to Employees Regarding, Claim Agents' Convention	569	Albia Interurban Railway, Track and Roadway	80, 966	Track and Roadway	143
Protection of Cars at Railroad Grade Crossings	†554	Albion, N. Y., Track and Roadway	234	American Society of Mechanical Engineers	415, 685, 743, 996
Publicity	†847	Algiers Railway & Light Co., Track and Roadway	289	Annual Meeting	865
Quebec Bridge over St. Lawrence River	257	Allegheny Valley Street Railway—		American Steel & Wire Co.	627, 776
Recent	141, 170, 231, 286, 683, 714, 742, 770, 799, 835, 871, 934, 965	Power Plant	174	American Steel Foundries	806
Records of	†847	Shop Methods	274	American Steel Tie Corporation	268
Reducing Risks and Costs	67	Allen, C. Loomis—		American Stoker Co.	268, 295
Reports of	†554	American Convention	603, 604	American Tie & Timber Co.	208
Snohomish Valley Railway Office Burned	203	Freight Handling	604	Americus Railway & Light Co.—	
Accomac Power & Traction Co., Track and Roadway	966	Allen, John F., Orders	748	Incorporated	316
Accounting—		Allen Street Railway, Track and Roadway	997	Power Plant	319, 688
Accountants' Association—		Allentown, Pa., Track and Roadway	873	Track and Roadway	80
Convention	521, 602	Allentown & Reading Traction Co.—		Anacortes Improving & Developing Co., Track and Roadway	772, 997
Tentative Classification of Operating Expenses	†725, 735	Power Plant	145	Anchors—	
Annual Reports Required in Ohio	975	Track and Roadway	837	Atlas Guy	*296
Amusement Park Accounts. By F. J. Pryor	525	Allis-Chalmers Co.	208, 351, 720, 748, 776, 842, 877, 1001	Miller Guy	*90
Auditing Conductors' Collections. By William H. Forse, Jr.	258	Air Brakes	*508	Anderson, H. A., Jurisdiction of the Storekeeper	868
Car-Mile Results in New York State	†810, 815	Annual Report	696, 726	Anderson (S. C.) Traction Co., Track and Roadway	51, 172, 204, 264
Central Electric Accounting Conference	78	Christensen Air Brakes	*453	Appalachian Interurban Railroad—	
Depreciation	†182, †456	Convention Exhibit	504	Incorporated	345
A Factor in Rates	†752	Type OB Pneumatic Governor	*661	Track and Roadway	873
And Maintenance, Accountants' Convention	602, 647	Wearing Qualities of Engines for Traction Purposes	*57	Applegate Static Pick-up for Telegraph Relay	435
Interstate Commerce Commission System—		Alton Jacksonville & Peoria Railway, Track and Roadway	289, 345	Archbold-Brady Co.	877
Depreciation Accounts	†32	Altoona Hollidaysburg & Bedford Springs Railway, Track and Roadway	111	Architecture, Dewey System of Indexing	279
Electric Railways	49, †92, 864, 918, 1944, 954	Aluminum Company of America	806	Ardmore Traction Co., Track and Roadway	802, 937
Progress	†881, 896	Amarillo Street Railway, Track and Roadway	24, 81	Argenta Light & Power Co., Track and Roadway	743
Milwaukee Electric Railway & Light Co., Reserves	340	Ambos-Cudmore Co.	942	Arkansas Valley Traction Co.—	
Operating Expenses, Classifications	†392	Ambridge & Baden Street Railway, Track and Roadway	905	Incorporated	204
Recording Interline Waybills	*43	American Automatic Switch Co.	691	Track and Roadway	448
Standard Classification of Accounts and Form of Report, Accountants' Convention	602	American Blower Co.	806, 842	Arkona, Ont., Track and Roadway	997
Standard Form of Report	†2	American Brake Shoe & Foundry Co.	56, 476, 909	Armature Oven, Oakland Traction Co.	*334
State Railway Commissioners' Convention	146	Convention Exhibit	543	Armature Shafts, Devices for Straightening	*828
Time-Keeping Machine	57	American Bridge Co.	116, 691, 720	Armstrong, Albert H., Comparative Performance of Steam and Electric Locomotives	*786
Uniform System for Electric Railways, New York State	†881, 896, 995	American Car & Foundry Co.	322, 351, 941	Arnold, Bion J., Report on Investigation of New York Subway Congestion	880, 892
Ackerman, E. O.—		Orders	147, 747, 776	Arnold, T. B., Supply Co.	177, 806
Engineering Convention—		Refrigerator Cars, Illinois Traction System	*922	Asheville & Hendersonville Railroad, Track and Roadway	289, 743
Electric Railway Tracks, Care of	527, 528	American Car Co.		Asheville Rapid Transit Co., Track and Roadway	845
Acme Road Machinery Co.	322	Brill Semi-Convertible Car, Boise & Interurban Railway	*174	Ashland Light Power & Street Railway Co., Track and Roadway	716
Acme Supply Co.	116	Orders	147, 207, 294	Ashtabula Rapid Transit Co., Financial	267
Adams, H. H.—		American Carbon & Battery Co.	476, 635	Ashville, N. Y., Track and Roadway	143
American Convention—		American Cities Railway & Light Co., Dividends	388, 1001	Asmus, W. G., Fire Protection for Power Plants	*185
Address	559	American Concrete Coal Co.	116	Associations—	
Engineering Convention—		American Creosoting Co.	748	American Portland Cement Manufacturers	692
Address	487	American District Steam Co., District Steam-Heating	175	American Railway	965
Adams, W. S.—		American Electric Railway, Track and Roadway	264	Rail Sections	742
Engineering Convention—		American Engineering Co.	86, 941	Standard Location of Third Rail	*765
Standardization	528	American General Engineering Co.	208, 420	American Street and Interurban Railway Committees, Meetings of	370
Adams & Downs	57	American Institute of Electrical Engineers	383, 770, 835, 872, 955, 996	Convention—	
Adams & Westlake Co.	660	American-La France Fire Engine Co., Chemical Engine	*764	Addresses—	
				Adams, H. H., Engineering Association Work	559
				Bradley H. C., Claim Agents' Association Work	709

McGraw, James H., Manufacturer's Association	560	Rail Corrugation	528, 535, 650	Atlantic City & Shore Railroad—	
President John I. Beggs	557	Rolling Stock, Maintenance and Inspection	486, 489, 542	Financial	114
Tingley, C. L. S., Accountants' Association Work	559	Standardization—		Ocean City Extension	*14
Advertising from Street Railway Company's Standpoint	621	Axles	*537	Atlantic City Electric Railway, New Track Construction	*43, *324
Badge	461	Brakeshoes	*486, *537	Atlantic Coast Electric Railroad, Power Plant	875
Bulletins	340, 380	Of Equipment	528, *537	Atlantic Engineering & Construction Corporation	350
By-Laws, Amendment	560	Journals, Journal Bearings and Journal Boxes	*537	Atlantic Northern & Southern Railway, Track and Roadway	51, 448, 905
Car Houses, Rules for Construction, Car Storage and Operating Houses, Construction of	652	Rails	*537	Atlantic Shore Line Railway—	
Car Wiring	561, 566	Wheel Sections	*517, *537	Description	*214
Depreciation and Maintenance	602, 647	Tracks, Electric Railway, Care of	1515, 527, 529	Track and Roadway	111
Design of Railway Structures, Influence on Economy of Operation	*571	Treasurer's Report	496	Atlas Anchor Co.	239, 629
Election of Officers	640	Turbines—		New Type of Guy Anchor	296
Electric Traction, Heavy	710	Curtis Type	591, *609, 704	Atlas Export & Trading Co.	748
Executive Committee, Meeting	601	Horizontal Steam	*579, 591	Auburn & Northern Electric Railroad, Track and Roadway	81, 997
Fares, Interurban	657	Parsons Type	*563, 591	Auburn & Syracuse Electric Railroad—	
Fire Insurance, Co-operative	1515	Question Box	256	Boiler Feedwater Settling Tanks	*77
Freight Handling	603, *618, 621	Standardization—		Earnings	968
Insurance	639, 655	Axles	*153, *157, *335	Track and Roadway	997
Interurban Fares	657	Brakeshoes	*328, *335	Augusta Railway & Electric Co., Track and Roadway	686
Mail, Compensation for Carrying	560, 640	Cleveland Meeting of Committee	*157	Aurora Elgin & Chicago—	
Maintenance and Depreciation	602, 647	Gears	*335	Branch Routes and Schedules	*850
Motormen and Conductors, Rules	602	Journals	*335	Cars	*732
Municipal Ownership	639, 654	New York Meeting of Committee	282, *328, *335	Dividends	388
Municipal Ownership in Great Britain and in United States	640, 641	Wide Treads	*328, *335	Earnings	237, 388, 719, 841, 1000
National Fire Protection Association and Its Work	1553, 575, 590	American Street and Interurban Railway Manufacturers—		Financial	689
Papers, Early Preparation of	1638	Annual Meeting	556, 601	Funeral Car Service	*441
Parks and Amusement Features	1559, 615	Election of Officers	*964	Rolling Stock	350
Programme	306, 340, 462	Executive Committee Meeting	18	Station	350
Proposal of Atlantic City Hotel Men's Association for Permanent Convention Hall	555, 701	Exhibit Arrangements, Atlantic City, Atlantic City Hotel Men's Association, Plan for Permanent Convention Hall	555, 639	Track and Roadway	143, 234, 317
Public Relations	640, 701	Benefit, Illinois Traction System	63	Aurora Railway, Track and Roadway	937
Publicity, Department of	620	Canadian Electrical, Montreal Meeting, Canadian Street Railway, Montreal Meeting	307	Austin, Tex., Track and Roadway	143, 317
Rails and Rail Joints	524, 528	Central Electric Accounting Conference	78	Austin & Lockhart Interurban Railway, Incorporated	111
Secretary's Report	559	Recording Interline Waybills	*43	Austin Electric Railway, Power Plant	375
Small Roads, Management of	648, 1694	Central Electric Railway	793, 816	Automobiles, Transferring on Trail Cars	*197
Standardization of Equipment	561	September Meeting	331, 362	Axles—	
Subjects	560	Catenary Construction	362, *366	Proposed Standard	*328
T-Rail	640, *645	Express	362, 367	Standardization, Engineering Association	*153, *157, *335, *537
Technically Trained Railway Men	561, 576, 590, 1600	Insurance	362, 363	Axles and Fillets	*1973
Traffic, Promotion of	615	Motors, 1,200-Volt	362, *368		
Treasurer's Report	559	Standardization Committee Report	*364		
Future of	1781	Colorado Electric Light Power & Railway Co.	79, 315, 378		
Insurance Data Sheet	78	Electric Railway Shop Foremen's	770		
Municipal Ownership Committee Circular	241	Empire State Gas and Electric, Joint Meeting With New York State Railway Association	404		
Standard Code of Rules, Committee's Circular of Inquiry	101	Ft. Wayne & Wabash Valley Mutual Benefit	383		
American Street and Interurban Railway Accountants—		Michigan Electrical	79		
Convention—		Missouri Electrical	835		
Address, John I. Beggs	521	National Association of Railway Commissioners	344		
Amusement Park Accounting	525	Electric Railway Accounting	446		
Election of Officers	602	National Electric Light	966		
Maintenance and Depreciation	602, 647	National Fire Protection, Its Work in the Electric Railway Field	1573, 575, 590		
Mechanical Devices and Other Office Appliances	612	Northwestern Electrical	996		
President C. L. S. Tingley's Address	519	Pennsylvania Street Railway, Organized	996		
Programme	306, 340, 462	Southwestern Electrical and Gas	966		
Secretary's Report	523	Street Railway Association of the State of New York—			
Standard Classification of Accounts and Form of Report	602	Joint Meeting with Empire State Gas and Electric Association	404		
Treasurers' Report	523	September Meeting	305		
Operating Expenses, Classification	398, 1725	Fares	372, 375		
Standard Form of Report	42	Interurban Rules	371		
American Street and Interurban Railway Claim Agents—		Freight and Express	372, 375, 1393		
Convention	520	Street Railway Y. M. C. A., at Nashville	936		
Accident Work, Instruction of Employees	1553, 569	Technical Publicity	872		
Acting President Bradley's Address	486, 488	Traction Association Proposed in Central Electric Territory	816, 865, 896, 926		
Claim Agent and His Work	1515, 533	Union Internationale de Tramways et de Chemins de Fer d'Interet Local, Annual Convention	930		
Claim Department, Making it Most Effective	566	Wisconsin Electric and Interurban Railway	801		
Committees for 1908	590	Atha Steel Casting Co.	86, 476, 627, 748, 776, 971		
Investigators and Adjusters for the Claim Department, Selecting and Training	549	Steel Castings for Railway Work	*552		
Management of Bad Cases	542	Titan Gears	*632		
Policy of the Claim Department to the Injured Employee	532	Athens Electric Railway—			
President Goshorn's Address	590	Dividends	55		
Programme	306, 340, 462	Power Plant	292		
Question Box	531	Athol & Orange Street Railway, Car House	321		
American Street and Interurban Railway Engineering—		Atlanta & Carolina Construction Co., Track and Roadway	81, 873		
Car House Data Sheet	101	Atlanta & Carolina Railway, Track and Roadway	997		
Convention—		Atlanta Bolt Co.	295		
Addresses—		Atlanta Macon & Griffin Electric Railway, Track and Roadway	51		
Adams, H. H.	487	Atlanta Northern Railway—			
Beggs, John I.	495	Commutation Tickets	996		
Tingley, C. L. S.	496	Station	207		
Car House Terminals	*545, 1559	Atlantic Brass Co.	748		
Cars, Wiring, Adjustment of Resistance Steps	1599	Atlantic City, N. J.—			
Control Apparatus	526	Map	*472		
Data Sheets	22	Plan for Permanent Convention and Exhibit Hall	555, 639		
Election of Officers	591	Supply Men's Exhibits	*257		
Electric Railway Tracks, Care of	515, 529, 578, 591	Atlantic City & Ocean City Railroad—			
Gas Engines	578, 591	Automobiles, Transferring on Trail Cars	*197		
Maintenance and Inspection of Electrical Equipment	486, 489, 542	Financial	114		
President Adams' Address	487	Track and Roadway	24		
Programme	306, 340, 462				
Rail and Rail Matters	528				

B

Bacon, Frederic W., The Accident Problem	241, 244
Baker, William C., Hot Water Heater	*323
Bakersfield & Ventura Railway, Track and Roadway	81, 204
Bal Cave Railway, Incorporated	384
Baldwin Locomotive Works	28, 116, 776, 806
Orders	115, 452, 842
Ball & Wood Co.	877
Ball Engine Co.	806
Baltimore & Annapolis Short Line Railroad—	
Electrification	352
Substation	718
Baltimore Frederick & Hagerstown Electric Railway, Track and Roadway	111, 143
Baltimore Halethorpe & Elkridge Electric Railway, Track and Roadway	81, 172, 837
Baltimore Terminal Co., Financial	387
Bangor (Me.) Railway & Electric Co.—	
Dividends	388
Freight Service	278
Shops	*154
Barboursville, Ky., Track and Roadway	967
Barre & Montpelier Traction & Power Co., Financial	85, 237
Barstow, W. S., & Co.	176
Bartlesville Interurban Railway—	
Rolling Stock	877
Track and Roadway	204, 416, 716, 937
Bath Electric Service, Incorporated	345
Baton Rouge Electric & Gas Co., Track and Roadway	234
Bay Counties Electric Railroad, Track and Roadway	345
Bayonet Trolley Harp Co.	651
Bayou Teche Electric Light & Railway Co., Track and Roadway	686, 716, 802
Beach Haven Railway, Track and Roadway	385
Bearing Metals, Pyramid	504
Beaver Falls, Pa., Track and Roadway	967
Beaver Valley Traction Co., Track and Roadway	385
Beggs, John I.—	
Accountants' Convention—	
Address	521
American Convention—	
Address	557
Cars, Wiring	561
Insurance	639
Rules for Motormen and Conductors	603
Standardization of Equipment	561
Technically Trained Railway Men	589
Engineering Convention—	
Address	495
Bellamy Veslette Manufacturing Co.	86
Bellefonte & Interurban Railway, Incorporated	743
Beloit Traction Co., Track and Roadway	24, 204, 317
Belton & Temple Traction Co., Track and Roadway	234, 686
Belvidere City Railway, Track and Roadway	345
Bement, A., Boiler and Furnace Design	*983

Bennett, H. K.— Claim Agents' Convention— The Claim Agent and His Work. +515, 533	Boston & Northern Street Railway— Financial 267 Freight Privileges Desired 343 Track and Roadway 345, 772, 967	Brooklyn Bridge Contract 50 Car House and Shops, Maspeth, N. Y. *894 Commission Investigation 871 Financial 114, 237, 349 Line Service Plant +332, *400 New Surface Cars *705 New York Public Service Commission Investigation +61, 78, 227, 903 Rolling Stock 268 Surface Cars *705 Taxes, Excessive 192 Track and Roadway 345, 716 Track Service Plant +332, *400
Benton & Fairfield Railway, Rolling Stock 877	Boston & Worcester Electric Companies, Annual Report 849	Brooklyn Union Elevated Railroad, Financial 176
Benton Harbor-St. Joe Railway & Light Co., Accident Risks and Costs Re- duced 68	Boston & Worcester Street Railway— Concrete Bridge *133 Financial 176, 775 Rolling Stock 176, 294 Track and Roadway 905	Brown, Harold P.— Convention Exhibit 420 Plastic Rail Bond 632
Berger Manufacturing Co. 295	Boston Elevated Railway— Accident in Power Plant 344 Adjusting Resistance Steps 728 Annual Report 759 Cambridge Subway 22 Financial 876 New Generators *258 Power Station Progress 793 Station Changes *738 Track and Roadway 716, 772 Train Starting Signals +241	Browning Engineering Co., Railroad Ditcher *506 Browning Foundry Co. 116
Berkshire Electric Co. 116	Boston Lowell & Lawrence Electric Rail- road, Proposed Lines *72, 379	Brownsville Carmichaels & Waynesburg Railway, Track and Roadway 317, 385
Berkshire Street Railway— Car Houses 776 Financial 940 Track and Roadway 24, 51, 143, 744, 997	Boston Safety Switch Co. 350	Brownsville Masontown & Smithfield Street Railway, Track and Road- way 24
Berry Brothers 540	Boston Suburban Electric Companies— Dividends 419 Financial 940	Brunswick & Middletown Electric Rail- road, Track and Roadway 317
Bessemer, Ala., Track and Roadway 448	Boston Waltham & Weston Electric Rail- road, Track and Roadway 204, 289	Brushes, Motor 192
Bethany Trolley Syndicate, Incorporated 716	Bowker, William R.— Bonuses as Safeguards Against Acci- dents 107 Pension Funds 134	Bryant Zinc Co. 690
Bethlehem & Nazareth Passenger Rail- way, Power Plant 718	Bowling Green Railway, Rolling Stock 776	Buckeye Engine Co. 500
Bethlehem Steel Co. 239, 690	Bowser, S. F., & Co. 971	Bucks County Electric Railway, Finan- cial 908
Bettendorf Axle Co., Orders 147	Bozeman, Mont., Track and Roadway 802	Bucyrus Co. 56
Betton, Use of Sand Blast by Electric Railways *422	Bradley, H. C.— American Convention— Address 559 Claim Agents' Convention— Address +486 Brake Hanger, Non-Chattering *863	Buenos Aires, Argentine, S. A., Track and Roadway 837
Bibbins, J. R.— Engineering Convention— Gas Engines 591 Horizontal Steam Turbines *579, 591	Brakes— Compound Magnetic *507 Electro-Pneumatic, Westinghouse 633 Fender Tripping Valve *635 Foundation Gear, By F. Heckler 817 Hand, Peacock *632 Inside or Outside +182 Non-Skidding +272 Track, Electro-Mechanical *927 Type OB Compressor Governor *661 Westinghouse EL Equipment 473	Buffalo, N. Y., International Railway, Pay-as-You-Enter Cars 935
Billings, Mont., Track and Roadway 111, 289	Brakeshoes— Armbrust 484 M. C. B. Committee Report, 1907 163 Standardization, Engineering Associa- tion, +153, *159, +328, *335, +486, *537	Buffalo & Lake Erie Traction Co.— Rolling Stock 238, 452 Track and Roadway 81, 111, 143, 448, 873, 937, 997
Bingham Railroad Construction Co. 176	Braking, Correct Percentage of, By H. M. Prevost Murphy +809, 825	Buffalo Forge Co. 389
Binghamton Street Railway, Strike 141	Brantford Street Railway, Track and Roadway 802	Buffalo Lockport & Rochester Railway— Power Plant 206 Track and Roadway 234, 264
Birmingham & Gulf Railway & Naviga- tion Co., Incorporated 384	Brigdenport & Danbury Electric Railway, Incorporated 23, 81	Buffalo Niagara & Toronto Railway, Track and Roadway 873
Birmingham Railway Light & Power Co.— Dividends 27 Financial 85 Passenger and Freight Station 690, 747 Passes Discontinued 262	Bridges— Boston & Worcester Street Railway *133 Boston Elevated Railway, Between Boston and Cambridge *926 Collapse of Bridge over St. Lawrence River at Quebec 257 Concrete, Lima & Toledo Traction Co. *988 Illinois Traction Co. 49 Los Angeles, Cal. *674 Pacific Electric Railway *674 Brill, The J. G., Co. 691, 748, 806, 877 Cars, Dallas Consolidated Railway *636 Narragansett Type Car for Mexico *634 Orders 207, 228, 268, 294, 338, 690, 842, 941 Pay-As-You-Enter Type Cars, New York City Railway *709 Semi-Convertible Cars for Danbury *597 Semi-Convertible Cars, Nashville Rail- way & Light Co. *354 Surface Cars, Brooklyn Rapid Transit Co. 705	Buggy, John A., Special Sand Box *981
Blake Signal & Manufacturing Co. 420, 630	Bristol & Kingsport Railway— Incorporated 837 Track and Roadway 873, 937, 997	Burdett, Everett W., Public Control from the Corporate Standpoint 406
Blake, Henry W.— American Convention— Technically Trained Railway Men 561	Bristol & Plainville Tramway Co.— Power Plant 319 Track and Roadway 24, 81	Burgahaw, Traction Co.— Incorporated 967 Track and Roadway 967
Blank Forms— Instruction Blank for Placing Signs on Cars *930 Power Station Report *761 Rolling Stock *923	Bristol Gas & Electric Co., Track and Roadway 111	Burlington Traction Co., Rolling Stock 720
Bliss, E. W., Co. 56	British Columbia Electric Railway 898	Buss Machinery Co. 239
Bliss Electric Car Lighting Co. 691	Power Plant 450 Rolling Stock 28	Butler, Pa., Track and Roadway 686, 716
Bloomington & Normal Railway & Light Co., Track and Roadway 289	Track and Roadway 173, 317, 345, 448, 744	Butler & Chicago Street Railway Incorporated 801 Track and Roadway 448
Bloomington Pontiac & Joliet Electric Railway— Rolling Stock 207 Track and Roadway 448, 686, 772	British Tramways, Civic Federation Commission Report 98	Butler Saxonburg & Tarentum Street Railway— Shops 147 Track and Roadway 173, 204
Blue Island Car & Equipment Co. 239	Brockton & Plymouth Street Railway, Earnings 237, 419	Butte Electric Railway, Track and Road- way 111, 143, 148, 802
Blue Print Machine, Wagenhorst *118	Brookings & Sioux Falls Electric Rail- way, Track and Roadway 289, 686, 716, 772	Bytton Brothers, Rolling Stock 941
Blue Valley Railway, Track and Road- way 772	Brooklyn, N. Y.— Bridge Congestion +426 Subway 22	
Bluestone Traction Co., Track and Road- way 837	Brooklyn City Railroad, Dividends 85	
Bluffton Anchor Co. 239	Brooklyn Rapid Transit Co.— Annual Report 436	
Boiler Compound, Magic 120		
Boiler Feedwater Tanks, Auburn & Syra- cuse Electric Railway *77		
Boilers— Automatic Water Gauge *942 Continental 633		
Boise & Interurban Railway— Cars, Semi-Convertible *474 Passenger and Freight Station 971 Rolling Stock 388 Track and Roadway 51, 204, 234, 448, 686, 997		
Boise Traction Co., Track and Roadway 345		
Bohlers, Atha Steel *552		
Bonds, Plastic Plug 632		
Book Reviews— American Street Railway Investments 49		
Ashe, Sidney W., Electric Railways Theoretically and Practically Treated 763		
Cravath, James R., and Harris C. Trow, Electric Railways 828		
Fowler, George L., The Car Wheel 953		
French, Lester G., Steam Turbines 103		
Gant, L. W., Elements of Electric Traction 279		
Goldingham, A. H., The Gas Engine in Principle and Practice 953		
Hendricks' Commercial Register for Buyers and Sellers 257		
Hiscox, Gardner D., Modern Steam En- gineering 102		
Parshall, H. F., and H. M. Hobart, Electric Railway Engineering 102		
Walker, Sidney F., Pocket Book of Electric Lighting & Heating 828		
Bossert, W. F., Manufacturing Co. 389		
Boston, Mass.— Construction Details of Proposed High- Speed Lines *72 Electric Suburban Service, New York New Haven & Hartford Railroad +152 Tourist Information Bureau 110 Track and Roadway 113, 448		
Boston & Eastern Electric Railroad— Method of Comparing Transportation Facilities 893 Proposed Lines *72, 379 Terminal Plans 737 Track and Roadway 716		
Boston & Lockport Block Co. 208		
Boston & New York Electric Railroad, Proposed Lines 379		

C

Cache, Okla., Track and Roadway 744	Cache, Okla., Track and Roadway 744
Cairo Electric Traction Co., Power Plant 774	Cairo Electric Traction Co., Power Plant 774
Cairo Terminal Traction Co., Incor- porated 23	Cairo Terminal Traction Co., Incor- porated 23
California Gas & Electric Corporation, Power Plant 718	California Gas & Electric Corporation, Power Plant 718
Calman, Emil, & Co., Ohmic Insulation 476	Calman, Emil, & Co., Ohmic Insulation 476
Calumet Electric Street Railway— Financial 970 Rolling Stock 294	Calumet Electric Street Railway— Financial 970 Rolling Stock 294
Cambridge, Mass., Subway 22	Cambridge, Mass., Subway 22
Camden & Suburban Railway, Rolling Stock 207, 388	Camden & Suburban Railway, Rolling Stock 207, 388
Camden Interstate Railway— Car Houses 115 Power Plant 906 Rolling Stock 842	Camden Interstate Railway— Car Houses 115 Power Plant 906 Rolling Stock 842
Campion, H. T.— American Convention— Influence of Design of Railway Struc- tures on Economy of Operation *571	Campion, H. T.— American Convention— Influence of Design of Railway Struc- tures on Economy of Operation *571
Canadian General Electric Co. 239	Canadian General Electric Co. 239
Canandaigua Southern Electric Railroad, Track and Roadway 204, 289, 317	Canandaigua Southern Electric Railroad, Track and Roadway 204, 289, 317
Canyon City & Royal Gorge Electric Railroad, Track and Roadway 173, 234, 686, 802, 887, 873	Canyon City & Royal Gorge Electric Railroad, Track and Roadway 173, 234, 686, 802, 887, 873
Canyon City Pueblo & La Junta Railway & Power Co.— Incorporated 51 Track and Roadway 51, 81	Canyon City Pueblo & La Junta Railway & Power Co.— Incorporated 51 Track and Roadway 51, 81
Cape Breton Electric Co.— Dividends 719 Earnings 267 Rolling Stock 268	Cape Breton Electric Co.— Dividends 719 Earnings 267 Rolling Stock 268
Capital Circuit Traction Co., Track and Roadway 81	Capital Circuit Traction Co., Track and Roadway 81
Capitol Traction Co., Dividends 388	Capitol Traction Co., Dividends 388
Car Clearance, Chicago 237	Car Clearance, Chicago 237
Car Houses, See Also Shops.	Car Houses, See Also Shops.
Car Houses— Brooklyn Rapid Transit Co., at Mas- peth *894 Doors, Steel Rolling, Wilson *598 Poughkeepsie City & Wappingers Falls Electric Railroad *908	Car Houses— Brooklyn Rapid Transit Co., at Mas- peth *894 Doors, Steel Rolling, Wilson *598 Poughkeepsie City & Wappingers Falls Electric Railroad *908

Rules for Construction, American Convention.....	639	Sleeping, Holland Interurban Co.....	459	Dispatching System.....	332
Terminals, Open and Closed, Engineering Convention.....	545, 559	Surface, Brooklyn Rapid Transit Co.....	705	Dividends.....	388, 908
Wiring.....	568	Tacoma Type.....	733	Financial.....	387
Car Lighting, Lintern System.....	354	Washington Baltimore & Annapolis Electric Railway.....	438	Theft.....	879
Car Service, Parlor, Spokane & Inland Railroad.....	477	Windsor Essex & Lake Shore Rapid Railway.....	951	Track and Roadway.....	143, 448, 744
Car Wiring, Protecting Cables.....	183	Work Car With Cranes, London.....	184	Rehabilitation.....	1356, 376, 992
Carbolinum Wood Preserving Co.....	941	Workings, Los Angeles Railway.....	103	Track Reconstruction.....	394
Carey, Philip, Manufacturing Co.....	147	Youngstown & Southern Railway.....	822	Tracks, Distance Between.....	151
Carmichaels Waynesburg & Brownsville Street Railway, Track and Roadway.....	264	Carse Brothers Co.....	721	Chicago Electric Traction Co., Financial.....	85, 116
Carnegie Library.....	239	Carthage, Mo., Track and Roadway.....	111, 317	Chicago Fox Lake & Lake Geneva Railroad—	
Carolina Valley Railway, Track and Roadway.....	173, 967	Case, F. E., Control Apparatus.....	526	Incorporated.....	743
Carondelet & Webster Groves Railway, Incorporated.....	801	Case Manufacturing Co.....	116	Track and Roadway.....	772
Carpenters, Ellis C.—		Castings, Journal.....	691	Chicago General Railway, Financial.....	387, 419
Claim Agents' Convention—		Catenary Line Construction, By G. D. Nicoll.....	366	Chicago Harvard & Geneva Lake Railway, Power Plant.....	418
Selecting and Training of Investigators and Adjusters for Claim Department.....	549	Cedar Rapids, Ia., Track and Roadway.....	802	Chicago Indianapolis & Terre Haute Railroad, Track and Roadway.....	173
Carizzo Springs, Tex., Track and Roadway.....	289	Cedar Rapids & Iowa City Railway & Light Co., Power Plant.....	839	Chicago Joliet & Central Illinois Railway, Incorporated.....	966
Cars—		Cement Show at Chicago.....	965	Chicago Lake Shore & South Bend Railway—	
Alighting.....	879	Census, Electric Railways.....	807	Construction, Progress of.....	174
Brake Hanger, Non-Chattering.....	863	Central Arkansas Electric Railway, Power Plant.....	718	Power Plant.....	745
Brake Rigging, Correct. By F. Heckler.....	817	Central California Traction Co., Track and Roadway.....	52, 173	Track and Roadway.....	81, 143, 686, 744, 947
Brakes Inside or Outside.....	1182	Central Illinois Traction Co., Accident Near Charleston.....	743	Chicago Milwaukee & St. Paul Railway, Electrification.....	22, 202, 263, 399
Center Entrance.....	1723	Central Inspection Bureau.....	86, 116, 239, 691, 720, 748, 806, 877, 909	Chicago-New York Electric Air Line Railway—	
City Service, By T. J. Nicholl.....	44	Central Kentucky Traction Co.—		Rolling Stock.....	207
Cleaning Compound, Gillette.....	296	Financial.....	176	Track and Roadway.....	289, 716
Construction, Tri-City Railway.....	980	Line Opened.....	414	Chicago Ottawa & Peoria Railway, Track and Roadway.....	143
Destination Signs, Connecticut Co.....	871	Track and Roadway.....	234	Chicago Pneumatic Tool Co.....	28, 239, 476, 499, 570, 615, 627, 749
Efficiency of Light.....	327	Central Railway, Track and Roadway.....	997	Chicago Railways Co.—	
Fire, for Storage Yards.....	751, 764	Central Traction Co., Financial.....	176	Chicago Union Traction Reorganization.....	22, 49, 361, 71, 109, 140, 164, 167, 231, 249, 299, 312, 413, 447, 683, 714, 770, 815, 934
High Steps.....	1425	Central Valley Electric Railway Light & Power Co., Track and Roadway.....	905	Financial.....	876, 908
Historical, Omaha & Council Bluffs Street Railway.....	165	Centralia, Wash., Track and Roadway.....	716	Securities.....	161
Hospital, Milwaukee Electric Railway & Light Co.....	262, 335	Centralia & Central City Traction Co., Financial.....	349	Chicago South Bend & Northern Indiana Railway—	
Lintern Signal System.....	662	Centralia Sandoval Railway, Track and Roadway.....	838	Contract with United States Express Co.....	23
Overhead Collector.....	281	Centralia Chehalis & Western Railway, Track and Roadway.....	448	Shops.....	720
Pay-As-You-Enter Type.....	162, 1693, 1694	Chambersburg Greencastle & Waynesboro Street Railway, Track and Roadway.....	143, 686, 744, 802	Stations.....	86, 294, 350
Buffalo.....	935	Charleston, Ill., Accident, Central Illinois Traction Co.....	743	Track and Roadway.....	111, 289, 449, 744
By T. J. Nicholl.....	976	Charleston & Paris Interurban Railway, Track and Roadway.....	686, 772, 838	Chicago Subway Arcade & Traction Co., Proposed Subway System.....	22
Chicago.....	943	Charleston & Summerville Electric Railway, Track and Roadway.....	937	Chicago Union Traction Co.—	
Instructions to Trainmen.....	780, 795	Charleston Consolidated Railway Gas & Electric Co., Dividends.....	55	Commutator Press.....	227
Jersey City, N. J.....	965	Charleston Westfield Marshall & Terre Haute Interurban Railroad—		Electrical Testing Device.....	104
Reasons for Use of.....	916	Incorporated.....	51	Financial.....	719, 970, 1000
Record Blanks, Northern Electric Railway.....	923	Track and Roadway.....	81	Rolling Stock.....	250
Sanding Apparatus, Liverpool Corporation Tramways.....	678	Charlotte Consolidated Construction Co.—		Track and Roadway.....	204
Signs On, Denver City Tramway Co.....	930	Interurban Station.....	86	Chihuahua, Mex., Track and Roadway.....	346
Steel-Panel, Danville.....	502	Track and Roadway.....	111	Chilean Government, Rolling Stock.....	207
Steel Passenger, Painting.....	677	Charlotte Electric Railway, Track and Roadway.....	838	Chilton, John—	
Steps, Adjusting Resistance.....	728	Chase City, Va., Track and Roadway.....	24	Engineering Convention—	
Storage Houses, Construction of, American Convention.....	652	Chase-Shawmut Co.....	629	Parsons Type Steam Turbine.....	563, 591
Street Car Building in 1904.....	701	Stage Pocket.....	240	Chippewa Valley Construction Co., Track and Roadway.....	838
Tacoma Type.....	1723	Test Lamp.....	119	Chippewa Valley Electric Railroad—	
Tests of Wiring.....	1300	Chatham Wallaceburg & Lake Erie Railway, Track and Roadway.....	345	Financial.....	267
Trail Car Operation in Paducah, Ky.....	921	Chattanooga Railways Co.—		Power Plant.....	25, 803
Trucks for Electric Motor Service, By Franklin M. Nicholl.....	679	Dividends.....	115, 876	Rolling Stock.....	147
Wiring, Adjustment of Resistance Controllers.....	599	Track and Roadway.....	745	Choctaw Railway & Lighting Co.—	
Wiring Diagram, Single-Phase.....	952	Chautauqua Traction Co., Track and Roadway.....	52	Car House.....	113
Wiring of, American Convention.....	561, 568	Chelan Electric Co., Incorporated.....	172	Rolling Stock.....	776, 971
Cars, Descriptions of—		Chester, Pa., Track and Roadway.....	204, 264, 873	Christchurch Tramways Co., Rolling Stock.....	147
Atlantic Shore Line Railway.....	218	Chicago—		Christie, E. J., Gasoline Motor Car.....	89
Aurora Elgin & Chicago Railroad.....	782	Board of Supervising Engineers.....	343, 356, 376, 785	Cincinnati & Columbus Traction Co., Financial.....	114
Brill, for Dallas, Tex.....	636	Guard Rail for Chicago.....	796	Cincinnati Car Co.....	909
Brill, for Mexico.....	634	Track Layout.....	794	Chicago South Bend & Northern Indiana Railway, Passenger Cars.....	353
Chicago & Milwaukee Electric Railroad.....	178	Car Clearance Problem.....	287	Cincinnati Traction Co., Closed Cars.....	808
Closed Cincinnati Traction Co.....	808	Electrical Show.....	414	Orders.....	147, 388, 842
Combination Passenger, Indianapolis & Louisville 1,200-Volt Railway.....	854	Electrification of Terminals of Steam Roads.....	1271, 287	Cincinnati Dayton & Ft. Wayne Railway, Track and Roadway.....	317, 967
Convertible, Pittsburg & Westmoreland Railway.....	829	Elevated Loop Congestion.....	1753, 760	Cincinnati Electrical Tool Co.....	420
Electric Express.....	618	Funeral Car Service.....	1425, 441	Cincinnati Georgetown & Portsmouth Railroad, Rolling Stock.....	842
Elgin Railroad, Rochester Division.....	433	Metropolitan West Side Elevated Railway, Cost of Maintenance.....	1329	Cincinnati Newport & Covington Light & Traction Co.—	
Fire, South Side Elevated Railroad.....	751, 764	Northwestern Elevated Railroad—		Dividends.....	27
Ft. Dodge Des Moines & Southern Railroad.....	424	Employment of Trainmen.....	981	Wages Increased.....	49
Freight, Pacific Electric Railway.....	94	Operating Expenses.....	780	Cincinnati Northern Traction Co., Track and Roadway.....	317
Funeral Car, Chicago.....	125, 441	Rehabilitation, Progress of.....	992	Cincinnati Reading & Middletown Railway, Track and Roadway.....	716
Gasoline, Aurora DeKalb & Rockford Railway.....	298	South Side Elevated Railroad—		Cincinnati Street Railway, Dividends.....	388, 970, 1001
High-Speed, Richmond & Chesapeake Bay Railway.....	670	Fire-Fighting Car.....	1751, 764	Cincinnati Traction Co.—	
Inspection, Gasoline Motor.....	749	Reconstruction.....	251	Rolling Stock.....	147
Interurban Passenger, Chicago South Bend & Northern Indiana Railway.....	353	Union Loop.....	203, 231	Track and Roadway.....	81
Los Angeles Railway.....	10	Chicago & Interurban Electric Railway, Incorporated.....	204	Circuit-Breaker Records, Keeping.....	1724
Mail, Inland Empire System.....	278	Chicago & Joliet Electric Railway—		Citizens' Electric Co.—	
Milwaukee Northern Railway.....	889	Shops.....	1001	Financial.....	55, 689
Ocean Shore Railway.....	126	Track and Roadway.....	52	Track and Roadway.....	716
Parlor, Spokane & Inland Railroad.....	977	Chicago & Milwaukee Electric Railroad—		Citizens' Electric Street Railway, Newburyport, Mass., Dividends.....	27
Passenger, Pacific Electric Railway.....	64	Cars.....	178	Citizens' Railway & Light Co., Financial.....	349
Pay-As-You-Enter Type—		Earnings.....	207, 350, 690, 876, 970	Citizens' Traction Co., Dividends.....	841
Chicago City Railway.....	332, 1779, 1780, 795, 859	Track and Roadway.....	111, 204, 234, 289, 744	City & Elm Grove Railroad, Financial.....	349
New York City Railway.....	769	Chicago & Oak Park Elevated Railroad, Track and Roadway.....	289, 716	City & Suburban Railway, Incorporated.....	289
Refrigerator, Illinois Traction System.....	922	Chicago & Southern Traction Co.—		City Railway, Dayton, O., Dividends.....	27
Semi-Convertible—		Chicago-Kankakee Line Opened.....	835	Civic Federation, See National Civic Federation.....	
Boise & Interurban Railway.....	474	Track and Roadway.....	52	Claim Department—	
Brill, for Danbury, Conn.....	597	Chicago City Railway—		Accidents, Reports of.....	1554
Easton & Washington Traction Co.....	275	Cars—		Attitude Toward the Injured Employee, R. H. Schoenen, Claim Agents' Convention.....	532
Nashville Railway & Light Co.....	354	Pay-As-You-Enter Type.....	332, 1779, 1780, 795, 818, 943		
Toledo Railways & Light Co.....	492	Instructions to Trainmen.....	1780, 795		
Shop Utility, Los Angeles Railway.....	104				
Single Truck, Kenosha Electric Railway.....	508				

Claim Agents' Work, H. K. Bennett, Claim Agents' Convention.....	523	Indiana—		Brooklyn Rapid Transit Co.—	
Investigators and Adjusters, Selecting and Training, Ellis C. Carpenter, Claim Agents' Convention.....	549	Annual Reports Required.....	311	Car House and Shops at Maspeth, N. Y.	*894
Making It Effective, Charles B. Hardin, Claim Agents' Convention.....	566	Jurisdiction over Street Crossings....	344	Line and Track Service Plant.....	*400
Management of Bad Cases, H. P. Vorles, Claim Agents' Convention.....	542	Steam and Electric Roads Must Interchange Freight.....	413	Cars, Street Railway, Built in 1904....	701
Medical Experts in Personal Injury Cases.....	1516	Massachusetts—		Chicago Electric Traction Lines, Track Reconstruction.....	*394
Claims—		Proposed Lines out of Boston.....	379	Concrete, Inspecting.....	*810
Damage Claimant Held to Grand Jury in Louisville, Ky.....	97	Railway Law, Compilation of.....	872	Connecticut Co., Branford-Stony Creek Line.....	897
Fraudulent, Rochester Railway.....	*242	Michigan, Requires Annual Reports....	800	Connecticut Co., Meriden-Middletown Line.....	*921
New Law in Massachusetts.....	*880	Minnesota, Jurisdiction Tested.....	233	Dallas Interurban Electric Railway....	*898
Reducing Percentage of Damage Cost, Kansas City Railway & Light Co.....	*181	Missouri, Jurisdiction over Electric Lines.....	904	Easton & Washington Traction Co., Extension.....	*275
Claremore, I. T., Track and Roadway....	204	Nebraska, Lincoln Fare Case.....	108	Easton Transit Co., South Bethlehem Line.....	*131
Claremont Railway & Lighting Co.—		New York Public Service Commission .45, 109, 139, 171, 263, 743, 871, 935, 965		Indianapolis & Louisville Traction Co., 1200-Volt Railway.....	*552
Power Plant.....	875	Accidents, New York City.....	995	Lima & Toledo Traction Co., Concrete Bridge near Waterville, O.....	*988
Rolling Stock.....	388	Accident Records.....	*847	Repair Shops.....	*190
Clark, Walton, Municipal Ownership.....	70, *91, 132	Accounting System.....	762, 995	Los Angeles Interurban Railway—	
Clark, William J.—		Brooklyn Bridge Congestion, Investigation.....	*426	Bridges and Culverts.....	*674
American Convention—		Brooklyn Rapid Transit Co., Investigation.....	871, 903	Track and Roadway.....	*245
Municipal Ownership in Great Britain and in United States.....	640, 641	Improvements, Reports Required.....	830	Los Angeles Railway, Shops.....	*4
Cleveland, O.—		Interborough-Metropolitan Investigation.....	*61, 78, 135, *152, 165, 196, 227, *242, 250, 288, 305, 315, 413, 446	Milwaukee Northern Railway.....	*882
Franchise Controversy.....	78, 108, 137, 170, 202, 231, 262, 286, 309, 414, 683, 714, 742, 770, 799, 835, *847, 871, 903, 934, 965, 995	New York City Railway Investigation.....	800	New York Auburn & Lansing Railroad.....	*34
Mayorality Election.....	*752	Personnel.....	22	New York Central & Hudson River Railroad, Electric Zone, Harmon Shops.....	*919
Municipal Traction Co., Report of Expert Accountants.....	766	Rules.....	383	New York New Haven & Hartford, Electrification, By E. H. McHenry.....	*188
Cleveland & Sharon Electric Railway, Financial.....	940	Transportation Service Investigation.....	*61, 139, 343, 382	Northwestern Elevated Railroad, Wilson Avenue Terminus.....	*220
Cleveland Alliance & Mahoning Valley Railway, Cleveland, Ohio, Track and Roadway.....	24, 111, 143	Tunnel Investigation.....	170	Ocean Shore Railway.....	*124
Cleveland Armature Works.....	627	Ohio, Annual Reports Required.....	975	Pacific Electric Railway—	
Cranes With Lifting Magnets.....	*695	Wisconsin—		Bridges and Culverts.....	*674
Interpole Magnets for Lifting.....	*390	Decisions Affecting Public Service Corporations.....	*548	Track and Roadway.....	*245
Cleveland Brooklyn & Elyria Railway, Track and Roadway.....	112	Milwaukee Service Investigation.....	*63, 68, 193	Pacific Light & Power Co., Power Plant.....	*729
Cleveland Electric Railway—		Commutator Press, Chicago Union Traction Co.....	*227	Pittsburg & Westmoreland Railway.....	*829
Dividends.....	27, 388	Compagnie de Mutuelle Tramways, Rolling Stock.....	115	Poughkeepsie City & Wappingers Falls Electric Railroad, Car House.....	*308
Financial.....	27	Compania Tranvia de Chihuahua, Track and Roadway.....	717	Progress in Central States.....	*122
Rolling Stock.....	350	Compound Magnet Brake Co., Magnetic Brake.....	*507	Richmond & Chesapeake Bay Railway.....	*666
Cleveland Frog & Crossing Co.....	540	Concord Maynard & Hudson Street Railway, Financial.....	805, 876	Spokane & Inland Railway, Shops at Spokane.....	*891
Cleveland Painesville & Eastern Railroad, Financial.....	55	Concrete—		Terre Haute, Ind., Interurban Improvements.....	*755
Cleveland Southwestern & Columbus Railway—		Care in Use of.....	*62	Terre Haute Traction & Light Co., Paris Extension.....	*924
Power Plant.....	83	Construction, Inspecting.....	*810	Through Line St. Louis to Erie.....	*327
Shops.....	86	Elevated Structures, Richmond & Chesapeake Bay Railway.....	*664, *666	Toledo Postoria & Findlay Railway, Toledo Extension.....	405
Climax Stock Guard Co.....	605	Posts, Cost of.....	679	Twin City Rapid Transit Co., Selby Hill Tunnel.....	*358
Clinton, Ind., Track and Roadway.....	838	Shops, Twin City Rapid Transit Co.....	*456, *465	Windsor Essex & Lake Shore Rapid Railway.....	*944, *946
Clinton Street Railway, Rolling Stock.....	207	Tests, University of Illinois.....	966	Youngstown & Southern Railway.....	*822
Clio, S. C., Track and Roadway.....	317	Concrete, Reinforced—		Contactors with Controllers.....	*13
Clubhouse, Portland Railway Light & Power Co.....	818	Kansas City Outer Belt & Electric Railroad Structures.....	*225	Continental Passenger Railway, Dividends.....	940
Clubs—		Roofs, Trussit.....	*270	Control Apparatus, Engineering Convention.....	526
Engineers', of Philadelphia.....	23, 800	Conestoga Traction Co.—		Controllers—	
New England Street Railway.....	872	Car House.....	452	Contactors with.....	*13
New York Railroad.....	316	Track and Roadway.....	289, 346, 686	Regulator, Durkin.....	*423
Coal Lands, Illinois Traction System Purchase.....	79	Coney Island & Brooklyn Railroad—		Cooper, H. S.—	
Cobbs Car Co.....	691, 720	Financial.....	320	American Convention—	
Coils, Testing Insulating, at Los Angeles.....	*5	Rolling Stock.....	806, 842	Problem of the Small Electric Road.....	643, 7694
Cole, George F., Trolley Hanger.....	*119	Confidence, Business Man's Letter, By Ernest W. Heath.....	914	Cooper Heater Co.....	268, 627, 630, 660
Cologne-Bonn High-Voltage Electric Railway.....	*198	Conley Frog & Switch Co.....	350	Plant.....	*60
Colonial Sign & Insulating Co.....	86	Connecat & Erie Traction Co., Financial.....	320	Co-operative Realty Selling & Development Co., Incorporated.....	837
Colorado Springs & Interurban Railway, Rolling Stock.....	776	Connecticut Co.—		Copper Prices.....	*355
Columbia & Walla Walla Traction Co., Track and Roadway.....	234	Automobile Truck.....	*779, *794	Corn Belt Traction Co., Track and Roadway.....	231, 714, 818
Columbia Brake Shoe & Foundry Co.....	452, 499, 590	Branford-Stony Creek Line.....	897	Corning, John W.—	
Columbia Electric Street Railway Light & Power Co., Track and Roadway.....	52	Meriden-Middletown Line.....	*921	Adjusting Controller Resistances.....	*728
Columbia Machine & Malleable Iron Co., Broom Machine.....	*722	Signs, Destination.....	871	American Convention—	
Columbus, Ga., Track and Roadway.....	173	Track and Roadway.....	449, 802, 873, 938	Technically Trained Railway Men....	589
Columbus (Ga.) Electric Co., Dividends.....	1001	Connecticut Railway & Lighting Co., Track and Roadway.....	838	Engineering Convention—	
Columbus (Ga.) Railroad—		Connecticut Valley Street Railway Co.—		Control Apparatus.....	526
Car House.....	55	Financial.....	349	Corporations, Public Control, By Everett W. Burdett.....	406
Track and Roadway.....	52, 938	Substation.....	718	Corry & Columbus Street Railway—	
Columbus (Ind.) Street Railway & Light Co.—		Track and Roadway.....	717	Rolling Stock.....	747, 842
Financial.....	267	Connectors, Solderless, Dossert.....	423	Track and Roadway.....	741
Track and Roadway.....	24, 173	Connette, E. G.—		Cosper, W. P., Hot Water Heaters.....	499
Columbus, O.—		Engineering Convention—		Couplers—	
T-Rail Controversy.....	50	Standardization.....	528	Automatic, Tomlinson.....	*635
Track and Roadway.....	346	Consolidated Car Fender Co.....	720	Automatic, Van Dorn.....	*30, *596
Columbus Delaware & Marion Railway, Track and Roadway.....	264, 385, 905	Fender Tripping Valve.....	*635	Automatic, Westinghouse.....	636
Columbus Magnetic Springs & Northern Railway, Track and Roadway.....	*873, 937	Providence Fender.....	484	Washburn.....	*502
Columbus Malleable Castings Co.....	720	Consolidated Car-Heating Co.....	29, 176, 511, 632, 720	With Radial Connection, McConway & Torley.....	*504
Columbus Marion & Bucyrus Railway, Track and Roadway.....	52, 346	Cab Heater Switch.....	*58	Covington & Wabash Valley Railway, Incorporated.....	289
Columbus Newark & Zanesville Electric Railway, Dividends.....	27, 419	Electric Heater.....	*208	Cowing Engineering Co.....	295
Columbus Railway & Light Co.—		Consolidated Lighting Co.....	116	Cowlitz Valley Railway & Power Co., Track and Roadway.....	235
Dividends.....	55	Consolidated Railway Co. (Hartford, Conn.) Power Plant.....	347	Crafts, P. P.—	
Rolling Stock.....	877	Consolidated Railway Co. (New Haven, Conn.)—		American Convention—	
Track and Roadway.....	112, 143	Power Plant.....	206	Freight Handling.....	604, 601, *618
Columbus Railway Co., Dividends.....	85, 238, 841	Rolling Stock.....	28	Crane, with Lifting Magnets, Cleveland Armature Works.....	*595
Commission, German, Inspection of Single-Phase Railways.....	*404	Track and Roadway.....	52, 81, 317, 711	Crocker-Wheeler Co.....	452, 594, 628
Commission, Public Utilities of New York, See Also Commissions, Railroad.....		Consolidated Railways Light & Power Co.—		Crookston, Minn., Track and Roadway....	173
Commission, Public Utilities, of New York.....	11, *31	Power Plant.....	875	Crossings, Railroad, Protection of Cars.....	1554
Commissions, Railroad—		Track and Roadway.....	24	Crowley, H. J., Rolling Stock.....	720
		Consolidated Traction Co., Dividends....	1001	Curtain Fixtures—	
		Construction—		Cam, National Lock Washer Co.....	617
		Atlantic City & Shore Railroad, Ocean City Extension.....	*14	Curtain Supply Co.....	822, 871, 941
		Atlantic City Railway, Track Improvements.....	*43, *234	Ring Fixture for Closed Cars.....	*596
		Atlantic Shore Line Railway.....	*214	Chutes Motor Traction.....	
		Bangor Railway & Electric Co.....	*154		
		Boston Elevated Railway—			
		Cambridge Bridge.....	*926		
		Power Plant.....	793		

Cutler-Hammer Manufacturing Co..... 56, 452, 806

D

Dallas Interurban Electric Railway—
Description *898
Track and Roadway 173, 346
Danville Car Co. 268, 447, 449, 720, 909
New Plant 209
Orders 176, 268, 294, 321, 1001
Steel-Panel Cars 502
Danville & Eastern Illinois Railway,
Track and Roadway 235
Danville & Southeastern Railway, Incorporated 345
Danville Light Power & Traction Co.,
Track and Roadway 264, 416
Danville Street Railway & Light Co.,
Rolling Stock 268
Dauphin Street Railway, Incorporated 263
Davenport, Ia., Track and Roadway 112, 416, 744
Davenport & Dubuque Railway, Track
and Roadway 317
Davenport & Manchester Interurban Rail-
way, Track and Roadway 264, 289
Davenport & Suburban Railway, Financial 349
Davis, James C., Cast-Steel Wheel 750
Dayton & Troy Electric Railway, Track
and Roadway 317
Dayton Covington & Piqua Traction Co.,
Rolling Stock 842
Dayton Manufacturing Co. 541, 662
Sash Locks 501
Dayton Pneumatic Tool Co. 239
Dearborn Drug & Chemical Works 591
Decatur, Ill., Shops, Illinois Traction
System *13
Decatur, Tex., Track and Roadway 346
Decatur Sullivan & Mattoon Electric
Railway, Track and Roadway 687
Defiance Hicksville & Ft. Wayne Rail-
road, Incorporated 51
Defiance Paulding & Ft. Wayne Railway,
Track and Roadway 81, 802
De Hart, H. V., and W. H. Stafford 749
De Kalb Sycamore & Interurban Traction
Co.—
Financial 85
Power Plant 839, 906
De Kalb-Sycamore Electric Co., Track
and Roadway 143
Delafield, C. E., High-Tension Insulators 311
Delaware & Hudson Co.—
Ballston-Saratoga Line Opened 50
Power Plant 774
Delaware Mt. Gilead & Mansfield Rail-
road, Track and Roadway 289
Delaware River & Atlantic City Railway,
Track and Roadway 717
Denton Interurban Railway & Power
Plant Co., Track and Roadway 52, 235, 772
Denver, Colo., Track and Roadway 24, 317, 938
Denver & Greeley Railroad, Track and
Roadway 173, 744
Denver & Interurban Railroad, Track
and Roadway 264, 385, 687, 997
Denver & Northwestern Railroad, Finan-
cial 775
Denver & South Platte Railroad, Track
and Roadway 235, 419
Denver City Tramway Co.—
Accidents 996
Accident Risks and Costs Reduced 67
Financial 27, 55
Instruction Blank for Placing Signs on
Cars *930
Des Moines Ia., Track and Roadway 264
Des Moines City Railway—
Eleven-Hour Work Day 232
Franchise Case 49
Owl Car Service 724, 936
Track and Roadway 235, 744
Des Moines Winterset & Creston Electric
Railway, Track and Roadway 143
Detroit, Mich.—
Franchise Ordinance 286
Three-Cent Fares 108, 1299
Detroit & Adrian Traction Co., Track and
Roadway 143, 173
Detroit Graphite Co. 116
Detroit Holst & Machine Co. 691
Detroit Steel Products Co. 909
Detroit United Railway—
Dividend Not Declared *693
Dividends 27
Earnings 294, 451, 805, 908
Financial 176, 689
Power Plant 718
Track and Roadway 173
Devine, J. P., Co. 540
Vacuum Impregnating System 484
Dickney, John—
Engineering Convention—
Standardization 528
Dillon, Mont., Track and Roadway 772
Dillsburg & Wellsburg Railroad, Incorporated 415
Dimmock, W. S.—
American Convention—
Freight Handling 604
Discipline—
Accidents Lessened by Instructions *553
Instructing Employees How to Avoid
Accidents 917

Lax Danger of *272
Strictly Enforced Insures Content-
ment *3
Dispatching—
Chicago City Railway 332, 795
Egry Dispatching Register 633
Recording Train Movements *241
Telegraph Signal System *843
Time Points and Schedules *151
District Heating with Exhaust Steam 476
Dividends, Not Declared by Detroit
United Railway *693
Dodge & Day 322
Dominion Dump Car Co., Limited 877
Donora & Eldora Street Railway, Track
and Roadway 289, 772, 874
Doors, Steel Rolling, Wilson *598
Dossert & Co. 593, 630, 748
Joints 507
Solderless Connectors 423
Dothan, Ala., Track and Roadway 906
Drafting, Pacific Electric Railway Sys-
tem *223
Dressel Railway Lamp Works 322, 476, 499, 541, 570
Drummond Detective Agency, Method of
Handling Strikes 87
Duluth, Minn., Track and Roadway 997
Duluth Street Railway Co.—
Earnings 419, 719, 841, 1000
Office Building 747
Track and Roadway 143
Duluth-Superior Traction Co., Dividends 55, 419
Dunn-Locke Vacuum Cleaning Co. 177
Dunnville, Wabash Port & Beansville
Electric Railway, Track and Road-
way 997
Dunton, M. W., Co. 56
Duquesne, Ariz., Track and Roadway 874
Duquesne Belleville & St. Louis Electric
Railway, Track and Roadway 112
Durkin Controller Handle Co. 777
Controller Regulator *423
E
Earl, Charles R., Trolley Retrievers 721
Earnings—
Electric Lines, New York New Haven
& Hartford Railroad *693
New England Railroads *915
East Liverpool Traction & Light Co.—
Rolling Stock 388, 747
Track and Roadway 264
East Moline & Campbell's Island Railway,
Incorporated 142
East St. Louis & Eastern Railway, In-
corporated 289
East St. Louis & Suburban Railway,
Dividends 27
East St. Louis Columbia & Waterloo
Electric Railway, Track and Road-
way 264
Eastern Cahill Telharmonic Co. 842
Eastern New York Railroad, Financial 114
Eastern Pennsylvania Railway, Track
and Roadway 687, 744
Easton & South Bethlehem Transit Co.,
Track and Roadway 449
Easton & Washington Traction Co.—
Extension *275
Rolling Stock 147
Easton Consolidated Electric Co., Divi-
dends 388
Easton Transit Co.—
Car Houses 268
Rolling Stock 268, 294
South Bethlehem Line *131
Eatonton, Ga., Track and Roadway 112
Eclipse Railway Supply Co. 630
Edgar, Charles L., Municipal Ownership 70, 132
Edge Moor Iron Co. 147
Edmonton Electric Railway—
Power Plant 25
Rolling Stock 28
Track and Roadway 81
Education and Labor *151
Edwards, O. M., Co. 322, 351, 630, 806
Egry Autographic Register Co. 477
Dispatching Register 633
Egyptian Metal Co., Bearing Metals 504
Eldorado Springs Tiffin Monegaw Springs
& Lowry City Railroad, Track and
Roadway 338, 938
Electric Cable Co. 806
Electric Express Co. 79
Electric Locomotives. See Locomotives.
Electric Package Co. 263
Electric Railway Improvements Co. 57, 420, 500, 540, 628, 749
Electric Railway Reports *486
Electric Railways—
Address by Henry J. Pierce 408
Census 807
Connecticut 202
Effect upon Steam Roads in Ohio *133
Inspection by German Commission *404
Uniform Accounting System *881, 896
Electric Service Supplies Co. 660, 941
Electric Storage Battery Co. 239
Electric Traction, Heavy, American Con-
vention 710
Electric Traction Supply Co., Trolley
Hanger *323
Electrical Engineering Building, Worces-
ter Polytechnic Institute *280
Electrical Show, Chicago 414

Electrical Show, New York 78, 177, 315, 404
Electrification—
Arlberg Tunnel 799
Baltimore & Annapolis Short Line 352
Chicago Milwaukee & St. Paul Railway 202, 263, 399
Chicago Terminals *271, 287
Erie Railroad *427, *428
New York New Haven & Hartford 139, *152, 421
By E. H. McHenry *188
Southern Pacific Co. *281, *391, 415
Spanish Railroad 250
Steam Railways, By W. N. Smith 936
Elevator, Car, Hudson & Manhattan
Tunnels *986
Elgin, Ill., Track and Roadway 143, 346
Elgin & Belvidere Electric Co., Rolling
Stock 321
Elkader, Ia., Track and Roadway 838
Elkins Light & Power Co.—
Incorporated 345
Track and Roadway 416
Ellend, J. G., Co. 351
Elmira Corning & Chemung Railway,
Track and Roadway 235
El Oro, Mex., Track and Roadway 967
El Paso Electric Co.—
Dividends 27, 1001
Earnings 876
Financial 805
El Paso Electric Railway—
Power Plant 839
Track and Roadway 112
El Reno Railway, Incorporated 111, 172
Ely, W. Caryl—
American Convention—
Cars, Wiring 561
Elyria Southern Electric Railway—
Incorporated 111
Track and Roadway 143
Emery Steel Co. 389
Emmons, C. D.—
American Convention—
Freight Handling 603
Empire Bridge Co., Plant at Elmira,
N. Y. *297
Employees—
Benefit Association, Ft. Wayne & Wa-
bash Valley 383
Bonus Principle. By William R. Bow-
ker 107
Cleanliness *328
Department *152
Discipline and Contentment *3
Instruction in Accident Work, Claim
Agents' Convention 569
Instruction Schools *93
International Railway Employees' Asso-
ciation, Annual Report 864
Motormen and Conductors, Rules,
American Convention 602
Motormen, Selection from Shops *243, 244
Pension Funds, By William R. Bow-
ker 134
Trainmen, Northwestern Elevated Rail-
road, Chicago *981
Energy Diagram, New, By H. F.
Schmidt *671
Engineer Co. 90
Engines—
Gas, Operating Troubles *123
Ridgway *607
Supporting the Piston Rod *725
Enid Blackwell & Osage Interurban Traction
Co.—
Incorporated 51, 142
Track and Roadway 449
Enid Waukomis & Oklahoma City Inter-
urban Railway, Incorporated 51, 142
Ensley Street Railway—
Incorporated 716
Track and Roadway 204, 290, 385
Enterprise, Ore., Track and Roadway 906
Enterprise Transportation Co., Track and
Roadway 317
Erie London & Tilsonburg Electric Rail-
way, Track and Roadway 874
Erie Railroad—
Applegate "Static Pickup" *435
Electrification, Rochester Division *427, *428
Erie Stone Co. 116
Eugene & Eastern Railway, Track and
Roadway 317, 346, 772
Eugene Street Railway—
Car Houses 294
Track and Roadway 290
Evans, W. H.—
American Convention—
Technically Trained Railway Men 589
Engineering Convention—
Standardization 528
Evans-Almhall & Co., District Heating 605
Evansville, Ind., Track and Roadway 204, 416
Evansville & Boonville Traction Co.,
Track and Roadway 143, 416, 744
Evansville & Eastern Electric Railway,
Track and Roadway 143, 204, 802
Evansville & Southern Indiana Traction
Co.—
Stations 420, 720
Track and Roadway 317, 385, 687, 802, 906, 997
Evansville Petersburg & Vincennes Rail-
way, Incorporated 448
Evansville Princeton & Vincennes Inter-
urban Railway, Track and Road-
way 24, 81, 264, 385
Evansville Railways Co., Financial 968

Evansville Suburban & Newburg Railway— Station	28	Ft. Wayne & South Bend Railway, Track and Roadway	416	Iowa City, Ia.	801
Track and Roadway	112, 143	Ft. Wayne & Springfield Railway, Track and Roadway	24, 416, 802	Ithaca, N. Y.	937, 997
Everett, Wash., Track and Roadway	290	Ft. Wayne & Wabash Valley Traction Co.— Earnings	207, 321, 451, 775, 970	Jacksonville (Fla.) Electric Co.	447
Everett & Cherry Valley Traction Co., Incorporated	289	Horizontal Steam Turbines, Spy Run Station	*579	Jasper, Ind.	801
Excelsior Springs, Mo., Track and Roadway	290	Lafayette & Logansport Extension Completed	23	Joplin, Mo.	110, 203
Excursions, Western Ohio	232	Limited Service	171	Kananga & Gallipolis Traction Co.	685
Exeter Hampton & Amesbury Street Railway, Rolling Stock	28	Photographic Contest	170	Lafayette, Ind.	447
Expanded Metal & Corrugated Bar Co.	941	Track and Roadway	81, 717	La Junta, Colo.	142, 233
Express Companies— Contracts with Electric Lines	23, 232, 315, 684	Ft. Worth, Tex., Track and Roadway	81, 204, 235, 346, 449	Lebanon, Mo.	345
Electric Express Co.	79	Ft. Worth-Mineral Wells Interurban Railway, Track and Roadway	317, 385, 687	Lima, Ohio	23, 837
Express Service— Central Electric Railway Association	362, 367	Ft. Worth Weatherford & Mineral Wells Interurban Railway, Track and Roadway	717, 906	Lincoln, Neb.	233
Electric Package Co.	263	Fowler, George L., Advantages of Solid Forged and Rolled Car Wheels	*991	Lindenhurst, L. I.	743
Interurban Railways	1665	France Packing Co.	500	Long Beach, Cal.	447
Pittsburg & Butler Street Railway	232	Franchises— Aberdeen, S. D.	685	Long Island City, N. Y.	51
F		Alameda, Cal.	288	Lorain, O.	80
Fairbanks, Morse & Co.	295	Albany, N. Y.	837	Los Angeles, Cal.	233, 288, 743
Gasoline Motor Inspection Cars	*749	Annapolis, Md.	51, 80	Louisville, Ky.	288, 685
Fairmont, Minn., Track and Roadway	744	Annisston, Ala.	80, 110, 233	Louisville Railway Franchises Attacked	202
Fairmont & Clarksburg Traction Co., Rolling Stock	690	Arapaho, Okla.	203	Ludlow, Mass.	172
Fairmont & Mannington Railroad, Track and Roadway	52, 264, 967	Arkansas City, Ark.	51	McKinley, Minn.	203
Fairview, Nev., Track and Roadway	385	Ashland, N. Y.	80	Macon, Ga.	715
Falls Construction Co., Incorporated	686	Athens, Ga.	937	Mansfield, Ill.	447, 685
Fares— Cost of in Cleveland	104	Atlanta, Ga.	203, 263, 715, 801	Mansfield, O.	203
Detroit 3-Cent	108, 1299	Auburn & Syracuse Electric Railroad	715	Marinette, Wis.	937
Increase, When Desirable	1974	Aurora, Ill.	142, 997	Marysville, Cal.	288
Increasing, By J. L. Richards	928	Babylon, L. I.	447, 837	Mayfield, Ky.	80
Interurban, American Convention	657	Bainbridge, Ga.	685	Memphis, Tenn.	110, 316, 345
Interurban, Collection and Registration, By B. A. Frankel	372, 375	Battle Creek, Mich.	233	Millburn, N. J.	203
Lincoln, Neb.	108, 413	Bedford, Ind.	873	Minden, Ia.	966
Long Ride for One Fare in New York	93	Bemidji, Minn.	263, 415	Mineola, L. I.	905
Massachusetts Commission Investigation	905	Billings, Mont.	172, 316, 415	Moline, Ill.	110
Minneapolis Case	231, 1242, 262	Bluefield, W. Va.	937	Monongahela, Pa.	966
Newspaper Tickets at Los Angeles	*921	Boise, Idaho	203	Montgomery County, Ind.	415
"No Seat, No Fare" Ordinance in Jersey City	800, 836, 1809, 872	Brazil, Ind.	837	Monroeville, O.	263
Ohio Commission Decision Reversed in Scioto Valley Traction Case	135	Brooklyn, N. Y.	23, 203, 384	Morris, Ill.	415
Pennsylvania Law Upheld	383	Buffalo, N. Y.	447	Nampa, Idaho	415
Philadelphia Rapid Transit Co.	1299	Cambridge, Md.	233	Nashville, Ind.	801
Pittsburg Railways Co., Contests Reduction	996	Canyon City, Colo.	142	Neapolis, O.	345
Six-for-a-Quarter Tickets Discontinued, Pottsville Union Traction Co.	872	Cape Elizabeth, Me.	383	New Albany, Ind.	685
Three-Cent in Zone System	1391	Carthage, Ill.	384	New Carlisle, Ind.	937
Ticket Methods, Los Angeles, Cal.	*812	Centralia, Wash.	80, 203	New Orleans, La.	142, 743
Two-Cent Law in Indiana	140	Chattanooga, Tenn.	263	New Westminster, B. C.	142
Fargo & Moorehead Street Railway, Rolling Stock	877	Chattanooga Railways Company	142	New York, N. Y.	51, 233
Farnham Co., Third Rail	*508	Cheyanne, Wyo.	203, 384	Norwich, N. Y.	288
Fay, J. A., & Egan Co.	842	Chehalis, Wash.	873	Oakland, Cal.	142, 263, 384, 715, 905
Fayetteville, Ark., Track and Roadway	874	Chicago, Ill.	345, 384, 715	Olympia, Wash.	685
Fayetteville (N. C.) Street Railway & Power Co., Track and Roadway	235, 264	Chico, Cal.	80	Omaha, Neb.	80
Feeders, Determining Size, By Henry Dicker Jackson	*194	Chicopee, Mass.	80	Onalaska, Wis.	715
Fell, A. L. C., Rail Corrugation	707	Chisholm, Minn.	233	Oshkosh, Wis.	384
Fenders— Are They a Protection?	1243	Chrisman, Ill.	110	Oswego, N. Y.	384
Los Angeles Controversy	231, 263	Clarksdale Covington & Collierville Interurban Railway	447	Owensboro, Ky.	203
Meyers	*453	Clayton, Mo.	447	Owosso, Mich.	685, 715, 837
Providence	484	Cleveland, O.	263, 345, 771	Paducah, Ky.	142, 715
Tripping Air Valve	*635	Clinton, Okla.	110	Paris, Ill.	172, 837
Ferrocarril Electrico de Lerdo a Torreon, Rolling Stock	28	Cobalt, Ont.	837	Parsons, Kan.	233, 771
Ferrox Brazing Co.	239	Columbus, Ind.	51	Pasadena, Cal.	142, 233, 685
Finleyville, Pa., Track and Roadway	347	Colusa, Cal.	743	Patoka, Ind.	316
Finleyville Southern Street Railway, Track and Roadway	416	Corning, N. Y.	23	Pensacola, Fla.	345
Fire-Fighting Car, South Side Elevated Railroad, Chicago	1751, *764	Crawfordsville, Ind.	801	Peoria Railway	142
Fire Protection— American Convention	1553, 575, 590	Crookston, Minn.	110	Philadelphia Rapid Transit Co., 50-Year	131, 1212, 344, 414
Power Plants	*185	Cumberland, Md.	415	Pittsburg, Pa.	447
Fires, See Also Accidents.		Dallas, Tex.	263, 288, 771	Pittsburg Subway Co.	799
Fitchburg & Leominster Street Railway, Financial	207, 237	Danville, Ill.	966	Pittsfield, Mass.	233, 997
Fitz-Hugh, Luther Co., Orders	55	Dauphin, Pa.	110	Platteville, Colo.	715
Flagg, Charles E., Parlor Car Service, Spokane & Inland Railroad	*977	Dayton, O.	345	Playa del Rey, Cal.	263
Flangeless Railway Corporation, Miami	*930	Decatur, Ill.	110	Plymouth, Ind.	771
Fonda Johnstown & Gloversville Railroad, Annual Report	330	Defiance, O.	873, 937	Port Marion, Pa.	873
Forest City Railway— Dividends	27, 388	Des Moines City Railway	49	Portland, Ore.	447, 685, 715
Track and Roadway	687	Detroit, Mich.	286, 345, 801	Pueblo, Colo.	415, 447, 937
Forse, William H., Jr., Auditing Conductors' Collections on Interurban Railways	258	De Witt, N. Y.	172	Quincy, Ill.	316
Ft. Dodge Des Moines & Southern Railway— Financial	85	Dothan, Ala.	172	Racine, Wis.	686
Rolling Stock	268, 321, 388	East Alton, Ill.	288	Ravenna, O.	142
Track and Roadway	264, 346, 416, 449	East Moline, Ill.	172, 233	Redding, Cal.	110, 203, 345
Ft. Dodge Emmetsburg & Spirit Lake Railway, Track and Roadway	290, 687, 772, 998	East St. Louis, Ill.	203	Richmond, Ind.	80, 447
Ft. Pitt Bridge Works	690	Elkhart, Ind.	203	Rock Hill, S. C.	110
Ft. Scott Gas & Electric Co., Track and Roadway	81	El Paso, Tex.	316	Rocky Ford, Colo.	233
Ft. Smith, Ark., Track and Roadway	838	Elyria, O.	771	Rosedale, Kan.	415
Ft. Smith Light & Traction Co., Power Plant	266, 319	Essexville, Mich.	23	Saginaw, Mich.	448
		Evanston, Ill.	51	St. Louis, Mo.	51, 233
		Evansville, Ind.	345	Salem, Ohio	23, 288
		Eveleth, Minn.	384, 801	Salem, Ore.	233
		Fargo, N. D.	142	Salisbury, N. C.	316
		Faribault, Minn.	837	Salt Lake City, Utah	234, 715, 905
		Findlay, O.	345	Saltillo, Mexico	80
		Fitzgerald, Ga.	263	San Angelo, Tex.	142
		Fond du Lac, Wis.	873	San Antonio, Tex.	771
		Ft. Worth, Tex.	142, 172	San Diego, Cal.	80, 415
		Frankton, Ind.	837	San Francisco, Cal.	203, 288, 873
		Frederick, Md.	80	San Mateo, Cal.	110
		Gary, Ind.	51, 142, 997	Sand Point, Idaho	686
		Grand Forks, N. D.	288	Sayre, N. Y.	234
		Greeley, Colo.	51, 80, 203, 715	Seattle Electric Co.	686
		Greencastle, Ind.	142, 203	Shelbyville, Ky.	172
		Green Lane, Pa.	966	Sherman, Tex.	51
		Hanford, Cal.	771	Smithfield, Pa.	873
		Hayward, Cal.	937	South Ambler, N. J.	234, 937
		Hibbing, Minn.	263	South Bend, Ind.	234, 837, 937
		Hillsboro, Ore.	172	Southport, N. Y.	51
		Hillsdale, Mich.	233	Springfield, Ill.	384
		Houston, Tex.	384, 447, 713	Springfield, O.	203, 234
		Humboldt, Tenn.	685	Steubenville, O.	345
		Huntingburg, Ind.	743	Strathcona, Alberta	51
		Indeterminate	42	Streator, Ill.	172, 966
		Indianapolis, Ind.	172, 384, 685	Subway Franchise Tax	262

Vallejo, Cal.	415	Western Electric	*503	Hardin, Charles B.—	
Ventura, Cal.	997	Genesee & Orleans Railway, Track and		Claim Agents' Convention—	
Walla Walla, Wash.	316, 937, 997	Roadway	290	Accidents, Reports of	554
Washington, D. C.	966	Geneva Phelps & Newark Railroad, Track		Claim Department and What Should	
Waterloo, Ia.	142, 234	and Roadway	24, 112	be Done to Make it Most Effective.	566
Waukegan, Ill.	204	Georgia & Tennessee Interurban Electric		Harper, J. W.—	
Waynesburg, Pa.	80, 204	Railway, Track and Roadway	416	Engineering Convention—	
West Chester, Pa.	837	Georgia-Carolina Railway, Track and		Maintenance and Inspection of Elec-	
Wilkesbarre, Pa.	234	Roadway	385, 449	trical Equipment	543
Wilmington, Cal.	293, 316	Georgia Railway & Electric Co.—		Harrington, D.—	
Windsor, Ont.	837	Dividends	238	Anti-Straddling and Safety Device for	
Winfield, Kan.	80	Extension to Hapeville, Ga.	732	Channel and Split Switches	514
Woodland, Cal.	316	Rolling Stock	176, 238	Safety Switch Device	629
Frankel, B. A., Collection and Registration		Track and Roadway	802	Harris Pneumatic Tool Co.	690
tion of Interurban Fares	372, 375	Wages Advanced	202	Hart Steel Co., McKee Tieplate	501
Frankfort Delphi & Northern Traction		German Commission, Inspection of Single-		Hartford & Springfield Street Railway,	
Co., Track and Roadway	967	Phase Railways	*404	Financial	419
Franklin, Ia., Track and Roadway	81	Gilbert, A., & Sons Brass Foundry Co.	147	Hartshorn, Stewart, Co.	351
Franklin & Towamensing Street Railway,		Gillespie Electric Railway, Incorporated.	937	Hattiesburg Traction Co.—	
Track and Roadway	143	Gillette Chemical Co., Car-Cleaning Com-		Financial	85, 320
Franklin Electric Manufacturing Co.	447, 541	pound	296	Power Plant	145
Incandescent Lamp	*390	Girard Electric Railway, Track and		Rolling Stock	147
Frederick, Md., Track and Roadway	938	Roadway	290	Track and Roadway	81
Fredericksburg & Southern Railway,		Glasgow Corporation Tramways, Finan-		Havana Central Railroad—	
Track and Roadway	967, 997	cial	85	Financial	27
Freight—		Glass, Scheme for Grinding	9	Rolling Stock	941
Boston & Northern Street Railway,		Glick, J. E., Municipal Ownership a Fail-		Havana Electric Railway—	
Seeks Privileges	343	ure at West Seattle	14	Dividends	55, 388
Delivery Systems	1847	Gold Car Heating & Lighting Co.	476, 499, 615	Financial	55
Handling, P. P. Crafts, American Con-		Electric Car Heaters	505	Hawley Down Draft Furnace Co.,	
vention	603, *618	Golden-Anderson Valve Specialty Co.,		Schwartz Melting and Refining Fur-	
Indiana Roads Must Interchange	413	Automatic Water Gauge	*942	nace	*180
Recording Interline Waybills	*43	Goldschmidt Thermit Co.	568, 630	Hays Brothers Co., Rolling Stock	238
Illinois Traction System	960	Thermit Steel for Welding	*119	Hazelton, Ia., Track and Roadway	112
Freight and Express Rates—		Gonden, H. J., Regulation Versus Muncip-		Headway, Regulated at Time-Points	151
By C. H. Armatage	372	pal Ownership	670	Heaters—	
By Frank Walsh	372, 375, 1393	Goshen, Ark., Track and Roadway	967	Cab Switch, Consolidated Car Heating	
Freight Handling—		Goshorn, H. R.—		Co.	*58
American Convention	624	Claim Agents' Convention—		Car, Gold Type	*505
Automobile Truck	1779, *794	Address	590	Heath & Milligan Manufacturing Co.	239
Massachusetts Decision	1779	Goubert Manufacturing Co.	28	President Heath's Letter to Salesmen	
Freight Service—		Gould Coupler Co.	389	on Confidence	914
Bangor Railway & Electric Co.	278	Gould Storage Battery Co.	750	Heating—	
York County Traction Co.	141	Graham Nut Co.	177	Baker Hot Water Heater	*323
Fremont Street Railway, Track and Road-		Grain Traffic, Inland Empire System.	*678	Cab Heater Switch	*58
way	235	Grand Central Traction Co., Track and		District, Evans-Almire & Co.	605
French, M. J.—		Roadway	112, 264, 346, 802, 967	Electric Heater with Removable Back,	
Engineering Convention—		Grand Forks, N. D., Track and Roadway.	449	Consolidated	*208
Electric Railway Tracks, Care of	528	Grand Rapids, Mich., Incorporated.	345	Exhaust Steam for District Heating	475
French Point Street Railway, Track and		Grand Rapids & Battle Creek Interurban		Hecker, F., Foundation Brake Gear De-	
Roadway	772	Railway, Track and Roadway	24	sign	817
Fresno, Cal., Track and Roadway	24	Grand Rapids & Kalamazoo Valley Traction		Heine Safety Boiler Co.	29
Fresno Traction Co.—		Co., Track and Roadway	52	Helena & Butte Electric Railway, Track	
Car House	207	Grand Rapids Electric Railway, Track		and Roadway	346
Financial	176	and Roadway	744	Helena Light & Railway Co.—	
Fuel, Use of Oil in Power Plants	*212	Grand Rapids Hastings & Battle Creek		Dividends	115
Fuel Tests, St. Louis	936	Interurban Railway, Track and		Track and Roadway	173
Fuller Railway Electric Signal Co.	116	Roadway	687	Helwig Manufacturing Co.	748
Funeral Car Service in Chicago.	*425, *441	Grand Rapids Holland & Chicago Rail-		Henderson, Ky., Track and Roadway.	112, 906
Furnaces—		way, Freight Depot	720	Henderson City Railway, Strike	262
Melting and Refining, Schwartz	*180	Grand Rapids Railway—		Herrick, Albert, Analysis of Cost and	
Model Smokeless	*59	Dividends	85, 775, 841	Methods of Electric Railway Main-	
Oil, Oakland Traction Co.	*282	Rolling Stock	971	tenance	*819
		Grand Traverse Railroad, Incorporated.	415	Hewitt Manufacturing Co.	148
		Grand Valley Railway, Track and Road-		Heywood Brothers & Wakefield Co.	630, 842
		way	416	Hicks Locomotive & Car Works—	
		Graphite—		Car Orders	147
		Paint	878	Cars, Aurora Elgin & Chicago Rail-	
		Graphited Wood Grease in Gear Cases.	807	road	*782
		Lubrication, By H. C. Woodruff	325	High Point, N. C., Track and Roadway.	290, 385
		Gray's Harbor Railway & Light Co.,		High-Tension, Wire Entrance	*193
		Power Plant	236, 803	Hippe, G. B.—	
		Great Britain—		American Convention—	
		Electric Railway Returns	1781	Freight Handling	604
		Municipal Ownership	640, 641, 1943	Hocking Valley Fire Clay Co.	351
		Street Railway Operation, Civic Federa-		Hodge, M. F., Trolley Retriever	*150
		tion Commission Report	98	Hogeland, Israel, Dustless Journal Box.	*150
		Great Falls & Old Dominion Railroad,		Holland, H., Trolley Supplies Manufac-	
		Track and Roadway	687	turing Co., Trolley Base and Harp.	*58
		Green Bay Traction Co., Rolling Stock.	268	Holland Palace Car Co., Interurban Sleep-	
		Green Engineering Co.	499, 628, 748	ing Car	459
		Green Fuel Economizer Co.	477	Holman, D. F., Railway Tracklayer Co.	177
		Fuel Economizers and Mechanical		Holmes, E. B., Trolley Head	626
		Draft	*551	Holmes & Allen, Trolley Head	*326
		Greenfield Bernardston & Northfield		Holyoke Street Railway, Financial.	55, 176, 940
		Street Railway, Track and Road-			28
		way	24	Hooven-Owens-Rentschler Co.	28
		Greenlee Brothers & Co.	177	Hornellsville & Canestoe Railway, Rolling	
		Greensboro Air Brake Co.	350	Stock	842
		Greenville, Tex., Track and Roadway.	416	Hospital Car, Milwaukee Electric Railway	
		Greenville & Spartanburg Railway, In-		& Light Co.	262, 1355
		corporated	172	Hot Springs Railway, Track and Road-	
		Greenville Interurban Railway—		way	52, 235, 874
		Incorporated	172	Houghton County Street Railway—	
		Track and Roadway	906, 998	Dividends	321
		Grey Bull, Wyo., Track and Roadway.	717	Earnings	238, 419, 876
		Grip Nut Co.	500	Pavilion	115
		Grothwell, A., Mogul Insulating Special-		Power Station	292
		ties	720	Houston Electric Co.—	
		Gulfport & Mississippi Coast Traction		Dividends	85
		Co., Power Plant	774	Earnings	238, 419
		Gulick, Henderson & Co.	176	Rolling Stock	147
				Howell Car & Foundry Co.	56
				Hudson & Manhattan Railroad—	
				Track and Roadway	998
				Tunnels, Car Elevator	*986
				Hudson Companies, Shops	55
				Hudson Pelham & Salem Electric Rail-	
				way, Financial	114
				Hueneme Malibu & Port Los Angeles	
				Railway, Track and Roadway.	112, 173
				Hull Electric Co., Rolling Stock	877
				Huntsville Railway Light & Power Co.—	
				Power Plant	292, 347, 688
				Track and Roadway	81
				Hunt, Robert W., & Co.	501
				Hutchinson Interurban Railway, Track	
				and Roadway	906

Idaho & Nevada Southern Railway, Track and Roadway	967	Instruction— Employees in Accident Work, Claim Agents' Convention	569	Instruction of Employees in Accident Work	569
Illinois & Indiana Electric Railroad, Track and Roadway	998	Employees, Regarding Prevention of Accidents	917	Johnstown & Ebensburg Railroad, Track and Roadway	173
Illinois & Northwestern Electric Railway, Incorporated	142	Employees' Schools	193	Johnstown Ebensburg & Northern Railway, Track and Roadway	290
Illinois Central Electric Railway, Rolling Stock	452	Insulation, Ohmlac	476	Johnstown Electric Railway, Incorporated	873
Illinois Traction Co.— Car Houses	55	Insulators— High-Tension. By C. E. Delafield	311	Johnstown Passenger Railway— Dividends	388, 1001
Earnings	747, 1001	Porcelain	*502	Power Plant	450
Financial	85	Strain, Ohio Brass Co.	*594	Track and Roadway	318
Mississippi River Bridge Plans	49	Insurance— American Convention	*515, 639, 655	Joints, Mechanical, Dossert	507
Passenger Station	295	Central Electric Railway Association	362, 363	Joliet, Ill., Track and Roadway	81
Power Plant	292	Data Sheet, American Association	78	Joliet & Southern Traction Co.— Financial	387
Substation	206	Fire Protection, American Convention	*553, 575, 590	Station	207, 238
Terminals	115	Sprinkler Systems Reduce Premiums, Kansas City Railway & Light Co.	*181	Jones & Laughlin Steel Co.	147, 208, 420, 722
Track and Roadway	52, 81, 173, 235, 264, 346, 416	Interborough-Metropolitan Co.— Brooklyn Tunnel	315	Jones Positive Nut Lock Co.	776
Illinois Traction System— Cars, Refrigerator	*922	Deficit of Surface Lines	*242	Joplin & Monett Interurban Railway, Track and Roadway	449
Coal Lands Purchased	79	Dividend Not Declared	*273	Joplin & Pittsburg Railway— Car House	388
Development of Transportation Service and Its Effect on St. Louis. By B. R. Stephens	960	Financial	294, 908	Construction Plans	221
Growth of	1945	Public Service Commission Investigation	*61, 78, 135, *152, 165, 196, 227, *242, 250, 288, 305, 315, 413, 446, *455	Rolling Stock	338
Interurban Station	176	Track and Roadway	81	Track and Roadway	449
Lincoln-Mackinaw Line	965	Validity of Organization	49	Joplin & Pittsburg Street Railroad— Rolling Stock	115
Locomotives	*984	Interborough Rapid Transit Co.— Accident	79	Substations	418
Power Plant	83	Brooklyn Tunnel	904	Journal Bearings— Standardization	*537
Rolling Stock	176, 1001	Financial	719	Engineering Convention	*537
Shops at Decatur	*13, 207, 238	Special Police for Elevated and Subway Stations	904	Journal Boxes— Dustless, Hogeland	*150
Substation	347	Track and Roadway	318, 998	Standardization	*153, 158
Track and Roadway	449, 744, 772, 802, 838, 906, 938, 998	Intermountain Railway, Incorporated	837	Engineering Association Committee— Cleveland Meeting	*537
Illinois Tunnel Co.— Contracts	233	International Congress	930	Engineering Convention	*537
Rolling Stock	86, 115, 147	International Engineering Co.	420	Journals— Standardization	*335
Illinois Valley Railway, Track and Roadway	112	International Railway (Buffalo)— Car Houses	115	Engineering Association	*537
Improved Electric Railway, Incorporated	966	Cars, Pay-As-You-Enter Type	935	Engineering Convention	*537
Independence & Rush Park Street Railway	232	Earnings	805	Journals, Technical, Value of	132
Independence North & South Railroad, Incorporated	317	Employees' Association, Annual Report	864	Judson, W. H., Co.	177
Independent Pneumatic Tool Co.	942	Financial	267	Juniata Electric Street Railway, Track and Roadway	204
Indexing, Extension of Dewey System to Architecture	279	Track and Roadway	24, 112, 144, 318	Justice, Philip S., & Co.	508, 550, 594, 627
Indiana, Development of Electric Railways	22, *122	International Register Co.	593, 594, 627, 635		
Indiana & Michigan Electric Co., Track and Roadway	173	International Timber & Preserving Co.	594		
Indiana Columbus & Eastern Traction Co.— Rolling Stock	388	Interstate Commerce Commission— Accounting System— Depreciation Accounts	*32		
Station	28	Electric Railways	*92, 864, 918, *944, 954		
Track and Roadway	52, 144, 204, 318, 346, 416	Progress	*881, 896		
Indiana County Railways— Power Plant	206, 747	Trolley Lines	49		
Substations	206	Block Signal and Train Control Board	89		
Track and Roadway	235	Operating Expenses, Classification of	398		
Indiana Creosoting Co.	295	Steam and Electric Railway Statistics	*391		
Indiana Traction Co.— Car Houses	776, 1001	Interstate Transfer Railway, Incorporated	204		
Passenger Station	420, 452	Interurban Construction Co.— Incorporated	771		
Rolling Stock	776	Track and Roadway	687		
Track and Roadway	112, 385, 417	Interurban Electric Railroad, Incorporated	80		
Indianapolis & Cairo Traction Co., Incorporated	997	Interurban Power Co., Incorporated	142		
Indianapolis & Eastern Traction Co., Station	502	Inter-urban Railway (Des Moines, Ia.)— Beaver Park	79		
Indianapolis & Louisville Traction Co.— Financial	689	Track and Roadway	235		
Line Opened	770	Interurban Railway (Wheeling, W. Va.), Incorporated	172		
Power Plant	774	Interurban Railway & Terminal Co., Financial	85, 146, 267		
Track and Roadway	290	Interurban Railways. By Hugh J. McGowan	*858		
Twelve-Hundred Volt Railway	*848, *852	Invincible Rail Joint Co.	239		
Indianapolis & Northwestern Traction Co., Passenger Station	747	Iowa City, Ia., Track and Roadway	204		
Indianapolis & Western Railway, Track and Roadway	290	Iowa-Missouri Traction & Power Co.— Power Plant	803		
Indianapolis Columbus & Southern Traction Co.— Substations	53	Track and Roadway	290		
Track and Roadway	81, 144, 235, 385	Iowa State Union Railway, Track and Roadway	744		
Indianapolis Crawfordville & Western Traction Co., Track and Roadway	24, 687	Ithaca Street Railway, Financial	27		
Indianapolis Huntington Columbia City & Northwestern Railway— Financial	876	Ives, H. B., Co.	351		
Track and Roadway	417, 838				
Indianapolis Logansport & South Bend Traction Co., Track and Roadway	717				
Indianapolis Newcastle & Toledo Electric Railway— Financial	805				
Power Plant	174, 386				
Track and Roadway	112, 235, 417, 874				
Indianapolis Street Railway, Dividends	940				
Indianapolis Switch & Frog Co.	351				
Indianapolis Traction & Terminal Co., Terminal Station	55				
Indianapolis Transportation & Transit Development Co., Track and Roadway	52				
Indicators, Street Car, Mann	*150				
Industrial Works	239				
Inland Empire System. See Spokane & Inland Empire Railroad.					
Inspection— Car, Two-Man	*427				
Concrete Construction	*810				
Electrical Equipment, Engineering Convention	*486, 489, 542				
Inspection Bureau, Robert W. Hunt & Co.	501				

Iaconia Street Railway, Power Plant...	*41	Tests, Pennsylvania Railroad.....	*283	Track and Roadway	112
La Crosse City Railway—		Lodge & Shipley Machine Tool Co.....	691	Madison Four Lakes & Chicago Railway,	
Car Houses	116	Logan Truck Co.....	116	Track and Roadway.....	449
Rolling Stock	86, 147	Logansport & Marion Traction Co., Track		Magann Air Brake Co.....	116
La Crosse Water Power Co., Track and		and Roadway	338, 938	Magnets, Lifting	*390
Roadway	173	London, (England), Traffic Conditions.....	903	Maioning & Shenango Railway & Light	
Lake Charles Street Railway		London (Ont.) Street Railway—		Co.—	
Car House	176	Devices for Starting Pinions and		Rolling Stock	842
Power Plant	266	Straightening Armature Shafts.....	*828	Track and Roadway.....	449
Rolling Stock	176	Financial	114	Mail Service—	
Lake Erie & Youngstown Electric Rail-		Long Hollow Street Railway, Track and		Compensation for Carrying Mail, Amer-	
way, Track and Roadway.....	290	Roadway	52	ican Convention	560, 640
Lake Shore Electric Railway—		Long Island, Electrification	194	Inland Empire System.....	*278
Accident Near Genoa	344	Lorain Steel Co.....	420, 500	Interurban	935
Earnings	805, 908	Electric Welder	257	Maintenance—	
Extension Proposed, Fremont to Tif-		Lord & Burnham Co.....	690	Electric Railway, Analysis of Cost and	
fin	183	Lord Electric Co.....	28, 629, 941, 1001	Methods. By A. Herrick.....	*819
Wages Advanced	835	Lorraine Electric Railway, Track and		Electrical Equipment, Engineering Con-	
Lake View Traction Co., Track and		Roadway	82	vention	†486, 489, 542
Roadway	874	Los Angeles, Cal.—		Overhead Work	†751
Lamps—		Franchise Case	233	Where Maintenance Ends and Depre-	
Incandescent, Novi	*390	Pacific Electric Railway—		ciation Begins, Accountants Con-	
Test, Chase-Shawmut Co.....	*119	Bridges and Culverts.....	*674	vention	602, 647
Lancaster Oxford & Southern Railroad,		Description	245	Manchester Corporation Tramways, Fi-	
Track and Roadway	318	Drafting System	*223	ncial	114
Lansing-Jackson Electric Railway, Track		Freight and Miscellaneous Equip-		Manchester-Davenport Interurban Rail-	
and Roadway	144, 173	ment	*94	way, Incorporated	204
Lansing Southern Railroad, Incorporated		Passenger Equipment	*64	Manchester Street Railway, Car House..	909
Lardner, James F., Car Building and		Track and Roadway	205	Manchester Traction Light & Power	
Standard Cars, Tri-City Railway.....	*980	Los Angeles & Owens Valley Railroad,		Co.—	
Larimer & Routt County Railway, In-		Track and Roadway	967	Dividends	27, 1001
corporated	384	Los Angeles & Redondo Railway—		Financial	30
Las Vegas, N. M., Track and Roadway..	235	Rolling Stock	941	Track and Roadway	967
Las Vegas-Mora-Taos Electric Railroad,		Track and Roadway	998	Manhattan Railway, Financial	841, 876
Track and Roadway.....	838	Los Angeles Interurban Railway—		Manila (P. I.) Electric Railroad & Light-	
Lawrence Cement Co.....	878	Bridges and Culverts.....	*674	ing Co., Dividends	388
Lebanon Valley Street Railway, Track		Description	245	Manistee, Mich., Track and Roadway....	838
and Roadway	346	Fender Controversy	231, 263	Manitou, Colo., Track and Roadway....	745
Leeds City Tramways of England, Tests		Newspaper Tickets	*921	Manitou Incline Railway, Track and	
of Electro-Mechanical Track Brake.....	*927	Ticket Methods	*812	Roadway	802
Legal Decisions, Recent Electric Rail-		Los Angeles-Pacific Co.—		Mankato Electric Traction Co.—	
way, By J. L. Rosenberger.....		Financial	320	Car House	268
20, 47, 106, 138, 168, 201, 230, 260, 411,		Track and Roadway	235, 687	Rolling Stock	1001
445, 681, 713, 741, 833, 869, 902, 933,		Los Angeles Railway—		Track and Roadway	24, 52, 82
993		Cars	*10	Mann, P. J., Street Car Indicator.....	*150
Legal Decisions. See Also Special De-		Shop Utility	104	Manning, Maxwell & Moore.....	971
partment of Index.		Wrecking	*103	Mannington Light & Power Co., Track	
Legare, A. E. & T. K.....	269	Power System	*300, *302	and Roadway	290
Legare & Legare	322	Shops and Shop Practice.....	†2, *4	Mansfield Railway Light & Power Co.—	
Legislation, Wisconsin	50	Track and Roadway	773, 802	Financial	27
Lehigh Valley Transit Co—		Lost and Found Department, Pacific		Power Plant	939
Substations	968	Electric Railway	†182	Maps—	
Track and Roadway	82	Louisville & Eastern Railroad—		Atlantic City, N. J.....	472
Lembocke, C., & Co.....	208	Rolling Stock	388, 776	Atlantic Shore Line Railway.....	214
Le Raysville, Pa., Track and Roadway..	717	Station	971	Dallas, Tex., Operating and Proposed	
Leussler, R. A., Instructing Employees		Louisville & Northern Railway & Light-		Interurban Lines	898
How to Avoid Accidents.....	917	ing Co.—		Easton & South Bethlehem Transit Co.	131
Lewis Motor & Crane Co.....	295	Dividends	419	Easton & Washington Traction Co.....	275
Lewiston, Me., Track and Roadway.....	385, 773	Rolling Stock	747	Electric Railways, Price Publishing Co.	389
Lewiston & Southeastern Electric Rail-		Track and Roadway.....	112, 144, 717	Interurban Territory Tributary to Terre	
way, Track and Roadway.....	144, 687	Louisville & Southern Indiana Traction		Haute	755
Lewiston Augusta & Waterville Street		Co., Track and Roadway.....	264, 687	Milwaukee Northern Railway.....	882
Railway	175	Louisville Railway—		New York Auburn & Lansing.....	36
Financial	267	Financial	146, 176	Niagara Lockport & Ontario Power Co.,	
Rolling Stock	350, 388, 971	Strike	262, 316, 801, 836, 872	Transmission Lines	74
Track and Roadway	745, 967	Louisville Traction Co.—		Pacific Electric Railway.....	245
Lexington & Frankfort Interurban Rail-		Dividends	388	Richmond & Chesapeake Bay Railway,	
way, Track and Roadway.....	385	Financial	970	Richmond-Ashland Division.....	666
Lexington & Interurban Railways Co.—		Love Brakeshoe Co., Armbrust Traction		Spokane & Inland Empire Railroad.....	977
Earnings	207, 321, 690, 775, 970	Brakeshoes	484	Marengo Harvard & Lake Geneva Elec-	
Financial	114	Loyal Railway, Track and Roadway....	745	tric Railway, Track and Roadway.....	235
Power Plant	718	Lubrication—		Marietta, O., Track and Roadway.....	52, 346
Lexington Traction Co., Track and Road-		Graphite, United States Graphite Co..	325	Marietta-Maclean Railway, Track and	
way	173	Graphited Wood Grease in Gear Cases.	807	Roadway	802
Lifting, Interpole Magnets.....	*390	Ludington Southern Railway, Track and		Marion & Logansport Traction Co., Track	
Lightning Arresters, Inspection of.....	†121	Roadway	205, 318	and Roadway	264, 874
Lima & Honeoye Electric Light & Rail-		Lumen Bearing Co.....	29, 660	Marion Bluffton & Eastern Traction Co.,	
road Co.—		Ideal Trolley Wheel.....	*120	Rolling Stock	321, 350
Power Plant	803	Lykens Valley Construction Co., Track		Marion-Bucyrus Railway & Light Co.—	
Track and Roadway	802	and Roadway	417	Car House	268
Lima & Toledo Traction Co.—				Rolling Stock	268
Concrete Bridge Near Waterville, O....	*988			Marquette, Mich., Track and Roadway	
Financial	207			.....	173, 265
Repair Shops and Offices.....	*100			Marquette City & Presque Isle Railway,	
Rolling Stock	115			Track and Roadway	290
Track and Roadway	205, 717, 802, 874			Marquette County Gas & Electric Co.—	
Lima Insulator Co.....	1001			Power Equipment	347
Lima Southern Railway, Incorporated				Rolling Stock	747, 806
716				Track and Roadway	745
Limited Service—				Marquette Negaunee & Ishpeming Inter-	
Ft. Wayne & Wabash Valley Traction				urban Railway—	
Co., Ft. Wayne to Lafayette.....	171			Incorporated	381
Michigan United Railways.....	905			Track and Roadway	417
Lincoln, Neb.—				Marshall, Mich., Track and Roadway....	717
Fares	413			Marshall, R. W., & Co.....	351, 776, 941
Track and Roadway	938, 938			Marshalltown, Ia., Track and Roadway..	838
Lincoln Traction Co., Dividends.....	27			Marshalltown Light Power & Railway	
Line Service Plant, Brooklyn Rapid				Co., Track and Roadway	745
Transit Co.	†392, *400			Maryland Electric Railway—	
Little Rock & Pine Bluff Traction Co.—				Dividends	970
Power House	266			Financial	970
Rolling Stock	268			Maryland Railway Supply Co.....	268
Track and Roadway.....	205, 264, 967			Spike Strut Rail Fastener.....	*475
Little Rock Railway & Electric Co.—				Marysville, Cal., Track and Roadway....	290
Dividends	55, 970, 1001			Massachusetts Chemical Co.....	420, 499
Rolling Stock	147, 176, 717			Massachusetts Electric Companies—	
Lockeford, Cal., Track and Roadway....	82			Annual Report	897
Locomotives—				Financial	805, 876
Electric—				Massillon & Northern Electric Railway,	
Illinois Traction System.....	*984			Track and Roadway	205
New York New Haven & Hartford				Massillon Wooster & Mansfield Traction	
Railroad	*189			Co., Incorporated	234
Pacific Electric Railway	*94			Mathias-Hart Co.....	691
Portland Railway Light & Power				Matthews, I. E.—	
Co.	*959			Engineering Convention—	
Switching, Bush Terminal Co.....	*846			Rail Corrugation	651
Versus Steam. By Max Toltz.....	380			Mattoon City Railway, Accident near	
Westinghouse	597, *777			Charleston, Ill.	†272, 284, †300
Steam and Electric, Comparison.....	*786				
Steam Versus Electric. By Max Toltz	380				

Mattoon Shelbyville Pana & Hillsboro Railroad, Track and Roadway.....	906, 967	Missouri Traction Co., Track and Roadway.....	417	National Civic Federation, Municipal Ownership Investigation.....	132
Meade, Norman G., Interpole Railway Motors.....	*989	Missouri Valley Traction Co.—		National Fire Protection Association and Its Work in the Street and Inter-urban Railway Field.....	553, 575, 590
Meadville Conneaut Lake & Linesville Electric Railway, Track and Roadway.....	906	Incorporated.....	686	National Lock Washer Co.....	617
Mechanical Devices, Accountants' Convention.....	612	Track and Roadway.....	715, 938	Cam Curtain Fixtures.....	617
Medina Batavia & Ontario Railway, Track and Roadway.....	290	Mitchell, S. D., Track and Roadway.....	82	Lock Washer.....	612
Memphis, Tenn.—		Mitsui & Co., Rolling Stock.....	909	Sash Lock.....	559
Incorporated.....	384	Mobile, Ala., Track and Roadway.....	82	Window Sash Balance.....	593
Track and Roadway.....	838	Mobile Light & Railroad Co., Power Plant.....	25	National Machine Tool Builders' Association.....	391
Memphis Car Manufacturing Co.....	176	Model Stoker Co.....	420	National Malleable Castings Co.....	208
Memphis Covington & Northern Railway—		Smokeless Furnace.....	*59	American Convention—	
Incorporated.....	716	Moline East Moline & Watertown Railway, Track and Roadway.....	772	Where Maintenance Ends and Depreciation Begins.....	617
Track and Roadway.....	803	Monorail System, Gyroscopic.....	277	Nernst Lamp Co., Receivership.....	741
Memphis Street Railway, Dividends.....	55, 119	Monterey Railway Light & Power Co.—		Newcastle, O., Track and Roadway.....	265
Mentzel, H. F., Shop Management.....	274	Rolling Stock.....	776	New Castle, Pa., Track and Roadway.....	938
Mercer, W. V., Track and Roadway.....	265	Track and Roadway.....	52	New Departure Manufacturing Co.....	593
Meridian, Miss., Track and Roadway.....	417	Montgomery & Chester Electric Railway, Track and Roadway.....	205	Bells and Liberty Trolley Harps.....	*631
Meridian Light & Railway Co.—		Montgomery County Rapid Transit Co., Track and Roadway.....	112	Liberty Cushion Harp.....	*483
Accident Risks and Costs Reduced.....	67	Montreal Street Railway—		Plant.....	*595
Financial.....	85	Annual Report.....	759, 785	Prize Cup.....	*592
Meridian Street Railway, Track and Roadway.....	385, 417	Dividends.....	85	New Jersey & Hudson River Railway & Ferry Co., Sand Rails.....	*241, 244
Mershon, Ralph D., Transmission Plant, Niagara Lockport & Ontario Power Co.....	*74	Earnings.....	238, 388, 841, 1001	New Jersey & Pennsylvania Traction Co., Track and Roadway.....	205, 291
Metropolitan Street Railway (Kansas City), Track and Roadway.....	82	Moore Fare Register Co.....	268	New Orleans, La., Track and Roadway.....	291, 772
Metropolitan Street Railway (New York)—		Morden Frog & Crossing Works.....	720	New Orleans City Railroad, Dividends.....	85
Financial.....	689, 747, 805	Morgan Engineering Co.....	177	New Orleans Railway & Light Co.—	
Receivership.....	397, 436, *879	Morris, W. L., Piping and Power Station Systems.....	*19, *46, *105, *136, *167, *199, *228, *259, *285, *314, *341, *381, *410, *443, *680, *711, *739, *767, *797, *830, *866, *899, *931, *963	Dividends.....	388
Metropolitan West Side Elevated Railway (Chicago)—		Morris County Traction Co., Track and Roadway.....	773	Earnings.....	267, 747
Cost of Maintenance.....	*329	Motor Cars—		Financial.....	294, 350, 970
Dividends.....	388	Gasoline—		Rolling Stock.....	176, 350
Financial.....	1000	Aurora De Kalb & Rockford Railroad.....	*298	Track and Roadway.....	205, 449
Funeral Car Service.....	*441	Christie.....	*89	Transfers.....	413, 801
Mexico Santa Fe & Perry Traction Co., Track and Roadway.....	773	Inspection.....	*749	New South Investment Co., Incorporated.....	317
Meyercord Co.....	269	Stover.....	*352, *845	Newspaper Tickets at Los Angeles.....	*921
Meyers, Fred J., Manufacturing Co., Fender.....	*453, 691	Union Pacific.....	263	New York, N. Y.—	
Miami, Fla., Flangeless Railway System.....	*930	Motors—		Accidents During August, 1907.....	357
Michigan United Railways—		1,200-Volt. By E. H. Anderson.....	*368	Electrical Show.....	315, 404
Car Houses.....	720	1,200-Volt. Central Electric Railway Association.....	362, *368	Metropolitan Street Railway Receivership.....	397, 436
Limited Service.....	905	Brushes, Care of.....	*92	Municipal Lighting Plant Abandoned.....	*1211
New Offices.....	771	Commuting-Pole. By E. H. Anderson.....	*368	Pay-As-You-Enter Cars.....	*62
Track and Roadway.....	82, 290, 773	Interpole.....	*989	Subway Franchise Tax.....	262
Milcontinent Traction Co.—		Tinning Commutator Segments.....	*1002	Subway Traffic, Bion J. Arnold's Suggestions for Facilitating.....	*880, 892
Incorporated.....	172	Mt. Desert Transit Co., Track and Roadway.....	82, 144, 773	Subways.....	233, 987
Track and Roadway.....	265, 291, 449	Mt. Hood Railway & Power Co., Track and Roadway.....	235, 318, 938	Traffic During 1906.....	*355
Middle Georgia Interurban Railway, Track and Roadway.....	82	Mt. Mansfield Electric Railroad, Financial.....	1000	Transportation Service, Commission Investigation.....	343, 382
Middleburg, Pa., Track and Roadway.....	112	Mt. Vernon, Ill., Track and Roadway.....	838	New York & Berkshire Street Railway, Track and Roadway.....	967
Milford & Uxbridge Street Railway, Rolling Stock.....	28, 86, 971	Mt. Vernon & Eastern Railroad, Incorporated.....	448	New York & North Shore Traction Co., Track and Roadway.....	24
Miller Anchor Co., Guy Anchors.....	*90	Multigraph Gammeter.....	477, 484, *544	New York & Queens County Railway—	
Millersburg, O., Track and Roadway.....	346	Municipal Ownership—		Car Houses.....	207
Millersburg & Eastern Railroad, Incorporated.....	743	Address by H. J. Gonden.....	670	Shops.....	207
Milroy Electric Co.—		A Failure at Seattle. By J. E. Glick.....	14	Track and Roadway.....	205
Trolley Base.....	*90	American Association Circular.....	244	New York & Stamford Railway, Track and Roadway.....	328
Trolley Retriever.....	179	American Convention.....	639, 654	New York Air Brake Co.....	56
Milner & North Side Electric Railway—		Great Britain.....	*943	New York Auburn & Lansing Railroad—	
Incorporated.....	80	Great Britain and in United States, William J. Clark, American Convention.....	610, 641	Description.....	*34
Track and Roadway.....	205, 747, 938	National Civic Federation Investigation.....	*32, 39, 70, *91, 98, 132	Financial.....	85, 237
Milwaukee & Fox River Valley Railway, Track and Roadway.....	687, 773, 998	New York City Abandons Electric Lighting Plant.....	*211	Track and Roadway.....	82
Milwaukee Electric Railway & Light Co.—		Municipal Traction Co., Cleveland, Report of Expert Accountants.....	766	New York Central & Hudson River Railroad—	
Car Houses.....	941	Munsell, Eugene, & Co.....	389	Electric Service.....	965
Dividends.....	85	Murphy, H. M. Prevost, Correct Percentage of Braking.....	*809, 825	Shops at Harmon in Electric Zone.....	*919
Financial.....	85	Murphysboro Electric Railway Light, Heat & Power Co., Incorporated.....	771, 837, 938	New York City Interborough Railway, Track and Roadway.....	235
Headway in Congested Districts.....	*664	Muscatine, Ia., Track and Roadway.....	687	New York City Railway—	
Hospital Car.....	*355	Muscatine Light & Traction Co., Financial.....	115	Car House, Destroyed by Fire.....	452
Reserves.....	340	Muskegon, Mich., Track and Roadway.....	205	Cars, Pay-As-You-Enter Type.....	*709
Rolling Stock.....	941	Muskogum Valley Traction Co., Track and Roadway.....	235	Commission Investigation.....	800
Service Investigation.....	*63, 68, 793	Muskogee Electric Traction Co., Track and Roadway.....	112	Financial.....	85, 343, 800, 876, 908, 940, 970
Track and Roadway.....	82, 318, 967	Napa & Lakeport Railway, Incorporated.....	686	Improvements Authorized.....	710
Wisconsin Commission Decision.....	193	Nashua Street Railway, Financial.....	805	Office Building and Car House.....	909
Milwaukee Light Heat & Traction Co., Track and Roadway.....	24	Nashville, Tenn., Track and Roadway.....	173	Receivership.....	*256, 378, 397, 436, *879
Milwaukee Northern Railway—		Nashville & Columbia Interurban Railway, Track and Roadway.....	688	Rolling Stock.....	238, 720
Branch Routes and Schedules.....	*880	Nashville Bridge Co.....	748	Track and Roadway.....	52
Description.....	*882	Nashville Interurban Railway—		New York New Haven & Hartford Railroad—	
Financial.....	320	Construction Work.....	958	Annual Report.....	696
Gas Engines.....	*883	Track and Roadway.....	257, 318	Electric Railway Earnings.....	*693
Rolling Stock.....	350, 420	Nashville Railway & Light Co.—		Electrically Operated Lines.....	139, 440
Ticket Methods.....	*915	Accident Risks and Costs Reduced.....	68	Electrification. By E. H. McHenry.....	*188
Track and Roadway.....	82, 205, 745, 838	Rolling Stock.....	1001	Electrification, Boston Suburban Lines.....	152
Milwaukee Western Electric Co., Track and Roadway.....	265	Transfer Station.....	350	Financial.....	55, 320, 775
Mineral Wells, Tex., Track and Roadway.....	205	Nassau Railroad, Financial.....	176	Power Plant.....	266
Minneapolis, Minn., Twin City Rapid Transit Co., Operating Expenses.....	*301	National Brake Co.—		New York Public Service Commission. See Commissions, Railroad.	
Minneapolis Kansas City & Gulf Electric Railway.....	*273	Benjamin Steel Tie.....	*421	New York Public Utilities Commission. See Commissions, Railroad.	
Incorporated.....	172	National Brake & Electric Co.....	148, 350, 389, 540	New York Westchester & Boston Railway, Track and Roadway.....	112, 318
Track and Roadway.....	291	Alternating Current-Direct Current Air Brake Apparatus.....	*149	Newton & Boston Street Railway Fares Increased.....	974
Minneapolis Rochester & Dubuque Traction Co., Track and Roadway.....	144, 265, 291	National Carbon Co.....	628	Newton Street Railway, Rolling Stock.....	1001
Minneapolis St. Paul Rochester & Dubuque Electric Traction Co.—				Newtown (Pa.) Electric Street Railway, Financial.....	146, 876
Incorporated.....	416			Niagara Forged Steel Co.....	129
Track and Roadway.....	687, 874			Niagara Lockport & Ontario Power Co., Transmission Plant.....	*74
Mississippi Valley Electric Railway, Track and Roadway.....	21, 173, 318			Niagara St. Catharines & Toronto Railway, Track and Roadway.....	318, 417, 998
Missoula Mont., Track and Roadway.....	385			Nicholl, Franklin M., Trucks for Electric Motor Service.....	670
Missouri Tennessee & Georgia Railroad, Track and Roadway.....	24			Nicholl, T. J.—	
				Cars for City Service.....	60

Pay-As-You-Enter Cars	976	Oil Pumping Equipment, Maspeth Car House and Shops, Brooklyn Rapid Transit Co.	*895	Pacific Electric Railway—	
Niles-Bement-Pond Co.	389	Okanogan Electric Railway, Track and Roadway	773	Bridges and Culverts	*674
Niles Car & Manufacturing Co.	477, 499, 513, 577, 627, 629, 662	Oklahoma Central Interurban Railway Telephone Telegraph Light & Power Co., Incorporated	385	Description	*245
Cars, Ft. Dodge Des Moines & Southern Railroad	*424	Oklahoma City, Okla., Track and Roadway	82	Drafting Room Methods	*223
Orders	28, 115, 176, 207, 776	Oklahoma City & Southwestern Traction Co., Incorporated	771	Finding Lost Articles	*182
Nipissing Central Electric Railway, Track and Roadway	998	Oklahoma City Railway—		Freight and Miscellaneous Equipment	*94
Norfolk & Portsmouth Traction Co., Earnings	207, 321, 690, 775, 970	Financial	747	Newspaper Tickets	*921
Norfolk Railway & Light Co., Dividends ..	876	Power Plant	174, 266, 292	Passenger Equipment	*684
Norris, H. H.—		Rolling Stock	268	Station	321, 388
American Convention—		Track and Roadway	773	Ticket Methods	*812
Technically Trained Railway Men	561, 576, 590, *600	Oklahoma Electric Terminal Co., Incorporated	416	Track and Roadway	113, 144, 773, 839, 968
North Alabama Traction Co., Track and Roadway	318, 449	Old Colony Street Railway—		Pacific Light & Power Co., Power Plant at Redondo	*729
North American Co., Financial	805, 1000	Car Houses	207, 238	Pacific Traction Co.—	
North Midland Railway, Track and Roadway	998	Financial	267	Car House	55
North Shore Electric Co.	56	Rolling Stock	176	Financial	350
Northampton Street Railway, Dividends ..	27	Olds, E. W.—		Incorporated	142
Northern & Southern Railway, Incorporated ..	172	Engineering Convention—		Track and Roadway	52, 291
Northern Construction Co., Incorporated ..	51	Control Apparatus	526	Packing, Journal, Steel-Wool	177
Northern Electric Co.—		Maintenance and Inspection of Electrical Equipment	542	Paducah Southern Railroad, Track and Roadway	291, 968
Freight and Passenger Station	720	Rail Corrugation	651	Paducah Traction Co.—	
Rolling Stock	294	Olney, Ill., Track and Roadway	745	Track and Roadway	82
Substation	718	Olympian Springs, Ky., Track and Roadway ..	52	Trail Car Operation	*221
Northern Electric Railway—		Omaha & Council Bluffs Street Railway—		Paint—	
Incorporated	384	Accidents, Prevention of	*879	Electric Railway Use	501
Record Blanks for Rolling Stock	*923	Car, Historical	*165	Graphite, United States Graphite Co.	422, 878
Rolling Stock	238	Car Houses	207	Painting, Cars, Steel Passenger	677
Track and Roadway	52, 144, 173, 205	Dividends	419	Pantasote Co.	239, 541, 630
Northern Electric Street Railway—		Substation	386	Pardee, J. H.—	
Rolling Stock	268, 388	Track and Roadway	173, 874	American Convention—	
Track and Roadway	265	Omaha & Nebraska Central Railway, Track and Roadway	419	Freight Handling	603
Northern Electrical Manufacturing Co., ..	721	Omaha Lincoln & Beatrice Railway, Track and Roadway	25, 113	Paris, Tex., Track and Roadway	291
Northern Engineering Works	56	Oneida, N. Y., Track and Roadway	113	Parker, George W.—	
147, 177, 238, 389, 690, 748, 806, 842, 909		Oneida Railway, Track and Roadway	318	American Convention—	
Northern Ohio Traction & Light Co.—		Oneonta & Mohawk Valley Railroad, Track and Roadway	113	Freight Handling	604
Dividends	321, 1001	Ontario & West Shore Railroad, Track and Roadway	938	Parker, Lee H., Economies in Railway Construction	827
Earnings	267, 419, 719, 876, 1001	Ontario Interurban Railway, Track and Roadway	938	Parker Boiler Co.	322
Financial	320	Operating Expenses—		Parkersburg Marietta & Interurban Railway, Track and Roadway	25
Rolling Stock	28	Classifications of	*292	Parks—	
Track and Roadway	112, 173, 338	Tentative Classifications	956	Accounting	525
Northern Texas Electric Co., Dividends ..	267	Operation—		American Convention	*559, 615
Northern Texas Traction Co.—		Analysis of Cost and Methods of Electric Railway Maintenance. By A. Herriek	*819	Ft. Wayne & Wabash Valley Traction Co., Robinson Park	927
Power Plant	292, 418, 339	At High Voltage	*848, *852	Interurban Railway of Des Moines	79
Track and Roadway	82, 144	At Low Frequency	*943	Parkside, Cal., Track and Roadway	773
Northern Traction Co., Track and Roadway ..	235	Car-Mile Earnings and Expenses, New York State Roads	*810, 815	Parlor Car Service, Spokane & Inland Empire Railroad	*977
Northwestern Elevated Railroad (Chicago)—		Electrical Apparatus	310	Pasadena, Cal., Track and Roadway	874
Employment of Trainmen	*981	Examination into Results on Chicago Elevated Loop	*753, *760	Pascagoula, Miss., Track and Roadway ..	205
Operating Expenses	*780	Headway in Congested Districts	*664	Passes, Birmingham Railway Light & Power Co.	262
Rolling Stock	55, 147, 294	Interurban Line, Relation to the Steam Road. By T. Jay Tomlinson	929	Paving, Bitulithic, Warren Brothers Co.	*324, 632, 635, 843
Track and Roadway	24, 291, 874	Owl Car Service	*724	Pawcatuck Valley Street Railway, Financial	176
Wilson Avenue Terminus	*220	Owl Car Service, Des Moines	936	Pawling & Harnischfeger	208
Northwestern Interurban Railway—		Pay-As-You-Enter Cars	*693, *694, *709, *779, *859, *916, *942, 965, 976, 996	Pay-As-You-Enter Car Co.	*859, 877
Incorporated	289, 743	Promoting Purchase of Tickets	*915	Pay-As-You-Enter Cars	*693, *694, *779, 818, *859, *916, *942, 976
Track and Roadway	205, 318, 417, 688	Shorter Stops	*880	Instructions to Trainmen	*779, 795
Northwestern Pacific Railroad—		Signals for Following Section	*212	Jersey City, N. J.	965
Power Plant	386	Signs at Danger Points	*915	New York City Railway	*709
Rolling Stock	971	Small Roads, Management of, American Convention	*648, *694	Peck, E. F.—	
Substation	875	Stopping Points	1300	American Convention—	
Norton Car & Foundry Co.	806	Through Routes in Chicago	785	Freight Handling	603
Norton Grinding Co.	147	Trail Car, Paducah Traction Co.	*221	Peekskill Lighting & Railroad Co., Dividends	55
Norwalk, O., Track and Roadway	265, 838	Transfer Privileges, Temporary Extensions	*849	Pekin Peoria & Bloomington Interurban Railway, Track and Roadway	906
Norwich Colchester & Hartford Traction Co., Track and Roadway	346	Oquawka, Ill., Track and Roadway	346	Peninsula Railway—	
Nuttall, R. D., Co.	660	Oregon, Ill., Track and Roadway	745	Rolling Stock	294
		Oregon Electric Railway—		Track and Roadway	52, 173
		Station	86	Peninsular Railway, Track and Roadway ..	205
		Track and Roadway	113, 205, 385, 417, 449, 839, 874, 938	Penn & Franklin Street Railway, Track and Roadway	998
		Oregon Interurban Railway, Incorporated ..	801	Pennsylvania Railroad—	
		Track and Roadway	874	Test Locomotives	*283
		Organization, Centralized Repair Forces ..	*392	Tests of Lateral Rail Pressures	830
		Orlando, Fla., Track and Roadway	717	Pennsylvania Steel Co.	477, 503, 552, 577, 628
		Orrville Doylestown & Barborton Electric Railway, Track and Roadway	839	Pensacola Electric Co., Dividends	876
		Oshkosh, Wis., Track and Roadway	82	People's Street Railway, Rolling Stock ..	842, 941
		Oskaloosa Traction & Light Co., Power Plant	266, 319	Peoria Railway, Accident Risks and Costs ..	67
		Oswego Traction Co., Track and Roadway ..	82	Peoria Streator & Ottawa Railway, Track and Roadway	52
		Otselle Trolley Railroad, Track and Roadway ..	173	Pension Funds. By William R. Bowker ..	134
		Ottawa Car Co., Orders	842, 877	Peru, Ind., Track and Roadway	938
		Overhead Work—		Petaluma & Santa Rosa Railway—	
		Catenary Construction, New Method	*179	Accident Risks and Costs Reduced	68
		Cost for Maintenance	*751	Track and Roadway	144, 773
		Erie Railroad, Rochester Division	*430	Phase-Changing Station, Spokane & Inland Empire Railroad	*695, *697
		Feeders, Determining Size. By Henry Docker Jackson	*194	Philadelphia & Easton Electric Railway—	
		For Single-Phase. By G. D. Nicoll	*366	Financial	207
		Locating Grounds	*781	Power for	195
		Maintenance Cost, Reducing	*426	Philadelphia & Westchester Traction Co.	82, 688
		New York New Haven & Hartford Railroad	*188	Philadelphia & Western Railroad, Financial	940
		Tester for Trolley Wire Supports	166	Philadelphia City Passenger Railway, Dividends	55
		Owensboro Railway Chemical Spraying Co.	56	Philadelphia Co. (Pittsburg, Pa.), Dividends	27
		Owingsville, Ky., Track and Roadway	688	Philadelphia Delaware & Montgomery Railroad, Track and Roadway	717
				Philadelphia Rapid Transit Co.—	
				Ambulance Chasers	*327, 446
				Annual Report	330
				Committees of Directors	382
				Fare Controversy	*299

Financial.....	116, 176, 320, 1000
50-Year Franchise.....	18, 131, 1212, 344, 414
Rolling Stock.....	207, 238, 909, 941
Strike Threatened.....	995
Track and Roadway.....	25, 113, 144, 174, 205, 968, 998
Transfers.....	743
Wage Increase Demanded.....	872
Philadelphia Subway Terminal Railway, Incorporated.....	448
Phillipsburg, N. J., Track and Roadway.....	318
Pierce, J., Electric Railway Situation of Today.....	408
Pine Bluff, Ark., Track and Roadway.....	113, 205
Pinions, Devices for Starting.....	*828
Pipe Covering, "Electroless," Johns-Manville Co.....	*296
Piping, Jefferson Unions.....	*972
Piping and Power Station Systems, By W. L. Morris.....	*19, *46, *105, *136, *167, *199, *228, *259, *285, *314, *341, *381, *410, *443, *680, *711, *739, *767, *797, *830, *866, *899, *931, *963
Pittsburg, Pa., Bridge Case.....	71
Pittsburg & Allegheny Valley Railway, Financial.....	115
Pittsburg & Butler Street Railway—Express Company Contracts.....	684
Express Service.....	232
Rolling Stock.....	268, 321
Station.....	28
Track and Roadway.....	25
Trade Mark.....	*70
Pittsburg & Westmoreland Railway—Description.....	*829
Track and Roadway.....	205, 745
Pittsburg Art Glass & Mosaic Decorating Co.....	420
Pittsburg Automatic Vise & Tool Co.....	239, 410, 691
Pittsburg Harmony Butler & New Castle Street Railway, Power Plant.....	999
Pittsburg McKeesport & Greensburg Railway, Financial.....	115
Pittsburg McKeesport & Westmoreland Street Railway, Track and Roadway.....	113
Pittsburg Pole & Forge Co.....	500, 660, 941
Pittsburg Railway & Light Co., Financial.....	85
Pittsburg Railways Co.—Contests Fare Reduction.....	996
Rolling Stock.....	115, 147
Track and Roadway.....	319, 803
Pittsburg Subway Co.....	799
Plomo Specialty Manufacturing Co.....	447, 499, 540
Poles—Concrete.....	329
Southeastern Missouri Cypress Co.....	*89
Polk, H. H., American Convention—Freight Service.....	603, 604, 624
Port Arthur, Tex., Track and Roadway.....	291
Port Arthur Electric Street Railway, Power Plant.....	968
Porter Tool & Supply Co.....	239
Portland & Northern Railroad, Track and Roadway.....	113
Portland Eugene & Eastern Railway, Incorporated.....	937
Portland Gray & Lewiston Railroad—Incorporated.....	142
Track and Roadway.....	205
Portland Railway Light & Power Co.—Club House.....	818
Dividends.....	321, 940
Electric Locomotives.....	*959
Rolling Stock.....	147, 176, 776
Stations.....	877
Track and Roadway.....	144, 773, 803
Post, E. L. & Co.....	594
Posts, Concrete, Cost of.....	679
Pottstown & Northern Street Railway, Track and Roadway.....	144
Pottsville, Pa., Track and Roadway.....	235
Pottsville Union Traction Co., Six-for-a-Quarter Tickets Discontinued.....	872
Poughkeepsie City & Wappingers Falls Electric Railroad, Car House at Poughkeepsie.....	*308
Power—Reducing Demand in Emergency.....	*122
Sale and Measurement, By S. B. Storer.....	17
Power Improvement Co.....	28
Power Plants—Automatic Devices.....	*1357
Automatic Water Gauge.....	*942
Boiler and Furnace Design.....	*983
Boiler Feedwater Tanks, Auburn & Syracuse Electric Railway.....	*77
Boston Elevated Railway.....	793
Choice of Prime Movers.....	*181
Connecticut Co., Meriden-Middletown Line.....	*921
Design of American Convention.....	*571
Fire Protection, By W. G. Asmus.....	*185
Generating Units, Capacity.....	*462
Keeping Circuit-Breaker Records.....	*1721
Laconia Street Railway.....	*41
Mechanical Draft Apparatus, Green.....	*551
New Energy Diagram for Steam.....	*671
New York New Haven & Hartford Railroad at Cos Cob.....	*190
Ocean Shore Railway.....	*126
Pacific Light & Power Co. at Redondo.....	*729

Report Blank, New Form.....	*761
Turbines, Horizontal Steam, Engineering Convention.....	*579
Windsor Essex & Lake Shore Rapid Railway.....	*947
Power Specialty Co.....	208
Power Station and Piping Systems, By W. L. Morris.....	*19, *46, *105, *136, *167, *199, *228, *259, *285, *314, *341, *381, *410, *443, *680, *711, *739, *767, *797, *830, *866, *899, *931, *963
Power System, Cologne-Bonn.....	*198
Power System, Trials of Operating Man, By M. A. Sammett.....	310
Pratt & Lambert.....	660
Presidio & Ferries Railroad, Track and Roadway.....	291
Pressed Steel Car Co.....	541, 748, 776
Orders.....	207, 238
Preston Car & Coach Co.....	776
Priest, E. D., Engineering Convention—Standardization.....	528
Priest Rapids Railway, Incorporated.....	111
Princeton Power Co., Incorporated.....	234
Pryor, Frank J., Amusement Park Accounting.....	525
Public Relations.....	1455, 1973
American Convention.....	640, 701
Public Service Commission of New York, Work of.....	45
Public Service Corporation, Wisconsin Railroad Commission Decision.....	*848
Public Service Corporation of New Jersey—Dividends.....	27, 419
Financial.....	27, 85, 146
Public Service Street Railway, Financial.....	237
Public Utilities Commission of New York, See Also Commissions, Railroad.	
Public Utilities Commission of New York.....	11
Publicity—Advertising from Standpoint of the Street Railway Company, By A. W. Warnock.....	621
Department of, J. Harvey White, American Convention.....	620
Pueblo, Colo., Track and Roadway.....	265, 319, 803, 874
Pueblo & Arkansas Valley Electric Railway—Incorporated.....	966
Track and Roadway.....	998
Puget Sound Electric Railway—Cars.....	*733
Dividends.....	1001
Earnings.....	238, 388
Puget Sound International Railway, Financial.....	294
Pullman Lacrosse & Columbia River Railroad, Track and Roadway.....	319, 939
Pumps, Centrifugal and Turbine.....	*778
Quebec Railway Light & Power Co., Financial.....	237, 908
Queen & Co.....	29
Question Box, Claim Agents' Association.....	531
Question Box Ideals.....	*154
Quincy, Cal., Track and Roadway.....	968
Quincy, Ill., Track and Roadway.....	25
Quincy Interurban Railway, Incorporated.....	24
Quitman & Blue Springs Street Railway, Incorporated.....	172
Quitman Valdosta & Thomasville Electric Railway & Power Co., Track and Roadway.....	205, 236, 385
Rail, Guard, for Chicago.....	*796
Rail and Rail Matters, Engineering Convention.....	528
Rail Bonds, All-Wire, Ohio Brass Co.....	536
Rail Joint Co.....	541, 660, 909, 971
Rail Pressures, Lateral, Pennsylvania Railroad Tests.....	830
Rail Sections, American Railway Association.....	742
Railroad Grade Crossings, Protection of Cars.....	*1554
Rails—And Joints, American Convention.....	524, 528
Corrugation of.....	*811, *975
By A. L. C. Fell.....	707
By C. B. Voynow.....	754
Engineering Convention.....	528, 535, 650
Standardization—Engineering Association Committee, Cleveland Meeting.....	*153, *160
Engineering Convention.....	*537
T-Rail, G. Gordon Reel, American Convention.....	610, *645
T-Rail in Cities, By H. L. Weber.....	*850
Railway Chemical Sprayer Co.....	89
Rolling Stock.....	117
Railway Equipment Co.....	720
Railway Paint Co.....	295

Railway Steel-Spring Co.....	56, 268, 351, 842
Railways, Flangeless System.....	*930
Raleigh Electric Co.—Rolling Stock.....	350
Track and Roadway.....	265, 347, 939
Ralston, C. A., Second-Hand Railway Equipment.....	420
Ransome Concrete Co. of California.....	909
Rapid Transit Interurban Co., Incorporated.....	801
Rates, Freight and Express, By Frank Walsh.....	372, 375, 1393
Rates, Freight and Passenger.....	1637
Reading Traction Co., Dividends.....	1001
Raymond Concrete Pile Co.....	720, 842
Reagan, H. C., High-Tension Wire Entrance.....	*193
Reagan Grate Bar Co.....	295
Receiverships—Metropolitan Street Railway of New York.....	397, 436, *879
New York City Railway.....	1356, 378, 397, 436, *879
Westinghouse Concerns.....	*1723, 741
Recording Fare Register Co.....	594
Self-Lubricating Trolley Wheel.....	*878
Records, Rolling Stock Blanks.....	*923
Red Bud Interurban Railroad, Track and Roadway.....	939
Red Lodge, Mont., Track and Roadway.....	319
Red River Railway, Incorporated.....	772
Redlands & Oak Glen Electric Railway, Track and Roadway.....	347
Redlands & Yucaipa Electric Railway—Rolling Stock.....	207, 321
Track and Roadway.....	25, 265
Redlands Central Railway—Car House.....	238, 321
Track and Roadway.....	113, 265, 417
Redondo, Cal.—Pacific Light & Power Co., Power Plant.....	*729
Track and Roadway.....	82
Reed, W. Boardman, Engineering Convention—Electric Railway Tracks, Care of.....	527
Rail Corrugation.....	651
Reel, C. Gordon, American Convention, T-Rail.....	640, *645
Reese Continuous Rail Co.....	56
Registers, Fare, Rooke Automatic.....	*88
Rendle, Arthur E., Skylights.....	806
Reno Power Light & Water Co., Track and Roadway.....	839, 874
Rhode Island Co.—Car House.....	55, 238, 268
Power Plant.....	745
Rolling Stock.....	55
Richards, J. L., Desirability of Increasing Fares.....	928
Richey, A. S., American Convention—Technically Trained Railway Men.....	562
Richmond & Chesapeake Bay Railway—Concrete Elevated Structures.....	*664, *666
Description.....	*666
Richmond & Tottenville Railway, Track and Roadway.....	417, 839
Richmond Traction Co., Substation.....	745
Ridgway Dynamo & Engine Co.....	420, 500
Engines and Generators.....	*607
Riverhead, L. I., Track and Roadway.....	113
Riverside, Cal., Track and Roadway.....	773
Roadway, See Track and Roadway.	
Roberts, E. P., Rolling Stock for Washington Baltimore & Annapolis Electric Railway.....	*438
Roberts, William, Engineering Convention—Control Apparatus.....	526
Maintenance and Inspection of Electrical Equipment.....	542
Robertson, W., & Co., Steel-Wool Journal Packing.....	177
Robins Conveying Belt Co.....	322
Rochester, N. H., Track and Roadway.....	113
Rochester & Eastern Rapid Railway, Financial.....	321
Rochester Corning & Elmira Traction Co., Track and Roadway.....	265, 291, 386, 874
Rochester Railway—Claims, Fraudulent.....	*442
Dividends.....	267, 419, 876
Financial.....	321
Track and Roadway.....	113
Rochester Railway & Light Co.—Dividends.....	267
Substations.....	174
Rochester Scottsville & Caledonia Electric Railroad—Financial.....	176
Track and Roadway.....	839, 906
Rochester Syracuse & Eastern Railroad—Earnings.....	908
Rolling Stock.....	28, 55
Track and Roadway.....	717, 998
Rockford & Interurban Railway—Dividends.....	37, 419
Passenger Stations.....	116
Track and Roadway.....	113
Rockwood & Bakersfield Railway, Track and Roadway.....	773
Rocky Ford, Colo., Track and Roadway.....	174
Rogers Southwestern Railway, Track and Roadway.....	417
Rolling Stock—Maintenance and Inspection, Engineering Convention.....	1463, 189

Record Blanks, Northern Electric Railway.....	*923
Rome, N. Y., Track and Roadway.....	52
Roofs, Concrete, Truss Reinforcement.....	*270
Rooke Automatic Register Co.....	500
Register and Fare Collector.....	*88
Rosenberger, J. L., Recent Electric Railway Decisions.....	
20, 47, 106, 138, 168, 201, 230, 260, 411, 445, 681, 713, 741, 833, 869, 902, 933, 993	
Rostand Manufacturing Co.....	116
Rotary Converter, Vertical.....	*962
Route Indication by Colors.....	*425
Routes, Branch, Arrangement of Schedules.....	*880
Ruddick, John J., Automatic Electric Signals.....	*117
Russell Car & Snow Plow Co.....	631, 877
Snow Plows for Heavy Service.....	475
Russellville, Ark., Track and Roadway.....	347
Russellville & Ozark Mountain Traction Light & Power Co.—	
Incorporated.....	172
Track and Roadway.....	236
Rutland Railway Light & Power Co., Financial.....	85
Ryder, M. T.,—	
Engineering Convention—	
Electric Railway Tracks, Care of.....	527
Ryerson, Joseph T., & Son.....	776, 941
Continental Boiler.....	*633
Key-Seating Machine.....	*503
S	
Sacramento & Lake Tahoe Railway, Track and Roadway.....	291
Sacramento Electric Gas & Railway Co., Track and Roadway.....	32, 688
Saiga & Co.....	690
St. Clair Tunnel Co., Rolling Stock.....	452
St. Johns Light & Power Co., Track and Roadway.....	25, 82, 113, 319
St. Joseph & Nodaway Valley Railway, Track and Roadway.....	144
St. Joseph Excelsior Springs & Lexington Railway—	
Incorporated.....	289
Track and Roadway.....	347, 839
St. Joseph Railway Light Heat & Power Co.—	
Dividends.....	388, 1001
Track and Roadway.....	347, 968
St. Joseph Valley Railway, Track and Roadway.....	874
St. Louis, Mo.—	
Development of Electric Transportation Service, By B. R. Stephens.....	960
Track and Roadway.....	418
St. Louis & Staunton Railway, Incorporated.....	772
St. Louis & Toledo Interurban Railway, Track and Roadway.....	688
St. Louis Car Co.....	239, 499
Orders.....	55, 86, 115, 147, 207, 238, 268, 294, 321, 388, 690, 747, 941, 971
St. Louis Electrical Terminal Railway, Track and Roadway.....	839
St. Louis Lakewood & Grant Park Railway, Track and Roadway.....	291
St. Louis Montesano & Southern Railway—	
Rolling Stock.....	147
Track and Roadway.....	688
St. Louis Mountain Grove & Southern Railway, Incorporated.....	51
St. Louis Surfacter & Paint Co., Paint for Electric Railways.....	501
St. Louis Terre Haute & Quincy Traction Co.—	
Financial.....	940
Track and Roadway.....	82, 205, 773, 968
St. Paul, Minn.—	
Selby Hill Tunnel, Twin City Rapid Transit Co.....	192, *358
St. Tammany & New Orleans Railroad, Track and Roadway.....	839, 939
St. Vital, Minn., Track and Roadway.....	874
Salina Street & Interurban Railway, Track and Roadway.....	968
Salisbury, N. C., Track and Roadway.....	83
Salt Lake & Ogden Railway, Track and Roadway.....	144
Sammett, M. A., Trials of the Operating Man.....	310
Samson Cordage Works.....	199, 511, 593, 594, 628
Samson Steel Underframe Co.....	691
San Angelo, Tex., Track and Roadway.....	291
San Antonio Traction Co., Substation, Track and Roadway.....	803, 205, 236, 688
Wages Advanced.....	771
San Bernardino Valley Interurban Railroad, Track and Roadway.....	998
San Bernardino Valley Traction Co., Track and Roadway.....	174
San Diego & Arizona Railroad, Track and Roadway.....	347
San Diego Electric Railway, Track and Roadway.....	347, 773
San Francisco, Cal.—	
Bribery Case.....	414, 447, 904
Track and Roadway.....	968
United Railroads—	
Strike.....	*183, *211
Track Construction, Recording Progress.....	*164
San Francisco Oakland & San Jose Railway, Fuel Oil Burner for Heating Tires.....	*736
San Francisco Vallejo & Napa Valley Railway, Track and Roadway.....	265
Sand Blast, Use by Electric Railways, By J. M. Betton.....	*422
Sand Box, Large Capacity.....	*981
Sangamon Valley Railway—	
Rolling Stock.....	971
Track and Roadway.....	52, 236, 839, 906, 968
San Joaquin Valley Western Railroad, Track and Roadway.....	291
San Jose & Santa Clara County Railroad, Rolling Stock.....	86
Sapulpa, Okla., Track and Roadway.....	83, 347
Sapulpa Interurban Railway, Track and Roadway.....	839
Saratoga, Wyo., Track and Roadway.....	717
Sargent, F. W., M. C. B. Brakeshoe Committee Report, 1907.....	163
Sargent Fender Co.....	147
Sarnia Street Railway, Track and Roadway.....	688
Savannah Electric Co.—	
Dividends.....	294
Rolling Stock.....	115
Track and Roadway.....	774
Schedules, Branch Routes.....	*880
Schenectady Railroad, Wages Increased.....	23
Schmidt, H. F.—	
Hints on Shop Management.....	129, 219, 274
New Energy Diagram for Steam.....	*671
Schoen Steel Wheel Co.....	629, 842, 877
Schoenen, R. H.—	
Claim Agents' Convention—	
Policy of the Claim Department to the Injured Employee.....	532
Schoepf Syndicate, Cincinnati, O., Interurban Station.....	86
Schreiber, A. M.—	
Engineering Convention—	
Electric Railway Tracks, Care of.....	527
Schuykill Railway, Financial.....	350
Schuykill Valley Traction Co., Track and Roadway.....	144
Scioto Valley Electric Co., Ohio Commission Decision Reversed.....	135
Scioto Valley Traction Co.—	
Dividends.....	27
Financial.....	146
Scranton, Miss., Track and Roadway.....	144
Scranton (Pa.) Railway, Track and Roadway.....	174
Seashore Municipal Railway, Hempstead, N. Y., Track and Roadway.....	52
Seattle, Wash., Municipal Ownership a Failure at West Seattle, By J. E. Glick.....	14
Seattle & Tacoma Short Line, Track and Roadway.....	265, 717, 773, 803
Seattle Electric Co.—	
Dividends.....	294
Financial.....	115
Rolling Stock.....	115, 452, 776
Seattle—Everett Interurban Railway, Track and Roadway.....	265, 939
Seattle Renton & Southern Railway, Financial.....	237
Seattle-Tacoma Short Line, Incorporated, Second-Hand Machinery Co.....	686, 351
Securities—	
Chicago Railways Co.....	22, 49, 161, 71, 109, 140, 161, 167, 231, 249, 299, 312, 413, 447, 683, 714, 770, 815, 934
Security Investment Co.....	721
Security Register & Manufacturing Co.....	473
Roth Screw Jacks.....	*30, *476
Sellers Manufacturing Co., Tieplate.....	*595
Selma, Ala., Track and Roadway.....	839
Selma Street & Suburban Railway, Track and Roadway.....	144, 319
Sergeant, C. S.—	
American Convention—	
Technically Trained Railway Men.....	562
Engineering Convention—	
Standardization.....	528
Service—	
Illinois Traction System.....	965
Milwaukee Electric Investigation.....	*63, 68, 193
Owl Car.....	*724, 936
Sharon, Pa., Track and Roadway.....	418
Sharpsburg, Ky., Track and Roadway.....	144
Sheboygan Light Power & Railway Co., Power Station Report Blank.....	*761
Sheffield Co., Track and Roadway.....	25
Sheffield Electric Co., Track and Roadway.....	688
Sherwin-Williams Co.....	177, 660
Bulletin on Financial Conditions.....	992
Convention.....	*750
Shop Management, By H. F. Schmidt.....	129, 219, 274
Shop Practice—	
Armature Oven, Oakland Traction Co.....	*334
Commutator Press.....	*227
Drafting Room Methods, Pacific Electric Railway.....	*223
Electrical Testing Device, Chicago Union Traction Co.....	*104
Exchange of Ideas.....	*1
Fuel Oil Burner for Heating Tires.....	*736
Labor-Saving Tools.....	*133
Los Angeles Railway.....	*4
Oil Furnace, Oakland Traction Co.....	*282
Screw Devices for Starting Pinions and Straightening Armature Shafts.....	*828
Selecting Motormen from Shops.....	*243, 244
Standardization.....	*1
Two-Man Car Inspection.....	*427
Wire Cleaning and Retaping Device.....	*824
Shops—	
Bangor Railway & Electric Co.....	*154
Brooklyn Rapid Transit Co., Maspeth.....	*894
Centralization.....	*392
Concrete, Twin City Rapid Transit Co.....	*456, *465
Illinois Traction System at Decatur.....	*13
New York Central & Hudson River Railroad at Harmon in Electric Zone.....	*919
Repair, Lima & Toledo Traction Co.....	*100
Repair Pits.....	*663
Spokane & Inland Empire Railroad at Spokane.....	*891
Shore Line Electric Railway, Track and Roadway.....	291, 347, 774
Shovels, Steam, Browning Ditcher.....	*506
Shreveport, La., Track and Roadway.....	774
Signals—	
Automatic, U. S. Electric Signal Co.....	*117
Car, Lintern.....	*354, *662
Destination.....	*425
For Following Section, Atlantic Shore Line Railway.....	*212, *214
Signs at Danger Points.....	*915
Starting.....	*241
Telegraph Signal System.....	*843
Signals, Block—	
Compulsory in Indiana.....	240
Interstate Commerce Commission Block Signal and Train Control Board.....	89
Signs, Destination.....	871
Silver City, N. M., Track and Roadway.....	386
Simmons, F. G.—	
Engineering Convention—	
Electric Railway Tracks, Care of.....	527
Rail Corrugation.....	651
Single Phase—	
Choice of Frequency.....	*943
Windsor Essex & Lake Shore Rapid Railway.....	*944, *946
Single-Phase Current, Storage Battery with.....	*695, *697
Sioux City Traction Co.—	
Power Plant.....	968
Rolling Stock.....	388
Track and Roadway.....	83
Sioux Falls, S. D., Track and Roadway.....	144
Smith, F. E.—	
Accountants' Convention—	
Mechanical Devices and Other Office Appliances.....	612
Smith, L. L.—	
Engineering Convention—	
Maintenance and Inspection of Electrical Equipment.....	542
Smith, W. N., Electrification, Rochester Division, Erie Railroad.....	*428
Smyrna Kent County & Delaware Bay Traction Co.—	
Power Plant.....	875
Track and Roadway.....	874
Snohomish Valley Railway—	
Office Burned.....	203
Track and Roadway.....	291
Snow-Plows, Russell.....	475
Socialism, Italian.....	*131
Sonoma & Lake County Electric Railway, Track and Roadway.....	265, 291, 874
Sonora Line Belt Railroad, Incorporated.....	24
South Bethlehem & Saucon Street Railway, Track and Roadway.....	968
South Carolina Public Service Corporation, Track and Roadway.....	25
South Lorain & Eastern Traction Co., Track and Roadway.....	144
South Memphis Light & Traction Co., Incorporated.....	204
South Memphis Traction Co., Incorporated.....	172
South Morgantown Traction Co., Track and Roadway.....	265
South Shore Traction Co., Track and Roadway.....	236, 449
South Side Elevated Railroad (Chicago)—	
Dividends.....	294, 908
Fire-Fighting Car.....	*751, *764
Reconstruction.....	*251
Track and Roadway.....	144, 319
Southeastern Missouri Cypress Co., Storage Yards for Poles.....	*89
Southern Cambria Railway, Track and Roadway.....	236, 265, 839
Southern Car Co., Orders.....	350
Southern Construction Co., Incorporated.....	111
Southern Electric Railroad, Track and Roadway.....	236
Southern Indiana Electric Co.....	86
Southern Light & Traction Co., Track and Roadway.....	347
Southern Pacific Co.—	
Electrification, Suburban Lines.....	281, *291, 415
Power Plant.....	145, 386, 418
Southern Pacific Co.—	
Power Plant Equipment.....	347
Track and Roadway.....	291
Southern Saw Mill Co.....	177
Southern Steel Co.....	116
Southern Wisconsin Light & Traction Co., Track and Roadway.....	53, 205
Southern Wisconsin Railway, Track and Roadway.....	291
Southwest Missouri Electric Railroad—	
Financial.....	419
Rolling Stock.....	268, 877
Track and Roadway.....	745, 874, 939

Southwestern Bridge Co.....	748	Stebbins, Theodore—		Taylor Electric Truck Co.....	630
Southwestern Interurban Railroad, Incorporated.....	385, 716	American Convention—		Technical Journals, Value of.....	32
Southwestern Traction Co.....	238	Interurban Fares.....	657	Technical Literature.....	389, 691
Track and Roadway.....	174	Steel Car Forge Co.....	748	Technical Publicity Association.....	776
Spear & Miller Co.....	477, 629	Stephenson, John, Co.....	388	Technically Trained Railway Men, H. H. Norris, American Convention.....	561, 576, 609
Speed, Toledo Ordinance.....	232	Sterling Dixon & Eastern Electric Railway, Financial.....	294	Tekamah, Neb., Track and Roadway.....	875
Speeds, Table for Ascertaining.....	101	Sterling-Meaker Co.....	322	Telegraph Signal Co., Telegraph Signal System.....	842
Speer Carbon Co.....	29, 541	Steubenville & East Liverpool Railway & Light Co. Track and Roadway.....	688, 717	Telegraph Systems, Applegate Static Pick-Up.....	435
Spencer Turbine Cleaner Co.....	806	Stewart, John A., Electric Co.....	116	Telephones, Inspection of Lines.....	4271
Spike Strut Rail Fastener.....	*175	Stock Promotion Schemes.....	1273	Telharmonic Securities Co.....	842
Spirit Lake, Ia., Track and Roadway.....	774	Stockton, Cal., Track and Roadway.....	145	Tennessee Construction Co.....	177
Spirit Lake Emmetsburg & Ft. Dodge Railway, Incorporated.....	111	Stone & Webster Engineering Corporation.....	239, 629	Tennessee-Georgia Interurban Railway, Incorporated.....	89
Spokane & Inland Empire Railroad—		Boston Elevated Power Stations.....	793	Terminals, Boston & Eastern Electric Railroad.....	737
Annual Report.....	726	Interurban Improvements at Terre Haute.....	*755	Terre Haute, Ind.,	
Docks.....	176	Stonewall Valley Electric Railroad—		Interurban Improvements.....	*755
Grain Traffic.....	*678	Incorporated.....	416	Track and Roadway.....	174
Inspection by German Commission.....	*404	Track and Roadway.....	717	Terre Haute & Merom Traction Co., Track and Roadway.....	25, 999
Mail Service.....	*278	Storage Battery in Alternating-Current Work, Spokane & Inland Empire Railroad.....	*695, *697	Terre Haute & Western Railroad—	
Parlor Car Service.....	*977	Storage Houses, Construction of, American Convention.....	652	Passenger Station.....	28
Phase-Changing Station.....	*695, *697	Storehouses, Track Layout.....	121	Track and Roadway.....	745
Repair Shops, Spokane.....	*891	Storekeeper, Jurisdiction of. By H. A. Anderson.....	863	Terre Haute Indianapolis & Eastern Traction Co.—	
Rolling Stock.....	55, 115, 350, 842	Storer, N. W.—		Rolling Stock.....	55
Shops at Spokane.....	*891	Engineering Convention—		Stations.....	147
Track and Roadway.....	174, 418, 688, 773, 998	Control Apparatus.....	526	Track and Roadway.....	53, 83, 347, 386, 998
Spokane Cheney & Southern Railway, Track and Roadway.....	386, 449	Standardization.....	528	Terre Haute Traction & Light Co.—	
Spokane Wallace & Interstate Electric Railway, Track and Roadway.....	53	Storer, S. B., Sale and Measurement of Power.....	17	Dividends.....	238
Spring Valley, Minn., Track and Roadway.....	998	Stotts Signal Co.....	86	Paris Extension.....	*924, 972
Springfield & Northeastern Traction Co., Financial.....	27, 350	Stover Motor Car Co., Gasoline Motor Cars.....	*352, *845	Rolling Stock.....	806
Springfield & Southeastern Traction Co., Track and Roadway.....	25, 83, 145, 265	Strikes—		Testing—	
Springfield Belt Line Railway, Track and Roadway.....	236, 292	Binghamton Street Railway.....	141	Railways and Railway Equipments.....	821
Springfield Consolidated Railway—		Henderson City Railway.....	262	Railway Test Car.....	*862
Car House.....	941	Louisville Railway.....	262, 316, 801, 836, 872	Tests—	
Track and Roadway.....	25	Method of Handling. By E. L. Drummond.....	87	Concrete, University of Illinois.....	966
Springfield Railway, Rolling Stock.....	877	United Railroads of San Francisco.....	*61, *183, *211	Fuel at St. Louis.....	936
Springfield Railway & Light Co., Dividends.....	388, 1001	Yonkers Railroad Co.....	743	Lateral Rail Pressures, Pennsylvania Railroad.....	830
Springfield Mass. Street Railway—		Stuart-Howland Co.....	842	Track Brake, Electro-Mechanical.....	*927
Car Houses.....	295, 350	Sturtevant, B. F., Co.....	56, 86	Texas Interurban Co., Track and Roadway.....	145
Through Service, Springfield to Worcester.....	50	Shops.....	389	Texas Midland Railroad, Track and Roadway.....	83
Track and Roadway.....	717	Subsidies, Indiana Supreme Court Decision.....	771	Texas Traction Co.—	
Springfield (Mo.) Traction Co., Track and Roadway.....	113	Substitutions.....		Power Plants.....	25, 175
Spur Carbon Co.....	500	Design of, American Convention.....	*571	Rolling Stock.....	321
Standard Motor Truck Co.....	540	Los Angeles Railway.....	*300, *302	Substations.....	418
Trucks.....	*605	Subways.....		Track and Roadway.....	145, 205, 236, 265, 292, 319, 347, 839, 875, 939, 999
Standard Paint Co.....	630	Boston & Eastern.....	*72	Third Avenue Railroad, New York, Financial.....	876, 970
Standard Roller Bearing Co.....	322, 748	Brooklyn, N. Y.....	22	Third Rail—	
Standard Truck Co.....	239	Buenos Aires.....	213	Farnham.....	*508
Standard Underground Cable Co.....	322	Cambridge, Boston Elevated Railway	22	Standard Location.....	765
Standard Varnish Works.....	389	Chicago, Proposed System.....	22	Thomas & Neill.....	720
Standardization.....	*516, *637	New York.....	233, 987	Thomas, Theodore, & Co.....	941
American Convention.....	561	Special Police at Stations.....	904	Tickets—	
Central Electric Railway Association.....	*364	Suggestions of Bion J. Arnold for Facilitating Traffic.....	*880, 892	Commutation, Atlanta Northern.....	996
Electric and Steam Standards.....	191	Operating Cautions.....	*211, 222	Los Angeles, Cal., Methods.....	*812
Engineering Association—		Suffolk County Traction Co., Track and Roadway.....	25	Newspaper, at Los Angeles.....	*921
Axles.....	*328, *335	Suffolk Traction Co.—		Promoting Purchase of	*915
Brakeshoes.....	*328, *335, 486	Power Plant.....	748	Through, Massachusetts Lines.....	771
Convention.....	528, *537	Track and Roadway.....	717, 745	Use of.....	*809
Cleveland Meeting of Committee.....	97, *122, 128, *153, *157	Sumter, S. C., Track and Roadway.....	449	Tidewater Development Co., Track and Roadway.....	292, 319, 803
Gears.....	*335	Sunbury & Selinsgrove Electric Railway, Track and Roadway.....	449	Tieplates—	
Journals.....	*335	Susquehanna Traction Co.—		McKee.....	501
New York Meeting of Committee.....	282, *328, *335	Car House.....	420	Sellers.....	*595
Wheel Sections.....	*517	Power Plant.....	386	Ties—	
Wheel Treads.....	*328, *335	Sweeping, Broom Machine, Columbia.....	*722	Consumption of, in 1906.....	969
Location of Third Rail.....	*765	Sweetland, Ralph—		Fire-Killed Timber.....	40
Progress Prior to Engineering Convention.....	486	American Convention—		Steel, Benjamin.....	*421
Shop Practice.....	*1	National Fire Protection Association: Its Work in the Street and Interurban Railway Field.....	*553, 575, 590	Steel, in Chicago.....	*394
Standards, Books of, Oakland Traction Co.....	*101	Switches, Anti-Straddling Safety Device, Harrington.....	514	Timber, Fire-Killed, for Railroad Ties.....	40
Star Brass Works.....	177, 628	Sydney & Glace Bay Railway—		Timetables—	
Staten Island Midland Railroad, Rolling Stock.....	806	Car House.....	238	Ft. Wayne & Wabash Valley.....	45
Statesville Air Line Railway, Track and Roadway.....	145	Power Plant.....	236, 939	Omission of Maps.....	12
Stations and Buildings.....		Symington, T. H., Co.....	475, 500, 615, 628, 629	Portsmouth Electric Railway.....	219
Attractive Passenger Terminals.....	*723	Syracuse & Milford Railroad, Track and Roadway.....	25	Tingley, C. L. S.—	
Boston Elevated Railway, Station Changes.....	*738	Syracuse Lake Shore & Northern Railroad—		Accountants' Convention—	
Car Storage and Operating Houses, Construction of, American Convention.....	652	Financial.....	350	Address.....	519
Design of, American Convention.....	*571	Track and Roadway.....	998	American Convention—	
Northwestern Elevated Railroad, Wilson Avenue Terminus.....	*220	Syracuse Rapid Transit Railway, Dividends.....	419	Address.....	559
Pacific Electric Railway.....	245			Technically Trained Railway Men.....	590
Steel Rolling Doors.....	*598			Engineering Convention—	
Terminal Station at Hamilton, Ont.....	*736			Address.....	496
Worcester Polytechnic Institute, Electrical Engineering Building.....	*280			Titusville Electric Traction Co., Track and Roadway.....	174
Statistics—				Toledo, O.—	
Car-Mile Earnings and Expenses, New York State Roads.....	810, 815			Speed Limit Ordinance.....	232
Steam and Electric Railway.....	*391			Track and Roadway.....	939
Steam, New Energy Diagram. By H. F. Schmidt.....	*671			Toledo & Chicago Interurban Railway—	
Steam Railways—				Contract with United States Express Co.....	232
Electrification of Chicago Terminals.....	*271, 287			Track and Roadway.....	386
Comparison with Interurban Lines. By T. Jay Tomlinson.....	929			Toledo & Ft. Wayne Electric Railway, Incorporated.....	142
Ohio Roads Affected by Electric Competition.....	133			Toledo Ann Arbor & Detroit Railroad, Financial.....	207
Steam and Electric Railway Statistics, Interstate Commerce Commission.....	*391			Toledo Eastonia & Findlay Railway.....	968
				Substation.....	495
				Toledo Extension.....	53, 115, 145, 207, 229, 688
				Track and Roadway.....	53, 115, 145, 207, 229, 688
				Toledo Port Clinton & Lakeside Railway, Track and Roadway.....	145
				Toledo Railways & Light Co.	
				Earnings.....	419, 451, 775, 788, 1001
				Financial.....	690
				Rolling Stock.....	386, 147
				Track and Roadway.....	83, 118

Tolledo Urban & Interurban Railway—	690	Electric Traction Supply Co.	*323	Track and Roadway	319, 418, 999
Stations	25, 113, 145, 205	Trolley Harps—		United Traction Co. of Indiana, Dividends	27
Track and Roadway	25, 113, 145, 205	Holland	*58	United Traction Extension Co., Incorporated	801
Toltz, Max, Steam Locomotive Versus	380	Liberty Cushion	*631	Universal Portland Cement Co.	56
Electric Locomotive	380	New Departure	*483	Utah Light & Railway Co.—	
Tomlinson, T. Jay, Relation of the Inter-	929	Trolley Head, Holmes & Allen	*326	Car Houses	55
urban Line to the Steam Road	929	Trolley Retrievers—		New Offices	316
Tool Steel Motor Gear & Pinion Co.	269, 691	Hodge	*150	Power Plant	53, 236
Topeka Railway, Rolling Stock	294	Milloy	*179	Rolling Stock	55, 86, 238, 268, 690, 720
Toronto, Ont., Track and Roadway	803, 999	Trolley Supply Co.	594	Track and Roadway	83, 113, 718, 774, 839
Toronto & York Radial Railway, Rolling		Trolley Wheels—		Utica & Mohawk Valley Railway, Divi-	
Stock	877	Ideal	*120	dends	419
Toronto Niagara & Western Railway,		Self-Lubricating	*878	Utica Southern Railroad—	
Track and Roadway	265	Troy, Ala., Track and Roadway	450	Rolling Stock	321
Toronto Railway—		Troy & New England Railway, Finan-	55	Track and Roadway	206
Dividends	27, 970	cial		V	
Rolling Stock	776	Trucks—		Vacuum Impregnating System. J. P.	
Wages Advanced	109	Electric Motor Service. By Franklyn	679	Devine Co.	48
Track and Roadway—		M. Nicholl	*605	Vallejo & Northern Railway, Track and	
Accidents at Spring Switches.....	*663	Standard Motor		Roadway	839
Atlantic City Railway Improvements		Tunnels—		Vallejo Benicia & Napa Valley Railroad,	
.....	*43, *324	Belmont, Interborough Rapid Transit	202	Track and Roadway	83
Bonds, Plastic Plug	632	Co.	315	Valley Transit Light & Power Co., Incorporated	204
Boston Elevated Railway, Cambridge		Brooklyn, N. Y.	*986	Van Brunt Street & Erie Basin Railroad	
Bridge	*926	Hudson & Manhattan, Car Elevator ..	904	Rolling Stock	971
Car House Terminals, Engineering		New York River	192, *358	Van Dorn, W. T. Co., Automatic Coup-	
Convention	*515, *559	Twin City Rapid Transit, Selby Hill ..		lers	*30, *596
Chicago City Railway	*151			Van Dorn Electric & Manufacturing Co. .	28
Chicago Electric Traction Lines, Re-		Turbines—		Veblen, S. D., Track and Roadway	906
construction	*394	Curtis Type, Engineering Convention	591, *609	Vehicles, Rights on Street Railway	
Complete Clearance Curves in Chicago.	*794	Horizontal Steam, J. R. Bibbins, Engi-	*579, 591	Tracks	141
Construction, Method of Recording		neering Convention		Ventilated Cushion & Spring Co.	239, 269
Progress	*164	Parsons Type, Engineering Convention	*563, 591	Vera Cruz Electric Light Power & Traction	
Electric Railway Tracks, Care of, En-		Test of	341	Co., Power Plant	206
gineering Convention.	*515, 527, 528, *796	Westinghouse-Parsons Type, Economy	*454	Virginia City, Mont., Track and Road-	
Guard Rail for Chicago		Test	629	way	319
Pacific Electric and Los Angeles Inter-		Turnerised Metal & Canvas Roofing Co.	803	Virginia Passenger & Power Co.—	
urban Railways	*245	Tuscarawas Traction Co., Track and		Power Plant	968
Pacific Electric Railway, Bridges and		Roadway	875	Substation	968
Culverts, Los Angeles	*674	Tuscarawas Valley Transit & Power Co.	776	Track and Roadway	145
Rail Corrugation	*811, *975	Track and Roadway	*852	Visalia Electric Railroad—	
By S. L. C. Fell	707	Tweedy, Hood & Finlen	1848, *852	Track and Roadway	145, 968
By C. B. Voynow	754	Twelve Hundred Volt Operation		Vogel, H. F., Contracting & Railway	
Engineering Convention	528, 535, 650	Twin City & Lake Superior Railway,		Supply Co.	208
Rail Pressures, Lateral, Pennsylvania		Track and Roadway	25, 450	Von Schrenk, Fuiks & Kammerer	116
Railroad Tests	830	Twin City Rapid Transit Co.—		Vories, H. P.,—	
Rails and Joints, American Convention		Advertising Exhibit	471, *607	Claim Agents' Convention—	
.....	524, 528	Concrete Shops	*456, *465	Management of Bad Cases	542
Rail Sections, American Railway Asso-		Dividends	115, 294, 690, 940	Voynow, C. B.—	
ciation	742	Earnings	294, 419, 747, 876	Engineering Convention—	
Rehabilitation Work in Chicago	992	Low-Fare Case	231, *242, 262	Rail Corrugation	651, 754
Sand Rails on Steep Hills, New Jersey		Operating Expenses	*301	W	
& Hudson River Railway & Ferry		Rolling Stock	294	Waco, Tex., Track and Roadway	83
Co.	*241, 244	Selby Hill Tunnel	192, *358	Waddell & Mahon	776
Second-Hand Bridges	*847	Track and Roadway	113, 906	Wagenhorst, J. H., & Co.	57, 148, 322, 777
Service Plant, Brooklyn Rapid Transit				Blue Print Machine	*118
Co.	*392, *400	U		Wages—	
Standard Location of Third Rail	*765	Under-Feed Stoker Co. of America	477, 499, 627	Increases—	
Storehouse Layout	*121	Underwood, H. B., & Co.	268, 541, 628	Cincinnati Newport & Covington	
Spike Strut Rail Fastener	*475	Union Electric Co.	611, 629	Light & Traction Co.	49
T-Rail, C. Gordon Reel, American Con-		Union Street Railway—		Georgia Railway & Electric Co.	202
vention	640, *645	Car Houses	322	Lake Shore Electric Railway	835
T-Rail in Cities. By H. L. Weber	*850	Dividends	775	San Antonio Traction Co.	771
Tieplates, McKee	501	Rolling Stock	321, 747	Schnectady Railway	23
Weed Burner	*751	Union Switch & Signal Co.	86, 748	Toronto Railway	109
Trade Mark, Pittsburgh & Butler Street.	*70	Union Traction Co. of Kansas—		Philadelphia Rapid Transit Co.	872
Traffic—		Interurban Station	55	Wagner Lake Shore & Armour Traction	
Congestion on Chicago Elevated Loop	</td>				

Washington (D. C.) Railway & Electric Co.—		Westinghouse Machine Co.....	540, 721, 749	Winnebago Traction Co.—	
Dividends	805	Westinghouse-Parsons Steam Turbine, Economy Test	*454	Financial	55
Rolling Stock	115, 720	Westinghouse Traction Brake Co.....	477	Track and Roadway.....	113
Washington Railway & Power Co. (Vancouver, B. C.), Track and Roadway.....	236, 718, 745	AML Brake Equipment.....	505	Winnipeg Electric Railway—	
Washington Spa Springs & Getta Electric Railway, Track and Roadway	939	AMM Brake Equipment.....	631	Financial	176
Washington Water Power Co.—		Automatic Car and Air Couplers.....	636	Track and Roadway.....	113, 174, 319
Dividends	419, 1000	Electro-Pneumatic Brake System.....	633	Winona Interurban Railway—	
Stations	86	SME Brake Equipment.....	598	Financial	690, 747
Track and Roadway	174	West Penn Railways Co.		Shops	877
Washington Westminster & Gettysburg Railroad, Track and Roadway	174	Dividends	115, 719	Winsor, Paul—	
Wason Manufacturing Co.....	28, 147	Track and Roadway.....	145	Engineering Convention—	
Waterbury, Conn., Track and Roadway.....	206	West Point, Ga., Track and Roadway.....	53	Gas Engines.....	578, 591
Waterbury & Milldale Tramway Co., Track and Roadway	113, 145, 265, 450, 718	West Shore Traction Co., Incorporated.....	142	Winston-Salem, N. C., Track and Roadway	999
Waterloo, Ia., Track and Roadway.....	113	Westchester Traction Co., Ossining, N. Y., Track and Roadway.....	25	Wire, Black Enameled, Western Electric Co.	353
Waterloo Cedar Falls & Northern Railway—		Western New York & Pennsylvania Traction Co., Track and Roadway.....	53	Wire Cleaning and Retaping Device.....	*824
Car Houses	420, 690, 720	Whall, C. H., & Co.....	691	Oakland Traction Co.....	971
Rolling Stock	452, 720	Wharton, William, Jr., & Co.....	476, 499, 635	Wisconsin Blower Co.....	971
Track and Roadway	745	Whitcomb County Railway & Light Co.—		Wisconsin Engine Co.....	322, 971, 1002
Waterloo Pella & Southwestern Railway, Incorporated	448	Dividends	238	Gas Engines.....	843
Waterman Car Wheel & Foundry Co.....	147	Earnings	238, 388, 876	Wood, Charles N., & Co.....	941
Watson-Stillman Co.....	748	Track and Roadway.....	53	Wood, Guilford S., Electric Railway Supplies	477
Wausau Street Railroad, Track and Roadway	386	Wheel Sections, Standardization, Engineering Convention.....	*517	Woodbury & Waterbury Street Railway, Track and Roadway.....	113
Waycross, Ga., Track and Roadway.....	145	Wheel Treads, Standardization, Engineering Convention.....	*537	Track and Roadway.....	325
Waycross Electric Railway, Track and Roadway	718	Wheel Truing Brakeshoe Co.....	630	Woodstock Marengo Genoa & Sycamore Electric Railway—	
Waycross Gas & Construction Co., Incorporated	802	Wheeler Condenser & Engineering Co.....	877	Incorporated	772
Weatherford, Tex., Track and Roadway.....	774	Wheeling & Western Railway, Track and Roadway	265	Track and Roadway.....	688
Weed Burner	*751	Wheeling Sherrard & Cameron Interurban Electric Railway, Track and Roadway	774	Wooster & Mansfield Electric Railway, Track and Roadway.....	688, 718
Welding, Thermit	*119	Wheeling Traction Co.—		Worcester Consolidated Street Railway—	
West Chester & Wilmington Electric Railway—		Freight Station.....	776	Financial	876, 940
Incorporated	873	Rolling Stock	294	Rolling Stock	398, 420
Track and Roadway	999	Wheels—		Through Service, Springfield to Worcester	50
West End Street Railway—		Car, Solid Forged and Rolled.....	*991	Worcester Polytechnic Institute, Electrical Engineering Building.....	*280
Dividends	388, 1001	Cast-Steel, Davis.....	750	Wyckoff Pipe & Creosoting Co.....	846
Financial	876, 940, 1001	Tire Heater	*736	Wyman, C. D.—	
West Farms, Mass., Track and Roadway	418	Tread and Flange, Standardization, Engineering Association.....	*153, *160, *328, *335	American Convention—	
West Penn Railways—		White, J. G., & Co.....	28, 29, 749, 971	Technically Trained Railway Men....	562
Financial	747	White, J. Harvey—			
Track and Roadway	688	American Convention—			
West Seattle. See Seattle.		Department of Publicity.....	620		
Western Electric Co.....	452, 691, 776, 941	Whitman Electric Railroad, Track and Roadway	875		
Black Enameled Wire	353	Whitmore Manufacturing Co.....	540, 593, 748		
Hawthorne Works	*634	Whittier, Cal., Track and Roadway.....	319		
Railway Generator	*503	Wiederholdt Construction Co.....	806		
Western Illinois Electric Traction Co.—		Wile Power Gas Co.....	909		
Incorporated	448	Willamette Valley Traction Co., Track and Roadway.....	113		
Track and Roadway	418	Willard Storage Battery Co.....	721		
Western New York & Pennsylvania Traction Co., Track and Roadway.....	347, 386	Williams, D. T., Valve Co.....	268		
Western Ohio Railway, Excursions	232	Williamsport, Md., Track and Roadway.....	266		
Western Railways & Light Co., Rolling Stock	321	Wilmington & Edge Moor Railway, Track and Roadway.....	266		
Western Society of Engineers.....	684, 770, 801, 904	Wilson, George L.—			
Western Steel Car & Foundry Co.....	748, 776	Engineering Convention—			
Western Tube Co.....	269, 477, 499, 541, 577, 596, 627, 662	Electric Railway Tracks, Care of.....	*515, 527, 528		
Kewanee Flange Union.....	*179	Rail Corrugation	650		
Westinghouse Air Brake Co. 208, 351, 941, 971		Wilson, James G., Manufacturing Co., Steel Rolling Doors.....	*598		
EL Equipment.....	473	Window Fixtures, Lock Washer, National	632		
Westinghouse, Church, Kerr & Co.....	748	Window Glass, Car, Semon Bache & Co. 484			
Westinghouse Companies.....	540	Window Lock, Dayton.....	*501		
Exhibit, New York Electrical Show.....	423	Window Sash Balance, National.....	503		
Westinghouse Electric & Manufacturing Co.....	56	Window Sash Lock, National.....	550		
87, 116, 147, 177, 295, 351, 452, 721, 1002		Windsor Essex & Lake Shore Rapid Railway—			
Electric Locomotives.....	*777	Financial	207		
Orders	350, 842	Rolling Stock	842		
Receivership	*723, 741	Single-Phase	*944, *946		
Single-Phase Equipment	597	Track and Roadway.....	745		
		Winfield, Kan., Track and Roadway.....	236		

PERSONAL

A	Benedict, H. A.....	418	Bueltzingslowen, F. W.....	907	Christie, E. W.....	147	Cosgrove, W. L.....	175
Acton, L. R.....	Benjamin, Charles		Bugbee, George L.....	939	Christie, W. K.....	175	Cosper, W. P.....	452, 941
Adams, George F.....	Henry	175	Bullock, A. G.....	939	Church, George H.....	746, 804	Cottingham, W. H.....	*750
Adams, J. L.....	Benson, D. L.....	776	Bunnell, C. M.....	295	Clapp, H. W.....	999	Crafts, P. P.....	*293, 348
Akerman, John N.....	Berry, Joseph H.....	86	Burke, J. T.....	348	Clark, C. H.....	348	Crall, J. H.....	907
Alcop, Thomas	Baugher, H. M.....	56	Barleigh, John J.....	939	Clark, H. J.....	27	Crawford, John B.....	875, 907
Anderson, A. A.....	Bilbrow, O. R.....	875	Burris, J. R.....	803	Clark, Leverett M.....	53	Crosby, Charles V.....	804
Anderson, F. H.....	Black, Charles N.....	348, *387, 418, 746	Burrows, Acton	206	Clark, W. T.....	295	Crox, John W.....	774
Anderson, J. W.....	Blanchard, A. S.....	86, 116	Burton, Frank C.....	450	Clarke, I. B.....	146	Crump, John, Jr.....	114
Andress, C. A.....	Bogardus, M. J.....	292	Bush, T. G.....	803	Coalgrove, Scott	53	Cunningham, P. J.....	689
Applegate, H.....	Bonner, D. E.....	239			Coen, F. W.....	236, 746, *841, 907	Cunningham, Robert	689
Arnold, Bion J.....	Bowman, A. H.....	840	C		Colburn, R. D.....	803, 840	Cunningham, T. J.....	146
Arnold, Frank	Bowman, E. M.....	969	Cadle, C. L.....	450	Colket, William Walker	266		
Atwood, T. W.....	Boyd, G. N.....	239	Calkins, Charles W.....	348	Collier, John J.....	27	D	
	Bradlee, Henry G.....	27	Callery, J. D.....	206	Collins, D. C. New-		Danforth, R. E.....	114
	Bradley, J. M.....	386	Cameron, Lewis O.....	322	man	389	Darbee, William.....	292
	Bradley, L. C.....	293	Candee, L. S.....	939	Collins, J. F.....	175	Darrow, E. E.....	320, 349
	Bramble, B. E.....	907	Carlichoff, E. R.....	322	Collins, James S.....	774	Davidson, H. E.....	114
	Brennan, Roy	320	Carleton, A. B.....	875	Colver, W. B.....	969	Davis, W. H.....	689
	Brennan, Thomas J.....	803, *840	Carr, Albert	450	Conklin, L. H.....	175, *849	Davis, George L. L.....	691
	Brine, G. W.....	175	Carse, David B.....	*721	Conolly, B. A.....	774	Davis, L. H.....	689
	Brown, B. M.....	146	Carson, Robert L.....	689	Conover, R. H.....	266	Davis, W. H.....	689
	Brown, F. A.....	774, 803	Caverhill, Walter	266	Conrad, Willis C.....	320	Davison, H. E.....	774
	Brown, F. W.....	114, 175	Caywood, George T.....	718, 746	Converse, C. T.....	320, 718	Decker, Martin S.....	716
	Brown, Joseph M.....	322	Chambers, Herbert J.....	177	Coak, E. J.....	114	De Hart, H. V.....	716
	Bryant, C. F.....	746	Chapman, Charles H.....	146	Coledge, C. A.....	746	Delamater, C. M.....	268, 776
	Buehling, E. W.....	420	Chapman, George F.....	348, 387	Cory, C. M.....	840, 841		

de Muralt, C. F. 746
 De Pew, H. H. 292
 Derr, William L. 81
 des Cognets, Louis. 875
 Dewsnup, E. R. 292
 Dickson, E. J. 840, 907
 Dinnen, W. F. 83
 Doty, Maurice F. 718
 Douglass, William A. 148
 Down, Harry 206
 Downs, James R. 57
 Doyle, J. P. 27
 Dozier, D. W. 718, 746
 Droyles, Edward 418
 Duck, J. J. 907
 Dunlop, W. 320
 Durbin, Fletcher. 774
 Dusbiberre, George B. 57
 Dutton, A. N. 999
 Dyer, R. A. 236

E

Eastman, Albert 293
 Easty, C. B. 774
 Edwards, D. G. 418, 746
 Edwards, N. M. 718
 Ellicott, Joseph R. *964
 Elliott, James R. 969
 Emery, J. A. 320, 349, 450
 Ensign, Orville H. 774
 Estill, John H. 804
 Eustis, John E. 22
 Evans, E. A. 206, 266
 Evans, Frederick 875
 Evans, W. H. 53

F

Faber, G. F. 939
 Felton, S. M. 907
 Felters, D. B. 774
 Fields, M. D. 418
 Fitch, Fred H. 293, *348
 Fleming, Harvey B. 84
 Flynn, C. E. *386
 Folds, George R. 293, 386, 804
 Foltz, S. A. 875, 907
 Foltz, Sidney E. 175
 Foote, H. M. 148
 Ford, A. H. 27, 54, *320
 Forman, W. E. 28
 Forrest, R. L. 386
 Forse, William H. 26, 27
 Foster, R. C. 450
 Foster, W. W. 27
 Fox, David 292
 Fox, R. E., Jr. 86
 Freeman, M. M. 386
 Fries, J. E. 452
 Fritsch, Howard C. 84
 Fritts, Charles E. 418, 746
 Fry, John H. *26, 54
 Fuller, G. C. 27

G

Gabel, T. R. 999
 Gaboury, J. D. 266, 803
 Galibert, Paul 266
 Garrett, George 969
 Garton, W. R. 1001
 Gavett, Blaine 175
 Gebhart, Henry 803
 Gennet, G. W., Jr. 971
 Gentner, O. H., Jr. 29
 Gibbs, B. P. 803
 Gibbs, Lucius T. 387
 Gibbs, W. A. 774
 Gibson, Charles, Jr. *840
 Gillette, A. L. 175
 Gilliam, H. 83
 Ginsburg, Solomon. 86
 Glenn, Thomas K. 175
 Glidden, S. C. 175
 Goelz, Nicholas 451
 Goltra, W. W. 53
 Goode, Henry W. 26
 Goodrich, Calvin G. *639
 Goodrich, Thomas 718
 Goodwin, George 27
 Goss, William Free-
 man Myrick. *84, 175
 Gossler, P. G. 774
 Gottschalk, Richard F. 84, 114
 Grant, H. F. 718
 Graston, M. E. 907
 Graves, C. B. 746
 Gray, James K. 236, 875, 907, 939
 Greene, John MacD. 389
 Griffin, W. R. W. 969
 Grisamer, J. H. 83
 Gulick, Henry, Jr. 176
 Gunn, Robert T. 875
 Guy, W. T. 840

H

Hale, O. A. 175, 348
 Haley, George S. 292
 Hall, Gordon W. 939
 Hall, W. D. 875

Hall, W. H. 939
 Hall, Walter P. 999
 Hall, Warren S. 54, 840, 907
 Hallam, Charles 22
 Hamilton, John W. 177
 Hamilton, R. B. 146, *175
 Hamilton, J. S. *148
 Handshey, C. F. 348
 Hanf, John 236
 Hansell, W. H. 748
 Harmer, James T. 146
 Harrigan, J. R. 939
 Harrington, A. C. 450
 Harrington, W. E. *293, 774
 Harris, R. W. 969
 Harrsen, Harro 840
 Hartshorn, Stewart. 351
 Haven, William E. 746
 Harvie, W. J. 689
 Hayden, Clarence P. 175
 Hayes, R. F. 877, 971
 Haylow, W. J. 146
 Henderson, A. F. 1001
 Henderson, J. W. 176
 Henderson, John C. 146
 Henkle, R. F. 969
 Henry, Frank R. *746
 Herely, Millard B. 718
 Heslet, Charles 907
 Hewitt, F. A. 266, 746, 804
 Hibbard, H. L. 806
 Higgins, H. C. 27, 84
 Hildebrandt, H. A. 53
 Himmon, W. E. 322
 Hine, E. W. 875
 Hogarth, J. B. 146, 175
 Hoke, W. M. 748
 Holderman, L. E. 27, 114
 Holloway, W. E. 147
 Holst, E. W. 236
 Hopkins, Marcellus 939
 Hubbell, Charles E. 53
 Huffman, C. J. 292, 348
 Hughes, V. R. 418
 Huntley, F. P. 389
 Hurin, C. C. 348
 Hutchinson, James E. 266

I

Inwood, Harry. 840, 969

J

Jackson, Dugald C. 774
 Jackson, James F. 875, 999
 Jackson, J. P. 999
 James, Alfred R. 266
 James, George P. 236
 Jarvis, J. A. 114, 907
 Jamison, Robert 27, 54, 320, 349
 Jensen, A. G. H. 116
 Jennings, William 969
 Joffron, W. F. 803
 Johns, S. W. 320, 348
 Johnson, C. W. 28
 Johnson, L. D. 266
 Johnston, J. P. 295
 Jones, J. N. 26
 Jones, L. W. 147
 Jordan, A. W. 774
 Jordan, Arthur W. 999
 Josselyn, Benage S. *26

K

Kaercher, H. C. 418
 Kellogg, Henry F. 420
 Kelvin, Lord 969
 Kennedy, John S. 83
 Kessler, William V. 969
 Keys, John F. 26, *54
 Kilbride, M. D. 969
 Killeen, G. C. 907
 Killingsworth, J. A. 348
 Kimes, J. S. 418
 Kineon, J. P. 27
 King, Chester H. 53
 King, John L. 53
 Kirk, Edward B. 27, 84, 175, 266
 Kirkpatrick, J. C. 450
 Kitch, C. S. 907
 Koch, Theodore F. 692
 Kohler, G. A. 450
 Kuhn, W. S. 386

L

Laffin, Richard T. 746
 Lang, Edmund 776
 Larcey, W. P. 236, 266
 Lasher, F. G. 774
 Laterman, Edward 351
 Laughlin, F. D. 208
 Lavenberg, D. H. 875
 Lawrence, Wallace 292
 Lawson, W. C. 177
 Lee, Ray P. 1001
 Lee, Robert T. 146
 Lester, J. W. 939
 Lincoln, E. B. 689
 Lines, C. C. 418
 Littell, Harvey M. 452

Littlefield, Elmer H. 451
 Logan, S. L. 718
 Love, William S. 877, *941
 Lowd, Mark 236
 Lucas, Robert 208
 Lunsford, H. H. 292, *348
 Lyall, W. R. 842
 Lyon, Lloyd 999
 Lyons, J. E. 53

M

MacAfee, John Blair. 875, 907
 McAleer, Charles J. 803
 McBee, A. E. 690
 McCaffery, Thomas 340
 McCallum, A. F. 26
 McCarroll, William 22
 McClellan, Charles F. 236
 McClure, G. W. 451
 McConway, W. 116
 McCray, L. H. 292
 McDonald, A. J. 939
 McDowell, E. R. 840
 McElroy, J. M. 27
 McEwen, I. H. 386
 McFarland, J. W. 875
 McFetridge, D. W. 803
 McGillan, F. L. 56
 McGrath, Morris 803
 McKay, C. R. *26, 348
 McKay, Hector W. 175
 McKinney, E. B. 804
 McLean, Embury 90
 McMillan, J. 840
 McMynn, John C. 909
 McNamara, John W. 999
 McPherson, James C. 418
 McQuilpin, Isaac 26
 Magee, Louis J. 27
 Maltbie, Milo R. 22
 Maltby, F. W. 268
 Mann, A. H. 418, 689
 Marlow, Charles Francis 236
 Martin, John W. 939
 Matthews, Frank B. 969
 Matthews, F. L. 208
 Matson, John L. 689, 803
 Matsumo, S. 840
 Mattis, G. M. 907
 Maxwell, Albert. 146
 Mellen, C. S. 804
 Menden, W. S. 53, 54, 83, 999
 Mershon, Charles E. 53
 Merwin, B. E. 774, 840
 Midgley, Stanley W. 971
 Miller, John G. 177
 Milliken, H. 86
 Milne, George G. 389
 Mitchell, William E. 292
 Mitten, Arthur G. 146, *175, 907
 Mitten, Thomas E. 803
 Monell, J. E. 320, 774
 Moore, E. W. 806
 Moore, Harry A. 206
 Moore, J. E. A. 420
 Moore, William E. 386
 Moorman, W. B. 840
 Mordock, Charles T. 293
 Morehouse, Walter 206
 Morine, George E. 292
 Morris, Elmer P. 476
 Morse, George C. 971
 Munroe, Robert J. 969
 Mulcahey, Thomas J. 348
 Murlin, O. H. 266
 Murphy, John Z. 84
 Murphy, Walter A. 236
 Murray, A. C. 875
 Muse, J. C. 53

N

Nash, L. R. 146, 206
 Neal, William L. 292
 Neall, N. J. 720
 Neff, Stewart S. 718, *804
 Nelson, Alfred B. 206
 Nelson, L. R. 803
 Nevins, George F. 746
 Norris, E. W. 418
 Norvell, F. D. 907
 Noye, E. B. 909
 Nuckols, G. Cecil. 322

O

O'Hara, E. 26
 O'Hara, Joseph 387, 418, 774, 840
 Orth, C. P. 450
 Osborne, Thomas Mott 22
 Overton, John E. 803
 Owens, W. H. 999

P

Page, H. C. 804
 Pagel, Henry G. 83
 Palmer, C. E. 146

Parke, F. K. 83
 Parker, Herbert 875
 Parson, John B. 689
 Peterson, C. L. 83
 Philipp, C. D. 746
 Pierce, George W. 292
 Pittis, E. A. 720
 Plunkett, Martin. 875, 907
 Polk, Jefferson S. *775
 Pope, E. V. 803
 Porter, E. E. 718
 Porter, George G. 114
 Porter, H. Hobart. 746
 Porter, J. T. 292, 348
 Powell, Charles S. 86
 Powers, Clifford B. 236
 Powers, Samuel L. 418
 Preble, Charles M. 53
 Primm, W. L. 909
 Printz, Carl J. 718
 Pritchard, J. H. 450
 Pulliam, J. P. 83, 175, 266
 Purinton, A. J. 840

R

Ramsey, W. J. 293
 Randall, F. 27
 Randall, Perry A. 83
 Ray, Lee H. 175
 Ray, R. R. 450
 Reamey, B. T. 26
 Reardon, John F. 450, 803
 Reed, W. Edgar. 777
 Reese, Charles M. 909
 Reilly, F. D. 146, 175
 Reiter, G. C. 452
 Renaud, William H. 320
 Reynolds, A. E. 53
 Rice, Cecil G. 206
 Rice, George S. 774
 Richards, James L. 418
 Richards, L. R. 236
 Richardson, J. W. 939, 969
 Rilling, John S. 386
 Rising, Charles L. 54
 Roberts, George J. 939
 Robinson, Arthur N. 803
 Rogers, C. L. 348
 Rogers, Fred 53
 Rogers, James H. 177
 Rohner, Henry 840
 Rooston, William E. 969
 Root, Oren, Jr. *451
 Roth, F. W. 147
 Rounds, George W. 146
 Royce, Allan H. 206
 Ryan, C. N. 999
 Royster, F. B. 450
 Ruddick, John J. *117
 Rushing, D. G. 292

S

Sague, James E. 22
 Sampson, A. J. 53
 Sampson, William C. 27
 Sargent, Charles E. 1002
 Scarritt, Sanford G. 1001
 Schaffer, F. D. 175
 Schilling, Otto 320
 Schoepf, W. Kesley. 746
 Schoonaker, A. 177
 Seaman, Henry B. 774
 Seibert, William. 146
 Selfridge, William. 1001
 Selig, E. T. 27
 Sengel, George, Jr. 746
 Shepard, Arthur B. 28
 Sherman, R. P. 999
 Sherman, Robert H. 840
 Sherrod, C. F. 907
 Sherwin, H. A. *750
 Shipperd, L. C. 236, 266
 Shonts, Theodore P. 907
 Shroyer, Walter 26
 Shumway, Thomas B. 841
 M. D. 452
 Shute, Nathan 939
 Sibley, Robert 939
 Slaughter, William E. 450
 Sloan, F. T. 971, 999
 Sloat, F. J. J. 53
 Smith, Clement C. 292
 Smith, Dow S. 999
 Smith, Julian C. 350
 Smith, Peter 806
 Smith, R. R. 746, 774
 Smith, Raymond H. 54, 83, 146, 292
 Snow, Walter B. 452
 Sperry, Marcy L. 146, 206
 Stafford, W. H. 749
 Stanley, Albert H. 718
 Stanley, Charles H. 320
 Stanley George A. 292, 320
 Stanley, J. J. 292
 Stanton, C. S. 348
 Stanton, Charles. 292
 Starring, Mason B. 387
 Stebbins, Theodore. 804
 Stevens, Frank W. 22

Stevens, R. P. *54, 236, 907
 Stewart, Bayard S. 176
 Stewart, E. J. 320
 Stewart, L. H. 718
 Stewart, R. G. *841
 Stillwell, L. B. 386
 Stone, George. 418
 Storer, S. B. 175
 Storrs, Lucius S. 146, 804, 939
 Stout, Ferman J. 236, 349, 746, 907
 Stowe, Fred A. *387
 Sturgis, E. A. 236
 Sturtevant, William E. 803
 Sturzing, O. R. 348
 Swan, C. E. 53, 266
 Swank, A. S. 206
 Swentsfager, William. 969
 Symington, E. H. 269, 1001

T

Talbot, F. H. 840
 Talbot, Guy W. 54, *114, 746
 Tarkington, W. B. 718
 Thomas, E. T. 875
 Thomas, F. T. 907
 Thomas, Percy H. 720
 Thompson, N. A. 969
 Thomson, Sir William 969
 Thornton, A. E. 175
 Thornton, R. S. 803
 Thurston, L. S. 56
 Tingley, C. L. S. 746
 Tobin, William H., Jr. 175
 Townsend, W. S. 320
 Tracy, G. E. 999
 Tucker, E. F. 746
 Tuell, S. B. 27
 Turner, Charles F. 999
 Turner, J. F. 418
 Tylee, William 292
 Tyree, D. E. 83

V

Van Andral 418
 Vance, Harry 348
 Van Pelt, William F. 746
 Voth, W. B. 348
 Vreeland, H. H. 450

W

Wallerstedt, H. 53
 Warren, H. C. 348
 Warwick, Charles E. 27
 Waters, C. M. 803
 Waterson, W. W. 907
 Watson, George L. 56
 Watson, Robert E. 907
 Watson, Wilbur J. 269
 Watson, Z. E. 999
 Weeks, Benjamin J. 450
 Welch, J. C. 83
 Weld, Fred M. 689
 Wells, J. A. 320
 Wellman, Harlan A. 53
 West, David Putnam. 293
 Western, Richard W. 351
 Weston, Charles V. 84
 Wharff, Edward M. 803
 Wharton, William, Jr. 877, 909
 Whipple, A. L. 322, 812
 Whipple, Fred G. 806
 White, A. J. 146
 White, Elmer M. 840, 841
 Wilcoxon, E. J. 735, 969
 Wilcoxon, C. L. 979, 969
 Wilgus, William J. 83, 840
 Wilhelm, P. H. 147
 Wilde, E. S. 718
 Wilcox, William R. 22
 Williams, D. A. 27
 Williams, W. H. 718
 Wilson, Charles N. 971
 Winchester, B. B. 27
 Witt, John P. 746
 Wood, C. V. 146
 Wood, W. O. 53
 Woods, A. C. 177
 Wright, George L. 746
 Wright, Karyl 840
 Wright, W. D. 206
 Wulkup, G. A. 83
 Wyman, Charles Dens-
 more *804

Y

Young, A. M. 349
 Young, C. S. 803
 Young, W. D. 387
 Young, William G. 292
 Yount, J. M. 175, 206

Z

Zihlman, Andrew H. 293

ELECTRIC RAILWAY LEGAL DECISIONS

A	Crossing, When Practicable to Change Grade 682	Duty of as to Pedestrians 107
Abutters—	D	Inexperience of Notice of Incompetency for Bad Weather..... 993
Cannot Enjoin Track Elevation on Opposite Side of Highway..... 933	Damages—	Liability for Omission by Overworked Within Scope of Employment Waving to Child..... 20
Right of to Recover for Special Injuries from Interurban Railways..... 741	For Wrongful Ejection of Holder of Transfer..... 106	Municipalization of Street Railways, Court Not Concerned with..... 201
Advertising, Publisher of Newspaper Cannot Litigate Right of Company to Have in Cars..... 713	In Condemnation for Transmission Line Debts, Liability of Directors for Under Statute..... 169	N
Arbitration, Validity and Operation of Agreement for..... 445	Derailments—	Negligence—
Assaults, by Police Officers Employed at Parks, Liability for..... 993	Caused by Boy Putting Brick on Track..... 681	Criterion as to in Case of Lurching of Car..... 833
Automobiles, Duty to Stop Cars to Give Chance to Get Off Tracks..... 993	Doctrine as to Liability for Injuries Caused by..... 993	Electric Shock Indicative of..... 261
B	Injury by to Passenger Sitting Near Track..... 994	Failure to Hear or See Car Not Always Proof of..... 168
Ball, Injury to Passenger from Foul..... 445	Previous as Evidence..... 260	In Not Providing a Safe Place to Alight Passenger Riding on Platform Does Not Excuse..... 869
Ballast, Validity of Contract for Necessary..... 902	Directors, Liability of Under Statute for Debts and Judgments..... 169	Notice of Conductors Permitting Passengers to Ride on Employees' Car..... 994
Boarding Cars—	Doorway, Liability for Injury from Electrified Plate in..... 261	Nuisance—
Precautions Required in..... 902	E	Transmission of Electricity Not..... 741
When Duty to Give Fair Chance of Begins..... 445	Ejection, of Holder of Transfer..... 106	Curved Rail Connections Cannot be Arbitrarily Removed as..... 902
Brakemen, Duty to Know if Passengers are Attempting to Leave Car..... 106	Electric Shock—	O
Bridges—	From Electrified Plate in Doorway..... 261	Ordinances—
Liability to Steam Roads for Repairs on..... 47	Injury from to Painter of Iron Poles..... 833	Agreement for Arbitration as Part of.. 445
Must Ask Permission to Meet Changes at..... 20	Electrical Transmission Line, Power of Condemnation by Lessee for..... 741	Authorizing Moving Buildings over Tracks..... 169
Intoxicated Persons Falling from..... 993	Engines, Use of Dummy in Building Street Railway Not Covered by Fire Law..... 993	P
Bridge Toll, Payments Deductible from Franchise Tax..... 47	Equipment, Care Required in Providing and Testing..... 138	Parks, Liability for Assaults by Police Officers Employed at..... 993
Buildings, Ordinance Authorizing Moving over Tracks..... 169	Evidence—	Passengers—
C	Admissibility of as to Racks for Baggage..... 833, 834	Assumption of Risks by, as to Places of Alighting..... 21
Cars—	Admissibility of Opinion as to Lurching of Car..... 833	Closing of Gate While Attempting to Leave Car..... 106
Duty in Operation of When Repairing Tracks..... 168	As to Customary Speed Admissible..... 934	Constituted by Signal and Response..... 902
Duty to Wait for Other After Giving Up Place Inside..... 869	Books Admissible in to Show Incompetency of Motormen..... 741	Do Not Assume Risks of Defective Cars Run at Excessive Speed..... 993
Electric Governed by Different Rules Than Trains..... 869	Permitting Passengers to Ride on Employees' Car and Previous Derailments Admissible in..... 994	Duty to Protect from Other Passengers Going on Other Tracks After Alighting Holding Articles and Not Steadying Themselves by Hands on Entering Car..... 902
Liability for Defective When Purchased from Manufacturer..... 138	Previous Derailments as..... 260	Injury to from Derailment Caused by Boy Putting Brick on Track..... 681
Lurching of..... 833	Extensions, Opportunity for to be Considered..... 411	Injury to from Foul Field..... 445
Must Provide for Being Readily Controlled..... 713	F	Injury to on Funeral Cars Run over Another Road..... 994
Overloading..... 713	Fares, Students in Commercial College Not Entitled to Special Rates of..... 933	Intoxicated Person Kicking at Conductor and Hitting..... 682
Passenger Stumbling over Baggage on Floor of..... 833, 834	Fellow Servants—	Liability for Insult to..... 902
Publisher of Newspaper Cannot Litigate Right of Company to Have Advertising in..... 713	Applicability of Statute Relative to Car Dispatchers Not of Conductors and Motormen..... 833	Limit of Duty and Liability to, on Cars Stalled in Snow..... 870
Risks from Defective Run at Excessive Speed Not Assumed..... 993	Motorman and Laborer Riding in Car are..... 106	May Assume Platforms and Steps or Running Boards to be Reasonably Safe..... 713
Should Wait for Through..... 138	Franchise as to Covering Right to Erect Switch Towers..... 48	May Presume That Cars Will Not be Negligently Overloaded..... 713
Stopping for Funeral Processions..... 411	Franchise Tax, Bridge Toll Payments Deductible from..... 47	Not Knowing Car Has Not Stopped Duty to..... 230
Using Old, and Burning Out of Fuse..... 934	Funeral Cars, Injury to Passengers on Run over Another Road..... 994	Persons Waiting to Transfer to Work Car are..... 994
When Duty to Refuse Admission to..... 682	Funeral Processions, Stopping Cars for..... 411	Riding on Lower Steps..... 713
Car Dispatchers, Not Fellow Servants of Conductors and Motormen..... 833	Fuse, Burning Out of in Old Car..... 934	Right of Transfers as Between Long and Short Service Cars..... 445
Carriers of Passengers, Care Required of Street Car Companies as..... 230, 260	Fuse Box Attached to Sill..... 934	Stumbling over Baggage on Floor of Car..... 833, 834
Children, Permitting to Sit at End of Seat in Open Car..... 261	G	Passenger Traffic, Construction of Obligation to Pay Percentage of Net Income from..... 230
City Cannot Construct Street Railways..... 230	Gates, Closing of with Passenger Attempting to Leave Car..... 106	Passes, Liability for Injuries to Users of Pedestrian—
Claims, Purchasing Company Not Liable to Holders of..... 21	I	Conductor Shooting at Passenger and Killing..... 870
Collisions After Cars are Started Without Warning..... 993	Income, Construction of Obligation to Pay Percentage of Net..... 230	Rights and Duties Between Cars and Platforms—
Common Carriers of Passengers, Care Required of..... 993	Injunction, Abutters are Not Entitled to, Against Track Elevation on Opposite Side of Highway..... 933	Interurban Stopping Places and..... 21
Companies, Purchasing Not Liable to Holders of Claims..... 21	Interurban Railways—	Passengers May Assume to be Reasonably Safe..... 713
Condemnation—	Condemnation and Other Powers of..... 903	Reason for Riding on Immaterial..... 869
Approach to Park Subject to..... 411	Not Additional Burdens on Streets..... 741	Poles, Injury from Shock to Painter of Iron..... 833
Power to Acquire Rights of Way by..... 834	Not "Street Railroads"..... 833	Policemen, Liability for Injuries to when Using Passes..... 48
Power of by Lessee for Transmission Line..... 741	Stopping Places and Platforms..... 21	President, Power of to Contract for Transportation of Passengers..... 994
Power of Interurban Railways Incorporated Under General Railroad Act..... 903	Street Railways Cannot Give Entrance to Cities..... 412	R
Railroad Requirement Not Applicable..... 230	Intoxicated Conductors, Sending Out with Cars..... 870	Races, Conductor Enforcing Law Requiring Separation of..... 902
Right of..... 260	Intoxicated Persons—	Rail Connections, Curved, Cannot be Arbitrarily Removed as Nuisance..... 902
Statement of Termini in..... 903	Admitting as Passengers..... 682	Railroads—
Sufficient Description for..... 741	Company Not Liable in Case of Expelled Falling from Bridge..... 993	Condemnation Requirement Not Applicable..... 230
Conductors—	Duty to Protect Passengers from..... 869	Right of Crossing..... 869
Duties of and Rights of Self-Defense..... 994	Kicking at Conductor and Hitting Passenger..... 682	Rails, Care Required when Slippery..... 713
Duty of Before Giving Signal to Start..... 201	L	Res Ipsa Loquitur, Derailments Come Under Doctrine of..... 993
Duty to Protect Passengers from Insult by..... 902	Laborers, Injury to Riding in Special Cars..... 106	Rights of Way, Power to Acquire by Condemnation or Purchase and Priority of Rights in..... 834
Employing Intoxicated, Armed..... 870	Looking and Listening, Requirement of Pedestrian as to..... 107	Rules
On Running Board..... 933	M	At Barn for Taking Transfer Cars..... 106
Permitting Passengers to Ride on Employees' Car..... 994	Motive Power, Difference in Care Required When Different is Used..... 139	Non-Compliance with by Overworked Motormen..... 201
Police Power of No Defense..... 869	Motormen—	
Refusal of to Give Provided Transfers..... 411	Books as Evidence of Incompetency of..... 741	
Shooting at Passenger and Killing Pedestrian..... 870	Duty and Authority of..... 20	
Consolidation, Immaterial to Other Company..... 869	Duty of as to Keeping Lookout Ahead..... 933	
Contracts—		
Requirements Under with Turnpike Company..... 138		
Validity of for Necessary Ballast..... 902		
Controllers, Explosion of Controller Does Not Alone Create Liability..... 833		
Corporations—		
Character of..... 260		
Things Determining Character of..... 869		

Running Boards—	
Conductors on	933
Passengers May Assume to be Reasonably Safe	713
S	
Schools, Pupils of, Entitled to Special Rates of Fare	933
Seats, Permitting Children to Sit at End of, in Open Car	261
Signal, Duty of Conductor Before Giving, to Start	201
Signals, Negligence in Maintaining Night, on Center Poles	902
Snow—	
Care Required when Road Blocked with	445
Limit of Duty and Liability to Passengers on Cars Stalled in	370
Speed—	
Evidence as to Customary Admissible. Risks from Defective Cars Run at, Not Assumed	993
When Conductors on Running Board ..	933
Starting Without Warning and Running into Vehicle	993
Station, Right to Connect Elevated, with Store	201
Statutes—	
Applicability of Fellow Servants'	333
Construction of Wisconsin Relative to Condemnation	834
Liability of Directors Under	169
Power Under, to Acquire Existing Roads	445
Relative to Fares for Pupils in Public and Private Schools Construed ..	933
Requiring Vestibules Constitutional ..	681
Tax Liability Under Alabama	369
Tennessee as to Taxation Construed ..	933
Validity of Indiana Condemnation ..	741
Steam Roads, Liability to, for Repairs on Bridges	47

Steps—	
Passengers May Assume to be Reasonably Safe	713
Passengers Riding on Lower	713
Stopping—	
Duty of to Give Chance to Get Automobile Off Tracks	993
Near Ball Field	445
Stopping Places, Interurban	21
Store, Right to Connect Elevated Station with	201
Streets—	
Degree of Care Owed Travelers on ..	139
Liability for Repairs on Bridges as Parts of	47
Rights as to Constructing Switch Towers in	48
Street Railways—	
And Interurban Railways Distinguished Between	412
City Cannot Construct	230
Court Not Concerned with Municipalization of	201
System of Not Authorized	903
Power Under State to Acquire Existing What are	260
Superintendents, Power of, to Contract for Transportation of Passengers ..	994
Switch Towers, Rights as to Constructing in Street	48
T	
Tax—	
Bridge Toll Payments Deductible from Franchise	47
Traction Company Liable for But One ..	369
Taxation—	
Concerning, in Tennessee	933
Offices and Franchises Exempt from ..	681
Tickets, as Evidence	106
Time—	
Care Required when Cars are Behind ..	445

Unpublished Change of Running	168
Tracks—	
Abutters Cannot Enjoin Elevation of on Opposite Side of Highway	933
Care Required Riding or Walking Along Cars Leaving	993
Changing from Double to Single for Repairs	168
Invitation to Cross	902
Liability from Boy Putting Brick on ..	681
Moving of, to Meet Changes at Bridge ..	20
Ordinance Authorizing Moving Buildings over	169
Passengers Going on Other, After Alighting	681
Requirement as to, Under Agreement with Turnpike Company	138
Space Outside of, to be Repaired	168
Traffic, Right to Regulate	138
Transfers—	
Action for Penalty for Refusal of, Barred by Starting New Action ..	833
Conductors Refusing to Give, Provided Need Not be Asked for in Same Second of Time that Fare is Paid ..	139
Place of Taking Cars for	106
Right to, as Between Long and Short Service Cars	445
Right to, Limited to Direct Routes ..	412
Should Wait for Through Cars and Not Try to Use	138
V	
Vehicles, Rights of Drivers of Where Cars are Started Without Warnig ..	993
Vestibule Law is Constitutional	681
W	
Weather, Inexperience of Motorman, Notice of Incompetency for Bad	993
Wheels, Accident from Looseness of ..	138

ADVERTISING LITERATURE

A	
Adams & Westlake	323
Advertising Mirrorgraph Co.	420
Allen, John F.	971
Allis-Chalmers Co.	208, 269, 420, 777, 842, 878, 909, 942, 971
American Blower Co.	296
American District Steam Co.	148
Anderson Forge & Machine Co.	777
Arnold Co.	749, 807
Aurora Specialty Manufacturing Co.	323
B	
Battery Supplies Co.	807
Baumruk Fountain Brush Co.	296
Belden Manufacturing Co.	240
Berger Manufacturing Co.	807
Blake Signal & Manufacturing Co.	452
Boston Gear Works	208
Brill, The J. G., Co.	148, 240, 351, 777
Brown Hoisting Machinery Co.	389
Bryant Electric Co.	148
C	
C. A. Manufacturing Co.	452
Caldwell, E. R., & Co.	389
Cameron, A. S., Steam Pump Works ..	208
Carbolineum Wood Preserving Co.	117
Carey, Philip, Co.	972
Champion Rivet Co.	777
Chase-Shawmut Co.	177, 721, 807
Chicago Pneumatic Tool Co.	240
Cling-Surface Co.	972
Cook, C. Lee, Manufacturing Co.	269
Cooper Heater Co.	240
Cutler-Hammer Manufacturing Co.	240
D	
Dean Brothers Steam Pump Works	269
Dean Electric Co.	351
Dixon, Joseph, Crucible Co.	942, 1002
E	
Edwards Manufacturing Co.	777
Electric Service Supplies Co.	177, 269, 323, 452, 807
Electric Storage Battery Co.	721
Electrical Trades' Directory	842
Ellwood Ivins Tube Works	807
F	
Formacone Co.	389
Fox Machine Co.	87

G	
Garden City Sand Co.	177
General Electric Co.	57, 87, 177, 269, 351, 452, 692, 722, 749, 842, 942, 971, 972, 1002
General Fireproofing Co.	296
General Storage Battery Co.	777
Goheen Manufacturing Co.	296, 1002
Golden-Anderson Valve Specialty Co.	323, 942
Goldschmidt Thermit Co.	692
Green Fuel Economizer Co.	29, 269
H	
Harrison Safety Boiler Works	807
Hawley Down Draft Furnace Co.	117
Heany Fireproof Wire Co.	240
Hicks Locomotive & Car Works	87
Highland Park College	57
I	
Indianapolis Switch & Frog Co.	972
Ingersoll-Rand Co.	29
Interstate Engineering Co.	87
J	
Jeffrey Manufacturing Co.	777
Jewell Electrical Instrument Co.	240
Johns, H. W.-Manville Co.	296, 390, 452, 721, 722, 842
L	
Lagonda Manufacturing Co.	240
Lumen Bearing Co.	57
M	
McConway & Torley Co.	1002
McGregor, James F.	117
McGuire-Cummings Manufacturing Co.	240
McKenzie, Holland & Westinghouse Power & Signal Co.	420
Manufacturing Equipment & Engineering Co.	89
Milloy Electric Co.	909
Munsell, Eugene & Co.	971
N	
National Brake & Electric Co.	117
National Electric Lamp Association ..	29
Niles-Bement-Pond Co.	692
Northern Engineering Works	807
O	
Ohio Brass Co.	296, 452, 807, 942
Ohmer Fare Register Co.	323

P	
Pacific Coast Pole Co.	208
Power Specialty Co.	240
Price Publishing Co.	240
R	
Railway Specialty & Supply Co.	807
Reinforced-Concrete Construction Co.	117
Ridgway Dynamo & Engine Co.	721
Rockwell Engineering Co.	177
S	
Security Register & Manufacturing Co.	296
Simmons, John, Co.	807
Snow, Walter B.	721
Spencer Otis Co.	942
Sprague Electric Co.	351, 971
Stover Motor Car Co.	351
Sturtevant, B. F., Co.	57
T	
Teredo-Proof Paint Co.	721
Trolley Supply Co.	807
Tropical American Publishing Co.	351
Trussed Concrete Steel Co.	240
U	
Under-Feed Stoker Co.	240, 807
Underwood, H. B., & Co.	269
Union Switch & Signal Co.	269
Universal Portland Cement Co.	971
V	
Ventilated Cushion & Spring Co.	269
Vredenburg Co.	148
W	
Watson, John B.	942
Watson-Stillman Co.	240, 296, 389
Webster, Warren & Co.	148
Western Electric Co.	269, 452
Western Tube Co.	878
Westinghouse Lamp Co.	87
Westinghouse Machine Co.	878
Wheel Truing Brake Shoe Co.	177
Wickes Brothers	269, 351
Wilder Snow Plow & Manufacturing Co.	177
Y	
Youngstown Car Manufacturing Co.	296
Z	
Zelnicker, Walter A., Supply Co.	807
Zug Iron & Steel Co.	972

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 1

CHICAGO, JULY 6, 1907

WHOLE No. 219

TABLE OF CONTENTS.

Editorial:

Passing of Rapid Transit Commission.....	1
Comparing Ideas on Shops.....	1
Standard Shop Practice Discussed.....	1
Standard Form of Report.....	2
Supplying Maps with Timetables.....	2
Los Angeles Railway Shops.....	3
Indeterminate Franchises.....	3
Discipline and Contentment.....	3
Contactors with Controllers.....	3
Shops and Shop Practice of the Los Angeles Railway (Illustrated).....	4
The Public Utilities Commission of New York.....	11
New Shops of the Illinois Traction System at Decatur (Illustrated).....	13
Failure of Municipal Railway at West Seattle, Wash. By J. E. Glick.....	14
Ocean City Extension of the Atlantic City & Shore Railroad (Illustrated).....	14
Comments on Sale of Power. By S. B. Storer.....	17
Philadelphia Ordinance is a Law.....	18
Meeting of Executive Committee of the Manufacturers' Association.....	18
Piping and Power Station Systems—XLIV. By W. L. Morris, M. E. (Illustrated).....	19
Recent Electric Railway Legal Decisions. By J. L. Rosenberger.....	20

News of the Week:

Electric Railway Development in Indiana.....	22
Electrification Plans of the Chicago Milwaukee & St. Paul.....	22
Gigantic Subway Project for Chicago.....	22
New York Public Utilities Commissions Appointed.....	22
Boston Elevated Railway Files Plans for Cambridge Subway.....	22
Data Sheets on Maintenance and Inspection of Electrical Equipment.....	22
Hearing of Arbitrators in Chicago.....	22
Increases of Wages.....	23
Construction News:	
Franchises.....	23
Incorporations.....	23
Track and Roadway.....	24
Power Houses and Substations.....	25
Personal Mention.....	26
Financial News.....	27
Manufactures and Supplies:	
Rolling Stock.....	28
Shops and Buildings.....	28
Trade Notes.....	28
Advertising Literature.....	29
The New Departure Manufacturing Company (Illustrated).....	29
Van Dorn Automatic Couplers (Illustrated).....	29
High-Pressure One-Man Jack (Illustrated).....	29

No matter how effectively the public utilities commission may ever regulate transportation conditions in Greater New York, there will be regret at the passing of

Passing of Rapid Transit Commission. By the provisions of the new law the existence of this board was terminated. The value of the work of the commission in furthering the construction of the subway system is generally recognized. Its efforts were discontinued before the task was complete, but without the results achieved so far the problem of transportation in New York would have been more serious than it is today. The rapid transit commissioners have aided and encouraged the development of facilities. Their example in this respect should inspire the new public service commissioners to enter on their duties with the same motive.

Comparing Ideas on Shops. Good repair shops are now being erected in larger numbers than ever before. Each master mechanic has his own idea as to how a model shop for the road whose cars are in his charge should be built. To some small extent local conditions control the general design of new repair shops and the machine equipment

to be purchased. But is there not a considerable part of the repair work in any shop that, no matter of what type the rolling stock may be, can be handled more economically if those in charge are given the advantages of direct interchange of ideas? In a way the meetings of various electric railway associations offer the opportunity for an exchange of ideas, but such meetings occur infrequently, once in eight weeks, perhaps, being the shortest interval of time between the meetings of one body. The technical journals serve to keep one who reads them abreast of the times and furnish permanent records of the discussions that take place before the various associations. Both attendance at meetings of associations and careful reading of technical journals are excellent sources of education and should not be neglected by any superintendent of rolling stock who does not wish to remain in a rut. Yet we desire to call attention to another excellent means for broadening a master mechanic in his field

that was suggested at the recent meeting of the New York State association. This is that the managements of roads authorize those in charge of the maintenance of their rolling stock to devote a part of their time to visiting other shops. Such inspection tours will, in our estimation, bring direct returns of much value. The visitor and those whose shops he inspects will be given opportunity for an exchange of helpful ideas regarding the details of shop practice that are never discussed before an association.

Another phase of the standardization problem has been given prominence by technical discussion. Wisely recognizing the need for advancement in shop methods, the members of the New York state association at their annual meeting last week discussed the existing condition of repair shops and shop practice in their state.

Two interesting papers dealt with these subjects. They successfully brought forth a valuable discussion. The present lack of adequate shopping facilities was recognized and a plea was made for uniform shop methods which resulted in the appointment of a committee of three master mechanics who were instructed to study the situation and report "as to the design of a model repair shop." Such a move is direct recognition of the need for more seriously attacking the standardization problem—standard shop methods can with facility be practiced after, and not until, trucks and electrical equipment have been made with uniformity in their controlling dimensions. That the problem will be solved in the electric railway field as it has been in steam railroad practice is again and again evidenced by discussions of the subjects before such organizations as the American Street and Inter-urban Railway Engineering Association, Central Electric Railway Association and the Street Railway Association of the State of New York. Each of these associations now has an active committee upon which rests the responsibility of suggesting for future adoption standards for some parts of rolling stock equipment. The benefits to be shared after rolling stock has been standardized, and shared equally by manufacturer and operator, are too well known to be over-

here. We suggest that it is not now too early for those directly interested to begin collecting argumental data which they can use in discussing standardization when it is considered at the Atlantic City convention this fall.

The recent conference at Cleveland of the committee on a "Standard Form of Report for Electric Railways" and of the committee on "Interurban Accounts" of the American Street and Interurban Railway Accountants' Association was held primarily for the purpose of determining what changes, if any, were necessary in the present classification to meet the requirements of interurban railways. The report of the committee on "Interurban Accounts," containing a tentative classification of operating expense accounts, was discussed thoroughly, with a view to perfecting a classification which is amplified sufficiently to meet the requirements of accounting for all interurban railways. The expectation is that later meetings will take place, with the final result of a new classification which shall be recommended to the association. The interstate commerce commission, in the classification which steam railways are to follow from July 1, states that the accounts are prescribed for the use of carriers by rail, exclusive of electric railways. No announcement has been made concerning the accounting of electric interstate roads, but the growing importance of all interurban lines makes it advisable to consider the subject of a standard form of report at this time.

With the advent of summer traffic progressive roads are doing their utmost on every side to stimulate pleasure riding, and hundreds of dollars are being expended each week in important centers of trolley travel to secure patronage. The folder plays a far-reaching part in this work, and upon the completeness of its information depend many fares which may be lost if the schedules are unintelligible, the hints to through travelers confused, or the statements of the company ambiguous. There is still one feature of these folders which needs more general attention—the map of the system drawn to a definite scale. Many folders leave nothing to be desired in this respect, but others omit the map altogether, probably because of the cost of having a cut made and the time required to make the sketch originally. Such a policy certainly indicates a lack of foresight; the expense of a simple map printed on a scale suitable for the use of the public should not be weighed for a moment against its value in making the travel clearer. Even a single-track road without branches should be shown in this way, for there are usually connections of importance, either with steamboat lines or other railways, which ought to be emphasized. This is one of the small points of operation, but it is of larger consequence than many managers appreciate as yet.

It seems proper at this time to direct special attention to the article descriptive of the shops and shop practice of the Los Angeles Railway, presented in this issue. The question of adequate shopping facilities is now deserving of and receiving proper recognition. At the recent meeting of the Street Railway Association of the State of New York acknowledgment was made for that state, as it could probably be for many others, that the traffic and rolling stock of today have far outgrown the existing shop accommodations necessary for proper maintenance. Three years ago a like condition existed in Los Angeles, but today the Los Angeles Railway Company has a shop equipment that, as earlier stated, is deserving of special attention by those contemplating improved shopping facilities. In these shops,

as described, are practiced many advanced methods and ingenious "kinks" for reducing time and lowering cost of repair work. As a model on which to draw in planning its new shops the Los Angeles Railway fortunately had in the same city the older and somewhat larger shop establishment of the Pacific Electric Railway. The value of a combination of ideas has resulted in a new shop layout in which work can be handled in a very economical way and at low first cost for buildings as compared with many eastern shops. The point illustrated is that sound judgment, aided by a free exchange of ideas before beginning the construction of a shop, must result in a good product.

INDETERMINATE FRANCHISES.

In the early stages of street railway development it was generally assumed, erroneously, that a limited franchise would be renewed at maturity without difficulty, assuring a continuance of the relations between the company and the municipality. Promoters not only capitalized such franchises, but allowed the properties to be conducted for years without provision for depreciation or the establishment of a fund to restore the investment at maturity of the rights conferred. The risk of this practice is now fully appreciated; and appreciation of a danger is necessary to its avoidance.

The theory of some of the early managers was that a railway, if once established, could so demonstrate its usefulness and value that the plant could be perpetuated without serious difficulty.

Conditions, however, have not developed in accordance with this expectation. The relations of companies with the general public and the authorities of the cities served have been transformed into contests for profitable existence of the corporations. Many companies have learned the bitter lesson that it is wholly useless to grant concessions with the idea that they will appease popular wrath and political demagoguery. The giving of favors and added conveniences simply create a demand for more on the part of the element which most vociferously assumes to represent the true public opinion on this subject.

While a limited franchise is now assumed by state and municipal authorities generally to be the best form of contract between corporation and municipality, indeterminate franchises are evidently to be factors of more importance in the future. The indeterminate permit for utility corporations, excepting street and interurban railways, is the most important feature in the Wisconsin public utility bill. Although this bill is framed to apply only to corporations (and municipalities) which own or operate telephone, heat, light, water or power plants for public use, a measure has been introduced in the legislature providing for indeterminate instead of limited franchises for street railways. The provisions of this latter bill are similar to those principles which are embodied in the public utility law. A street railway would be authorized to surrender its limited franchise and secure an indeterminate permit. By so doing it would accept a provision enabling the municipality to buy the property at any time at a valuation to be established by the state railroad commission. The right to a court review is reserved, but the city might acquire street railway property by condemnation.

In states where the indeterminate franchise is to prevail it seems that in order to preserve the rights of property the wide latitude which is allowed in the bill is undesirable. Not only for protection to holders of stocks and bonds of the companies concerned, but in order to guard the taxpayers of the community from mistakes by the municipal government, free rein regarding so revolutionary a change as that to municipal ownership should be distinctly prohibited. Application of the indeterminate franchise under these unwise conditions is designed to increase the power of the municipality without proper regard for the rights of the corporation.

The entire administration of a law such as that proposed

in Wisconsin for an indeterminate franchise should be vested in no body of lower rank than a state board. To grant such power to each community served would create intolerable conditions whenever city officials were disposed to harass railways. The average city government is incompetent to exercise much authority over street railways. Filled with the idea of strenuously serving the people, many officials have made mistakes in public office which, when realized, have resulted in their repudiation. In the end, the majority of people in this country would seriously oppose municipal ownership of street railways, and would reject any officials who, through misguided ambition, might foist this costly system upon unwilling or indifferent communities. Only when the duty of the public to the corporation is recognized as clearly as the duty of the corporation to the public could an indeterminate franchise be just and successful.

To those who study the question it is evident that a franchise which is limited too strictly in time is not equitable because with a fare of five cents or less it does not allow a margin for depreciation, amortization and a fair return on the actual cash investment. Supervision by a capable governing body under an indeterminate permit would be vastly preferable for some companies to the distressing conditions under which they now worry along. There is no room for choice, for instance, between a confiscatory 3-cent fare and an able state commission, if such a commission could be secured, which would obtain facts representing the railway point of view before its decisions were made. If indeterminate franchises would assure a fair measure of justice and protection to street railways they are to be preferred to the disgraceful conditions prevailing in certain cities, where managers are not accorded the fair treatment deserved by honest men in charge of an honorable business. The danger of indeterminate franchises under a state board and the most favorable conditions is that the frequent changes of politics might influence its complexion and decisions.

DISCIPLINE AND CONTENTMENT.

One of the serious operating problems with which the management of a large enterprise may be confronted is discontent among the employees. This is especially true of electric railways. Few other fields present so great a variety of sources of difficulty in this regard as are to be found in electric railway operation. In other industries the employees are neither brought into such intimate contact with the customers, nor are favorable relations between the employees and the public so essential to success. Situations exist during rush hours, in times of delay and because of the natural tendency of the public to foster a grievance against a public service corporation, in each of which the platform man should represent the company's side. Resentment against the service offered by a railway company is often transferred to the employees, frequently resulting in heated arguments before passengers, and complaints being sent to the company. Such conditions naturally irritate the employees and breed in their minds discontent with their employment and the wages it brings. It is but natural for the men to feel that additional compensation should be received for the abuse to which they are subjected at the hands of the passengers.

H. H. Vreeland, president of the New York City Railway Company, very recently discussed these relations in an article entitled "Personality in Handling Employees," republished in the *Electric Railway Review*, June 8, 1907. Accurate department records are kept for all employees. This has resulted in a condition of more general contentment among the men, improved service and the attracting of a better class of men to fill vacant positions. The length of time that men remain in the service also has been considerably increased. Though Mr. Vreeland did not make the statement in so many words, the inference is drawn that the basis of

his system is the enforcement of strict and exacting discipline. There is a tendency in some quarters to be entirely too lax in the enforcement of discipline. Possibly strikes are feared. To our mind this is a mistaken idea—provided, of course, that discipline is unfailingly and justly enforced.

There are two fundamental traits of human nature which form the basis of all orderly relations between employer and employee. The first of these is the demand for and the appreciation of fair treatment; the second is that men either want to serve or be served, not both. An employee will be contented with his task if he feels that he must obey each and every order, and knows that he will always receive fair treatment. The best examples of the effect of these principles are found in the army and navy. In spite of even despotic rule, in some instances, the men in these ranks are almost without exception contented with their life. If one knows that his record, good and bad, is systematically kept and discipline is to be strictly enforced, contentment will follow fair treatment.

CONTACTORS WITH CONTROLLERS.

Hardly any cars are now equipped for interurban service that do not have some form of multiple-unit control. Three years ago this statement could not have been made, because at that time the purchasers of equipment were just being convinced of the now well-recognized value of under-the-floor current handling control. Even today there are large cars that have platform controllers for handling the current fed to quadruple equipment of 50 or 75 horsepower motors. Under such conditions the circuit-breaker over the motorman's head becomes an especially important part of the control system of the car. When large cars so equipped run through city streets or into terminal stations, the old style platform controllers cannot be relied upon to break the circuit from the earlier series positions. Therefore in working his way through a busy street a motorman with such equipment must trip the breaker frequently or otherwise badly damage his platform controller. The circuit-breaker was never designed for such frequent service and its use as a part of platform control on large cars is hardly warranted in the light of the more recent adaptation of multiple-unit switch units for this service.

At the Columbus convention several members of the Engineering association commented on the good results that had been obtained by using train-control switch units to break the heavy current at the first positions of the platform controller. Again the use of contactors in connection with platform controllers is described by G. H. Hill in his paper on "Recent Improvements in Motors and Control," presented at the annual meeting of the Street Railway Association of the State of New York. (*Electric Railway Review*, June 29, 1907, page 856.) The gradual increase in trolley voltage, due to resulting economy in distribution, warrants a more general adoption of this practice. Controller burnouts and flashings occur more frequently as the operating voltage is raised, and it is hardly possible that much more advancement can be made in the present type of platform controller. For financial reasons it is not to be expected that the platform controllers now used on large city equipments can be scrapped, but their use can be made thoroughly safe on the higher voltages by the use of two contactors of similar form to those used in train control, in connection with the cylinder, so that the contactors will make and break the motor circuits and thus take all the arcing. Such additional switches are placed under the car floor and can also be used as circuit-breakers if a tripping coil connection to the vestibule is provided. The applicability of such switches will no doubt result in the greatest good by permitting the use of higher operating trolley voltages on roads that desire to extend their lines without incurring the heavy expense attendant on increased substation capacity.

SHOPS AND SHOP PRACTICE OF THE LOS ANGELES RAILWAY.

During the past year the Los Angeles Railway Company, Los Angeles, Cal., has greatly increased its shop and car house facilities. In these improvements are to be found many interesting practices. This article describes in a brief way the

new structures at Division No. 3. It will be noted that the exterior appearance is pleasing.

At Division No. 2 are the main repair shops and a barn similar in design to that at Division No. 3, except that it is one-third larger. An accompanying illustration will serve to show the general arrangement of the buildings, with the storage barn at the left and the shop buildings at the right. A



Los Angeles Railway Shops—Panoramic View of Buildings, Showing Shops on the Right and Car House on the Left.

new shops and storage buildings of this company and outlines many of its more interesting shop methods.

Division Headquarters.

There are three division headquarters, each comprising a storage barn with facilities for light repairs and also accommodations for the operating department. The headquarters for Division No. 1 are located near the center of the city;

second story has been built at one end of the car house. It is utilized for division headquarters and employees' recreation rooms.

Shop Buildings.

As earlier stated, the shop buildings in which the heavy repair work for the entire equipment of the Los Angeles Railway is performed are at Division No. 2 headquarters. With



Los Angeles Railway Shops—Interior of Well-Lighted Repair Shop.

Division No. 2 has its headquarters at the south edge of the city; and Division No. 3 at the north end of the city. The buildings for Division No. 1 have been utilized for some time. The structures at Division No. 3 are new and comprise a storage barn, 580 feet long, with 15 tracks extending its full length, and a two-story brick building, in which are the operating offices for the transportation department and excellent recreation facilities for the employees of this division. Accompanying engravings illustrate the general appearance of the

the car house already mentioned the group of buildings fully occupies a piece of land one block wide and two blocks long. The buildings are all of brick with concrete foundations. Special care was taken in the design to provide for abundant illumination during the daytime, as will be noted in several of the halftone engravings accompanying this article.

The arrangement of the shop buildings about the transfer table is shown in an accompanying line drawing. It will be noted that the various departments are arranged so that work

can be passed from one to the other with the shortest possible movements.

Other than the buildings shown in the floor plan of the shops are a material shed 80 by 120 feet, in which the iron supply is kept, and a brick oil house located across the street from the storeroom.

Water and Air Supply.

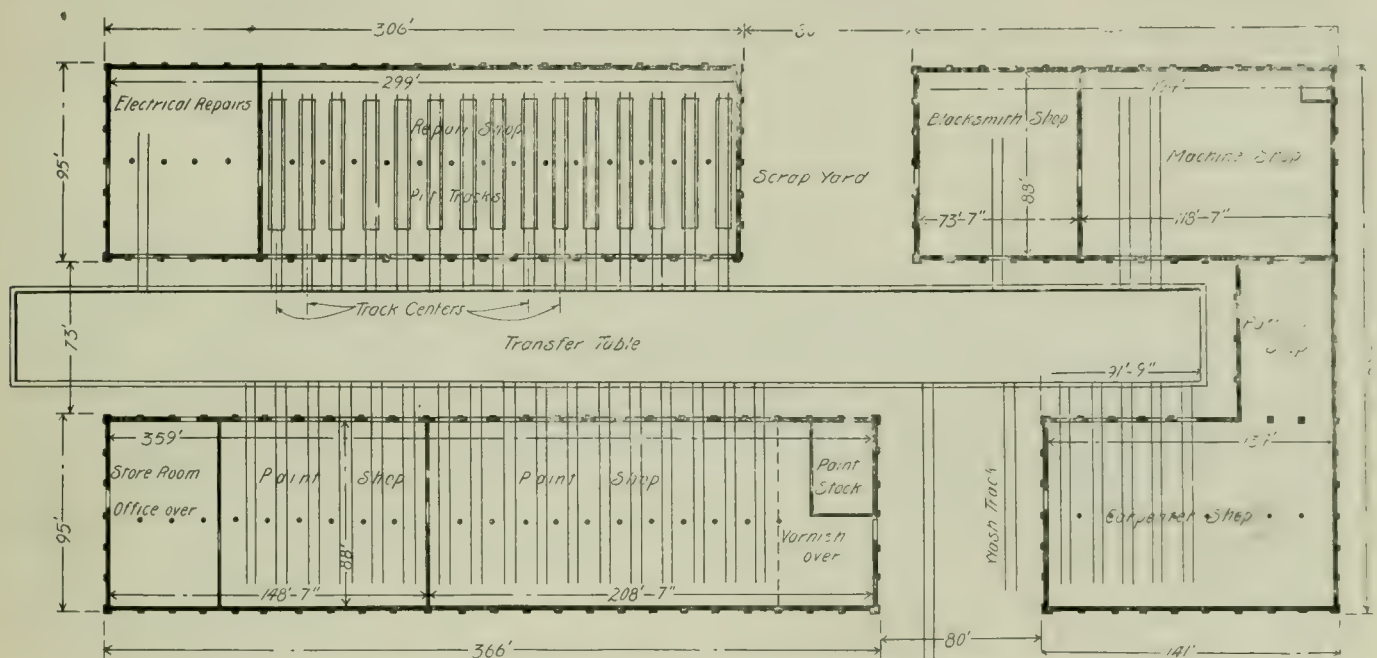
Near the oil house, which is shown in the foreground of the accompanying general view of the buildings, is a pressure tank for the shop water supply. This tank has a capacity of 24,000 gallons and supplies fire plugs located 90 feet apart along the walls of each of the shop buildings. The fire plugs are each provided with 50 feet of hose, and each shop has a portable reel on which is wound a section of hose 250 feet long provided with a nozzle. Reducers are placed at each fire plug so that the hose equipment of the city department may be used in times of emergency. This water system is supplied from a deep well located under the paint shop and served by a motor-driven pump.

To provide for the general use of air-operated tools a

60 pounds of air pressure. The coil is placed in a curved block supported on the work bench directly under the air cylinder, which also has its plunger fitted with a curved block. By means of a regulating valve the upper block may be brought down upon the coil with sufficient force to approach the normal conditions when the coil is clamped in the field frame. Thus any defects in the winding that otherwise might not appear can be noted with the testing set.

Coil-Winding Machines.

Some Westinghouse 38-B motors are used. These require curved coils. Such coils are wound on specially designed lathes, which are illustrated in an accompanying engraving. It will be noted that these lathes are driven from a jack shaft below the floor and each is provided with two coil forms, one on either end of its shaft. The speed of the shaft is controlled by a foot-brake and a belt-tightening pulley. A rope is wound around one of the pulleys on the shaft in such a manner that when the driving belt is loosened the shaft is not permitted to creep. These machines are utilized for winding both field and armature coils. While it probably takes more time



Los Angeles Railway Shops—Floor Plan of Repair Shops.

system of air piping serves all the shops and taps are also made about the shop yards. With a view to reducing the fire hazard small lockers have been built just outside the door to each shop, and in these is stored a sufficient supply of gasoline to last for one or two days. The offices of the master car builder and his assistants are located, as shown in the floor plan, over the storeroom at one end of the south building. All the departments are provided with a system of intercommunicating telephones.

Electrical Repairs.

The general repair shop and the electrical repair shop are housed in a building 95 by 299 feet in size and are set off from each other by a brick wall. The normal schedules of the Los Angeles Railway require 320 cars, and it is the plan of the shop management to inspect and overhaul the entire electrical equipment once each year.

Testing Field Coils.

All field coils are tested with a Century field-coil tester, which devices are used in the electrical repair shop and at division barns. To obtain the operating condition for a coil being tested it is placed under pressure in the compression device shown in one of the accompanying illustrations. This press comprises an air-brake cylinder operating with about

to wind curved coils to their final shape rather than to curve them after winding, nevertheless the practice of winding the coils to their final shape is deemed best by this company, since a proper fit and durability are thus insured.

Insulating Coils.

After the coils have been wound they are heated so that the moisture disappears, and are then dipped in black "Dielectric" insulating varnish. The immersion takes about 15 minutes' time, including that required for dripping. The coil is then heated in an electric bake oven. The temperature to which the coil is subjected is about 150 degrees F. It is next allowed to cool and the dipping process repeated. Then the coil is ready to be covered. The covering comprises three layers of canvas tape dipped in black varnish. It is finished with a layer of webbing tape, and completed with a coat of asphaltum paint. When thus insulated each coil is tagged with its date of manufacture and the winder's initials stamped on a fiber strip that is held in the webbing. All coils when ready for use are graded as either fair, good or new.

The dipping tank which is used in insulating the coils is built of steel and has two covers—one on the outside and hinged, the other on the inside and provided with an oil seal to prevent the evaporation of the insulating varnish.



Los Angeles Railway Shops—Interior of One of Two Similar Car Storage Barns.



Los Angeles Railway Shops—Exterior of Inspection and Storage Barn—Division No. 3.



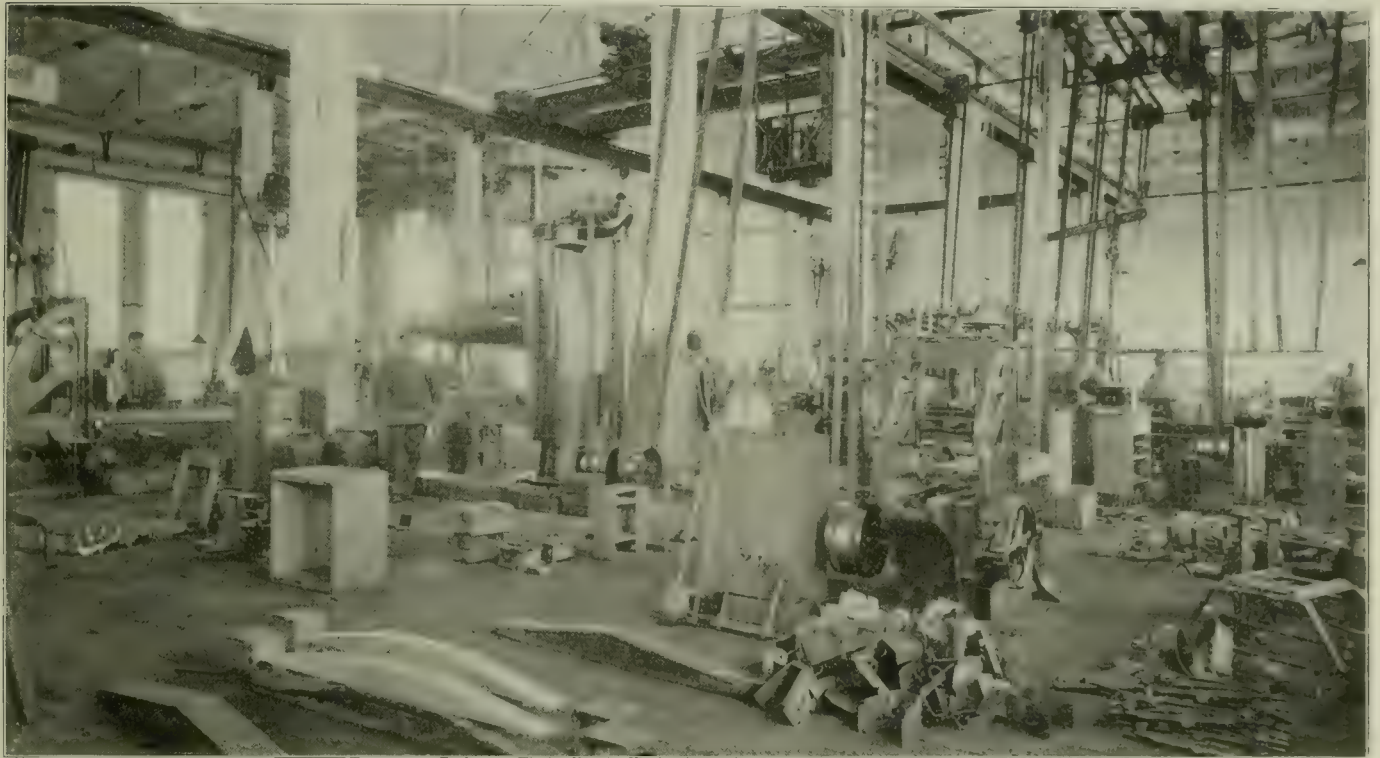
Los Angeles Railway Shops—General View of Machine End of Carpenter Shop.

These extra precautions that have been observed in winding and insulating motor coils have, by their results, shown the value of careful attention to details. During the past year this company has not had a single new or shopped coil break down, either from grounding or from moisture. The wire used in winding the field coils is the Heany fireproof insulated wire. It is stated that this wire is not used for armature coils because the life of an armature has been found to be about three years, and therefore it is not considered, on the score of durability, worth the extra expense attendant upon the use of a special wire. Armature breakdowns usually occur from mechanical strains and their resultant crystallization, and, while fireproof insulated wire will assure great freedom from electrical breakdowns, it does not increase the mechanical life of the copper wire itself. Therefore the special wire is used only for field coils.

The electrical repairs on air compressor motors are made in one corner of the electrical repair shop. It is the practice to overhaul all such motors each six months. The work is in charge of first-class mechanics and records of all details are kept as described for car motors.

General Repair Shop.

The general repair shop is about 275 feet long by 95 feet wide and has 16 pit tracks in it built on 15-foot centers. This latter dimension allows an abundance of room for staging between tracks and there is also plenty of room at either end of a car placed over the pit to work on the trucks. The pits are 4 feet 6 inches deep. Along the outer wall of the building is a work bench for making small repairs and at one end a portion of the floor space is set apart for making repairs to air-brake equipment. An accompanying interior view of



Los Angeles Railway Shops—General View, Showing Tools in Machine Shop.

Method of Recording Repairs.

As a means of recording the repairs that are made to armatures the superintendent of the electrical repair department keeps a record book which is ruled with the following heads, one page of the book being numbered and set apart for each armature: Date, nature of trouble and cause, out of car No., out of end No., date placed in, placed in car No., placed in end No., miscellaneous. The information for entering on the pages of this book is obtained as follows: Each armature is known by the builder's number, which is stamped upon it and which number corresponds with the number of the page in the record book on which all entries are made. The car inspectors make out blank reports for repairs necessary to each armature, which reports are ruled for information similar to that entered in the record book. These reports are kept on file in the shop office until the repairs have been completed, when the information on them is entered in the large permanent record.

By means of these records which are submitted to the head of the department each day it is possible for him to keep in close touch with the details of the work. And, since all steps in the work are recorded with the workmen's initials, incentive is offered for more careful and rapid work.

this shop will show the general arrangement and method for handling the work. In this shop all preliminary work is done so that no dismantling is required in the other parts of the plant.

Scrap Yard.

At the end of the repair shop and between it and the blacksmith shop is an open scrap yard 80 by 100 feet, in which all unused material is classified and stored.

Blacksmith Shop.

Reference to the accompanying floor plan will show the relative location of the blacksmith, machine and carpenter shops which are housed in a U-shaped structure, around one end of the transfer table. The blacksmith shop is 88 feet by 73 feet 7 inches in size and has one track entering it from the transfer table. The equipment in this shop comprises, besides the forges, two 1,100-pound steam hammers, a double punch and shear, eye-bolt machine for making all such bolts as are used in brake-hangers and by the line department, two small bulldozers for making light bends and a steam boiler to supply power to the steam hammer.

The railway company manufactures all its switch tongues and all the car trucks that are not purchased with new bodies.

During the past six months these shops have built 75 trucks of the type which is illustrated.

In one corner of the blacksmith shop is the bearing department. It is the policy of this road to wear down the axle

double-headed axle lathes, double-headed bolt machine, two 30 by 30 inch open-side planers, two small planers for special work, four drill presses, milling machine, 26-inch and 18-inch double-headed shapers, five lathes of various sizes, Universal



Los Angeles Railway Shops—Varnish-Drying Closet.

bearings to their smallest safe limit and then fill them with babbitt, anchoring this babbitt to the old bearing by means of holes drilled through it.

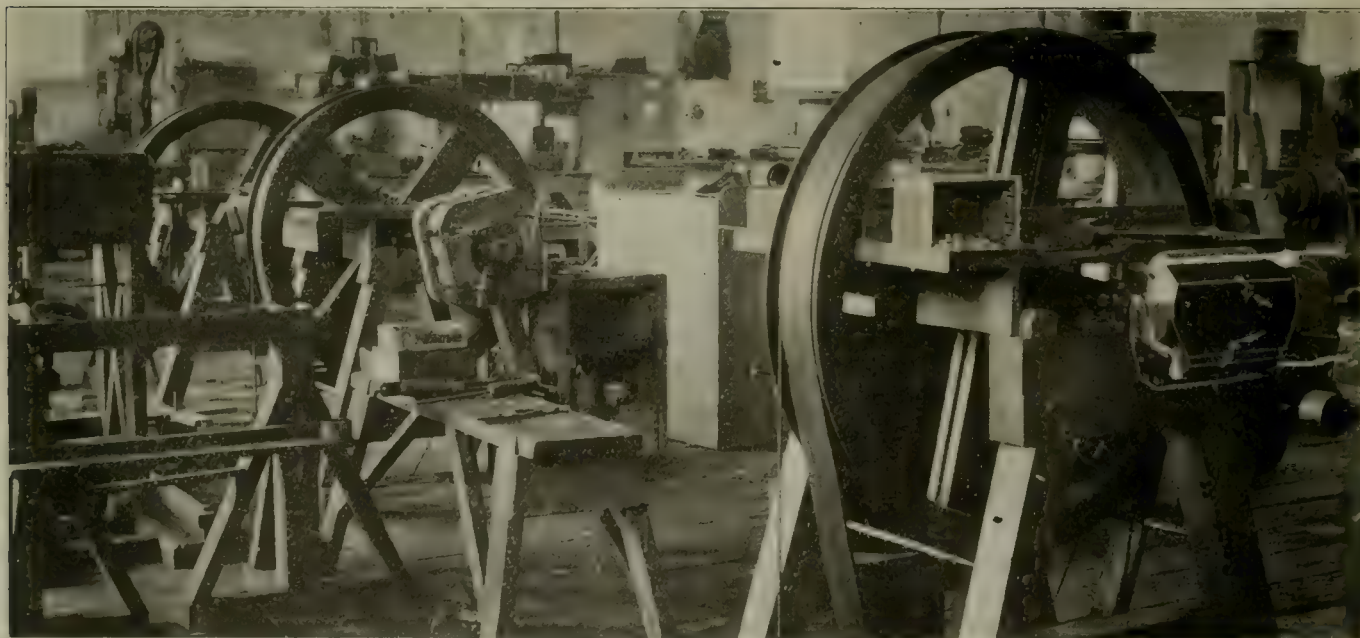
Machine Shop.

The machine shop, an interior view of which is presented, is 88 feet by 118 feet 7 inches in floor area and has two tracks



Los Angeles Railway Shops—Sand Blast for Frosting Window Glass.

drill, pipe cutters, belt-driven rail saw, wheel-boring mill and wheel grinder, together with emery wheels, grindstones, etc. One corner of the shop is partitioned off into a room for a toolmaker, in which all tools of a portable nature are kept. The toolmaker is provided with a Hendy lathe.



Los Angeles Railway Shops—Power-Operated Lathes for Winding Curved or Straight Coils.

entering it from the transfer table. The equipment of this shop includes the following tools: A 15-ton Niles crane, 100-ton Shafer hydraulic wheel press with a special form for pressing on or off wheels having solid gears on their axles,

At the opposite end of the shop a portion of the floor space is set apart for a tin shop. Here are made the gear cases for the car equipments. These cases are of galvanized iron with wrought-iron reinforcements along the joints and felt

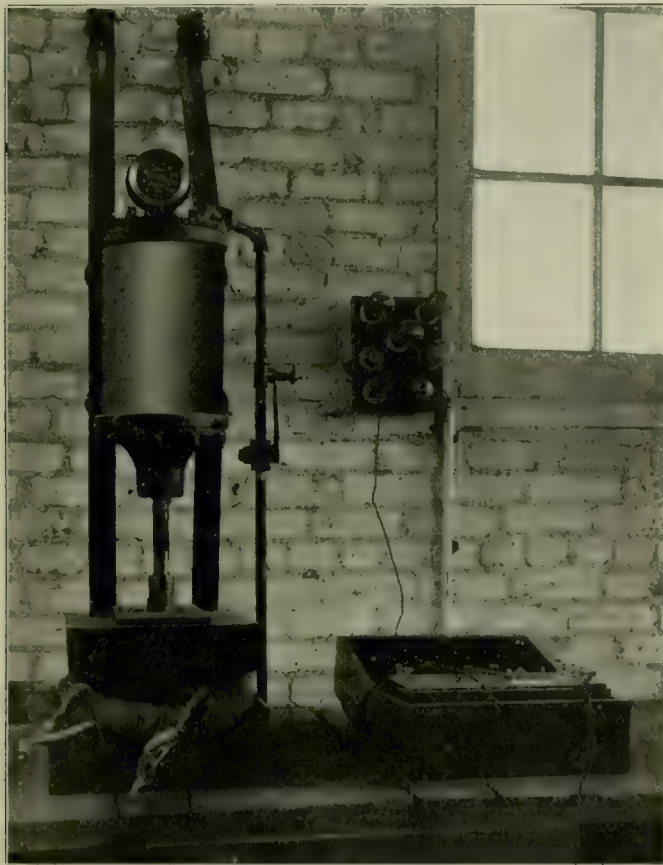
washers to exclude dust. Special benches are also provided with smaller tools and jigs for use in repairing fare-recording registers.

Standardization.

The mechanical department of the Los Angeles Railway is well advanced toward a thorough standardization of car parts. The trucks are built so that parts may be taken from any one to repair any other. The advantage of this practice is much appreciated in the storekeeping department, since there are with standardization but few kinds of supplies required for the same duty.

Some few years ago the rolling stock of this company required for its maintenance 19 different axles. This number has now been reduced to two, and it is stated that there will soon be but one axle, standard for all equipment. All axles are made of a suitable size for driving axles and are so carefully made with templates that they are interchangeable. A new axle is run as a driver for two years and six months and then is transferred to be used as an idler. This change is timed so that it occurs when a gear is pressed off. All axles are made from Jones & Laughlin special cold-rolled steel, which is purchased in carload lots already cut and centered to a length of 5 feet 7 inches.

At the east end of the machine shop a special equipment



Los Angeles Railway Shops—Air-Operated Press for Putting Field Coils Under Pressure While Testing.

is provided for the construction and erection of the special track work used throughout the entire system.

Carpenter Shop.

The carpenter shop is 88 feet wide by 134 feet long, with an ell of about one-third the floor area, which is used as a pattern shop.

Five tracks from the transfer table enter the carpenter shop. An accompanying illustration will serve to show the interior appearance of this shop. It will be noted that all the tools are driven from counter shafting located beneath the floor. This shafting is operated by a motor controlled from

the carpenter shop floor. All the electric wiring is carried in iron piping. The machine equipment of the carpenter shop includes a planer, band and rip saws, molding, tenon and jointer machines, automatic saw grinder and lathes.

Paint Shop.

The paint shop is 208 feet 7 inches long and has track facilities for holding 36 cars at one time. At one end of this shop on a balcony is the varnishing floor and below the balcony is a paint stock room, as shown on the floor plan. In the paint stock room are kept all the paint and varnish supplies.



Los Angeles Railway Shops—Baskets for Holding Car Fittings While Varnish is Drying.

The mixing is done by two men who handle the supply of paint, oils and brushes and deliver them on requisition over a counter. In this way the cost of painting each car may easily be determined.

All varnishing, upholstering and curtain work is done on the balcony earlier mentioned. One of the accompanying illustrations is a view of one of four drying closets which, it will be noted, are provided with adjustable racks and curtains to keep the freshly varnished parts free from dust.

Another illustration shows the baskets which are used for holding, during varnishing, all the small strips of wood, such as window stops, grille rails, poles, etc., for one car. When such parts for one car are received in the varnish room they are all grouped in one of these baskets and kept in it while in that shop. For identification the number of the car is chalked on the basket.

The wash track is provided in the 80-foot space between the paint and carpenter shops. It is the practice to wash each car every six weeks.

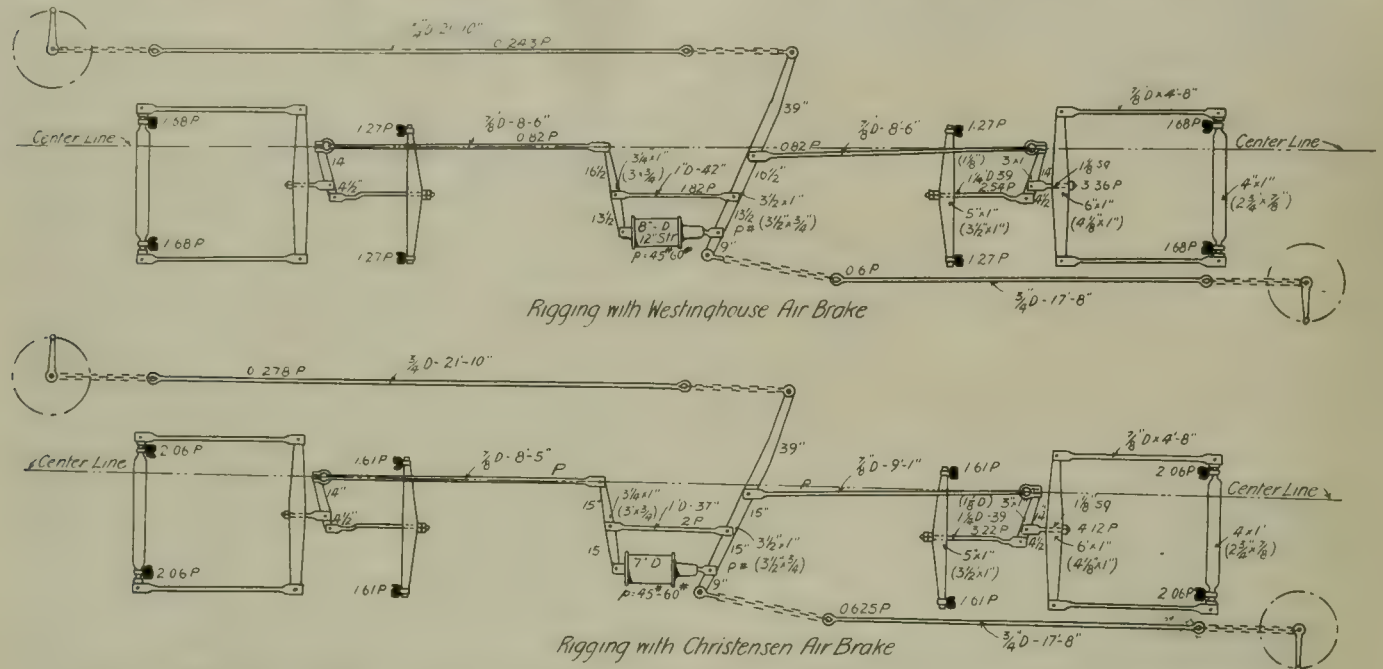
Grinding Glass.

It is the practice of this paint shop to utilize all broken glass of any size for small window openings. The window frames of all cars and the sash are exactly alike in dimensions and therefore interchangeable. By means of a sand

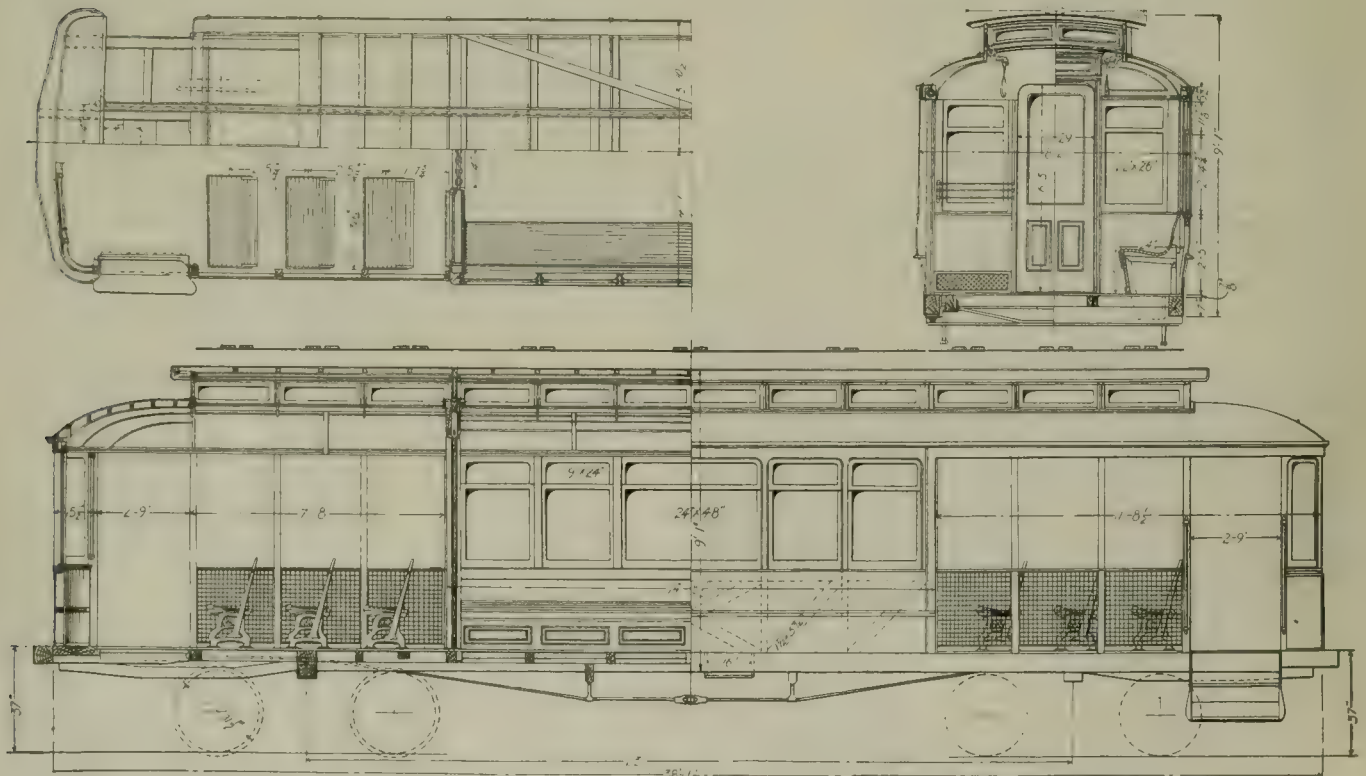
blast outfit, which is illustrated; old smooth glass after having been cut to the proper size is ground so that it may be used in such places as the front opening of the deck. Before grinding the old glass is cut to fit the largest standard size for which it is available. The grinding outfit comprises a closed box with an air syphon taking air from the shop sup-

ply, which forces the clean sand against the smooth glass held in a zinc frame, and thus quickly gives it a frosted appearance. The glass for destination signs is also ground in this way, rendering it rough, so that it will hold the paint more permanently.

The repair shops have recently rebuilt 48 cars to con-



Los Angeles Railway Shops—Air-Brake Rigging and Stresses with Westinghouse and Christensen Equipments.



Los Angeles Railway Shops—Section, Elevation and Half Floor Plan of Standard Car.

ply, which forces the clean sand against the smooth glass held in a zinc frame, and thus quickly gives it a frosted appearance. The glass for destination signs is also ground in this way, rendering it rough, so that it will hold the paint more permanently.

Rolling Stock.

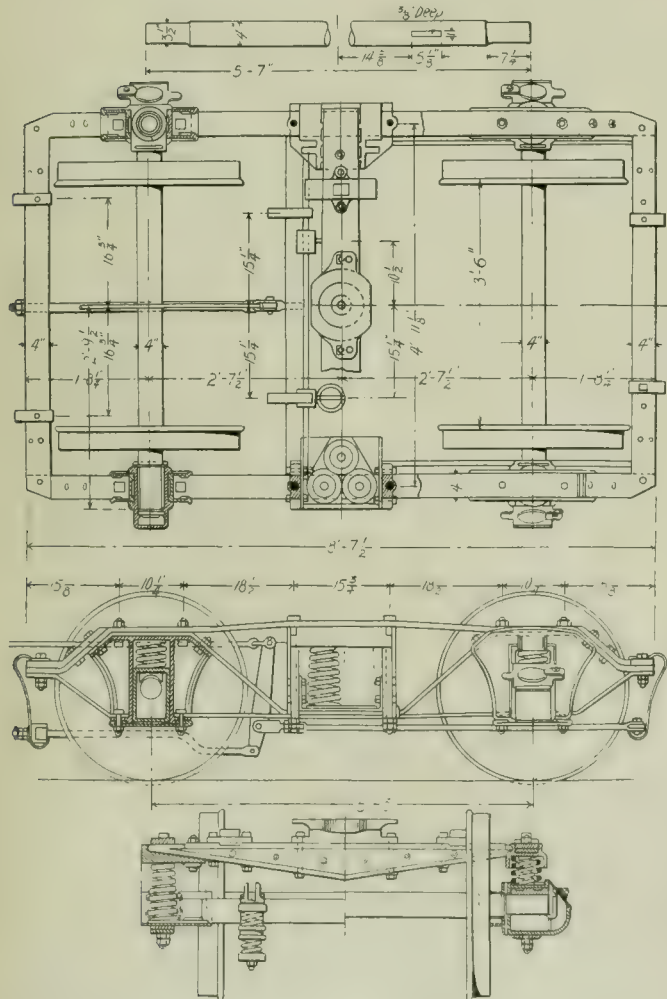
The repair shops have recently rebuilt 48 cars to con-

form closely to the dimensions of this company's standard car, as shown in an accompanying illustration. This reconstruction included the standardization of all parts and the changing of the bumpers from square-front angle irons to the solid bumper of the angular shape shown in the engraving. It will be noted that the car bodies are 9 feet 1 inch

throughout the length of the car with no bends. Wherever bends are used in the air piping they are made with a long radius. It is interesting to note that there are only six elbows and two keys in the air piping of an entire car.



Los Angeles Railway Shops—Sanitary Wash Basins Supplied in Each Shop Department.



Los Angeles Railway Shops—Plan, End and Side Elevations of Standard Motor Truck.

Each car has two Westinghouse type-M circuit-breakers with only one transferable handle. The use of one handle avoids any possibility of blundering on the part of the car crew, since the motorman, in transferring from one end of the car to the other, must necessarily open the breaker at the

end he is leaving before he can withdraw the handle to carry it ahead.

The electrical control wiring is all carried in an 8 by 10 inch pine box covered with waterproof paint and strapped to the floor. This box extends along under the side seats, as shown in the cross section of the car body, and serves to protect the wires from the wheel-throw. The controller leads are all taken through a metal base to the main leads in the cable box below, thus doing away with the usual controller connection board, and permitting all the joints to be soldered and protected in the box below.

The lamps for illuminating the car are grouped in five four-lamp clusters, wired in series with the headlight, so that no extra resistance is required. There is also an extra circuit to be used in the event of damage to the headlight circuit.

This type of car with the equipment described weighs complete when ready to run 32,100 pounds, the body weighing 13,500 pounds.

THE PUBLIC UTILITIES COMMISSION OF NEW YORK.

Discussion Upon Action to be Taken by Public Utilities Associations with Reference to the New Law.

At a special meeting of the Empire State Gas and Electric Association, held at the Hotel Champlain, Bluff Point, N. Y., on June 27, immediately following the annual meeting of the Street Railway Association of the State of New York, held at the same place on the two preceding days, an instructive discussion took place as to action that it may be desirable for the various public utilities associations of the state to take with reference to the public utilities act passed by the state legislature, and which went into effect on July 1. The following is an abstract of the discussion:

Chairman Thaddeus R. Beal (Poughkeepsie) called the meeting to order and said: It might be appropriate, for the information of some of you gentlemen who were not at the last meeting, and who are not members of the association, to state the reasons for having a special meeting of the association at this time and this place. When the public utilities bill became an assured fact it was felt that inasmuch as the Street Railway association and the gas and electric industries, as represented by the Empire State Association, were put in pretty much the same class as far as regulation was concerned, there might be worked out some scheme of co-operation between them. The Street Railway association invited our executive committee to attend its convention held here during the last two days. I was not here and am not familiar with all that was done, but I think there is a pretty general feeling that some scheme of co-operation between the two associations might be and ought to be worked out.

Chairman Beal introduced Mr. J. N. Shannahan, ex-president of the Street Railway Association of the State of New York.

Mr. Shannahan—When I wrote Mr. Palmer, the president of your association, inviting the executive committee of your association to be the guests of the Street Railway association of this state at its annual meeting just closed at this hotel, I hardly could hope that he would call a general meeting of your association at this time. Had I had any idea that that would be the result, I should have taken the liberty of urging upon him that your meeting be called for the same dates as the meeting of the Street Railway association. There are a number of questions which might properly come before such a meeting. The first one that occurs to me has been in the mind of all street railway men in this state since January 1, namely, the questions, the changes, which are necessarily brought up by the radical and drastic provisions of the new public utilities act, which, so far as it relates to the railways, steam and electric, changes the entire existing law. As a consequence of that act a condition is created which must compel all public utility companies to get closely together. It creates a community of interest, and it seems to me that both associations should seriously consider a closer relationship. That question is a very serious one. Our own association has been in existence a long time. This has been our twenty-fifth annual meeting, and I suppose in the minds of a good many of the members, especially the older members, there would be grave doubt as to the wisdom of our giving up our identity by merging with other public utility companies. On the other hand, there would be very many advantages in doing so. While I am not officially connected with the Street Railway association—that is, I am not an officer for the en-

suings year, and owing to my removal from the state of New York I will be obliged to sever my connection with that association the first of July—nevertheless, I believe that this subject will come before that association at its first quarterly meeting, the question of a closer relationship with your body, and my impression is that there will be a committee appointed to consider that matter, possibly inviting co-operation, or urging upon you the advisability of the appointment of a similar committee from your association to meet with them. I think it is a question which you should seriously consider. Would it not be possible to organize an association of all the public utility companies in this state, somewhat along the lines of the American Street and Interurban Railway Association, with branches?

Chairman Beal—It seems to me the situation is that the state, having for purposes of economy and for better administration, and because the industries overlapped, thought it best to combine the street railway and the gas and electricity commissions, we had better combine our associations, because in our work we could more efficiently administer one association and effect economies, because our questions overlap.

Arthur Williams (Yonkers Electric Light Company)—There has been lately a movement which has met with some success to bring the national bodies in touch with one another, not in the nature of amalgamation, but to have a point of contact in the formation of public policy committees; and recently the street railway association and the electric light association have appointed a committee on two points of contact, and I understand that other interests are very enthusiastic along the same lines, and that the gas interests, through their association, have either done something already or are contemplating it, so as to bring those four great bodies practically together and unite them for work which is of a common nature, such as work of publicity, meeting and considering adverse and unfair legislation, and considering those standards of morality for the conduct of corporations which best conform to enlightened public sentiment. Now, whether in the state associations the various utility companies could be consolidated, I do not know. There are problems that are common to all and there are problems that are not common to all, but are peculiar to each. Personally it seems to me that the plan which the national bodies are contemplating, that of maintaining their separate identity for the purpose of developing and specializing their own separate fields, and then merging on points of common interest, is perhaps the best. There is a large amount of work which is of equal importance to all.

Public Utilities Law.

Chairman Beal—It has been suggested that we take up a question we are all very much interested in, and that is a discussion of the public utilities law.

W. W. Freeman (Brooklyn Edison Company)—We have been operating under a commission for a year or more past, I think it is safe to say, without entire satisfaction to all of the companies. I think we can start out in connection with the present commission with the distinct idea that the disposition of the commission will be restrictive throughout. If investigations are to be made as to prices we have got to meet the situation that the commission will decide against us on every debated question. If applications are made for the issue of securities, our applications will be granted only if we are within our rights in the law and can enforce those rights in the event of refusal. I do not quite share the optimistic view in respect to the commission that some hold. My experience with the present commission and my expectations with the new commission are that we will only get what they are required under the law to give us. Now, it seems to me, that being the case, we ought to be in a position to point out very decidedly, and with a strong front, the inequalities that arise through the operation of the law. We asked for amendments. They were not granted. All of us believe that the present law is unnecessarily drastic and that the companies should be allowed privileges which they will not enjoy as the law stands at present. It has been intimated very strongly that the law will, in its operation, indicate amendments that should be adopted in fairness to the companies, and we have been invited, as I take it, to point out certain features of the law that can with justice to all concerned be amended by later sessions of the legislature to bring into effect what it is claimed is desired, simply a proper control of utilities, with no unnecessary hardships upon the companies. I think it would be very helpful if this association could secure, through its members, a complete record of every transaction that goes through the commission, and then at the close of the year, or such period as will meet the question properly, with all these data before us, we would be in a position to go to the legislature and say: "Such and such is what you claim will be the result of the operation of this law. These are the facts, these are the disadvantages under which we have been

operating, these are the hardships that we have had to contend against," and ask for relief that is reasonable, but relief, that would be called for in such a way that it could not be reasonably resisted. It seems to me that perhaps at the present time, in viewing the outlook as we can fairly, that is the most we can hope for. If we ask for what we are clearly entitled to, what cannot be denied, we are likely to get it. If we ask for more we are likely to be trimmed down to that point. The best way, perhaps, to avoid the most drastic action on the question of rates is to look after our own fences in our own communities. That is perhaps the best way to avoid action in that regard, and keep ourselves thoroughly posted on what is done, and prepare ourselves by this means to argue for the relief that we ought to get as the result of the operation of the law for the first year.

J. M. Wakeman—I was very much interested in what Mr. Freeman said in regard to the various companies reporting applications and the action or inaction of the commission. It seemed like a very effective way of getting valuable information on the commission and on the restrictions and hardships imposed, and there is very decided advantage in the utilities associations getting together. I would like to make a suggestion, if it meets with the approval of the members here, and that is that a public utilities state committee be appointed, composed of one or more representatives from each of the New York state public utilities associations, such as this one, and that those reports be sent to that committee, and that the annual report of the committee be read at the annual meeting of each of the associations. In that way the electric light, gas and street railway reports would all center in that one committee, and that annual report would be of interest to each of the state associations when they met the following year, to see what had been done during the year. If such a committee could be formed it would only mean one or two members from each association attending the meetings of that committee, and then making their report to the association.

Mr. Freeman—What my thought was was to get a line on the commission as to the time required to act on specific applications and how it transacted its business. That would have to be obtained, I think, through the records, and then I think that, having a personal interest in each case, that would help the person reporting to point out any features of the application or of the action on the application which would have a special bearing upon our desire to learn how efficiently the commission acted and how fairly it acted along all lines. That could only be brought out through the report made by the individual company that was particularly in mind when making the report, the very points we want to get at. Now, I think the present commission has acted in a manner that has been very restrictive and very dilatory in many applications, and has only granted applications that were of a kind where their action could only be one way, after unreasonable and inexcusable delays. I think that, now the challenge has practically been thrown out to us to show wherein this law is operating unfairly and in an unwarranted way, we ought to get together all the facts and get our ammunition in such shape that we can utilize it in our interests. I think that the basis of the information must be the report of the individual companies drawn up in such shape as to give the very matter we want to know, and in the most incisive way.

Mr. Macdonald—I want to second Mr. Wakeman's suggestion, and with his permission I would amend it so that it would be a committee of about six from this association, to confer with an equal committee from the street railway association, and all the information suggested by Mr. Freeman could be obtained by that joint committee.

Mr. Wakeman—Then I will restate the motion, that this meeting refer to the executive committee of this association for consideration and action the appointment of a public utilities state committee composed of representatives from this association, to collect information relative to the action of the public utilities commission in regard to applications made to it during the year, and suggest to the executive committee of the Street Railway Association of New York that they also appoint such a committee; that those two committees shall meet jointly and make a report which shall be read by the secretary of each association at the annual meeting of the associations; that the committee consist of three members from each of the associations, the secretary of each association being a member ex-officio, the secretaries to obtain the information presented to the committee, and the secretaries to make a report to the respective associations at their annual meetings.

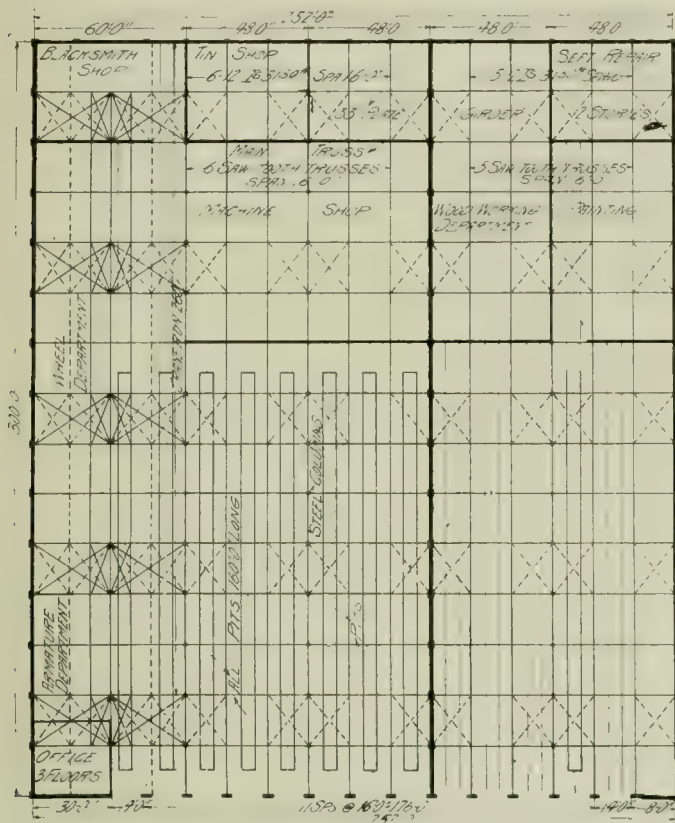
The motion was carried.

Coal oil or water, states Copper and Brass, is the best lubricant to use in the machine working of aluminum. Water is just as good for this purpose as coal oil, if used in sufficient quantity.

NEW SHOPS OF THE ILLINOIS TRACTION SYSTEM AT DECATUR.

The Illinois Traction Company of Champaign, Ill., has recently purchased 40 acres of land just east of the city limits of Decatur, Ill., on which to erect a number of new shop buildings. Through the courtesy of L. E. Fischer, general manager, and W. H. Lienesch, architectural engineer, we are able to present several of the latest plans of the new buildings. Decatur is located very nearly in the center of the system and the new buildings, which are located on the new Decatur-Champaign line, will be used as the main shops, machine, paint and carpenter, and all interurban cars will be repaired here. A branch line will be built to the Decatur-Bloomington division, so that cars can be brought to the shops from the northern division for repairs without passing through the streets of Decatur. The buildings to be erected,

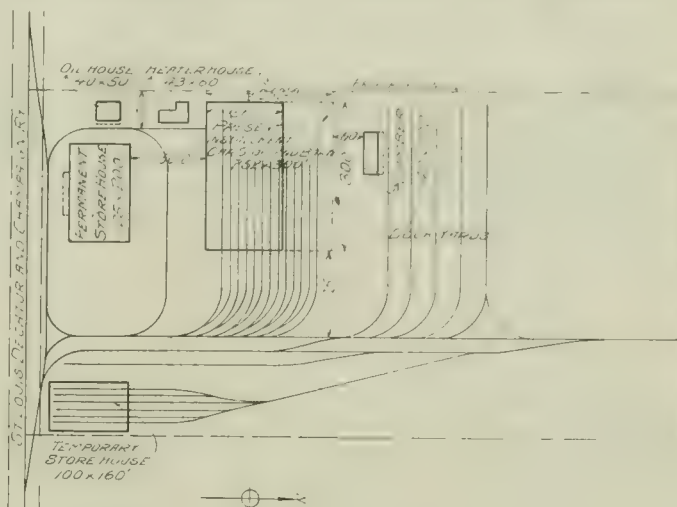
shop building will be of brick and steel frame construction, with concrete floors. The saw-tooth roof will be standard asbestos roofing manufactured by the H. W. Johns-Manville Company. The woodwork under the roof will be treated with one coat of white fireproof paint, which, in conjunction with the white asbestos roofing, is expected to insure perfect light-



Decatur Shops, Illinois Traction System—Floor Plan of Car House and Repair Shop.

as shown in the accompanying layout, include: A main shop, 252 by 300 feet; permanent storehouse, 125 by 200 feet; lumber house, 40 by 100 feet; oil house, 40 by 50 feet, and heater house, 43 by 60 feet. A temporary steel storehouse, 100 by 160 feet, with roof and sides of corrugated iron, has already been erected, and will be used as a distributing point for stores for the entire system until the permanent storehouse is completed, when the building will be used as a car house. Contracts for the steel work on the other buildings have been let to the Decatur Bridge Company.

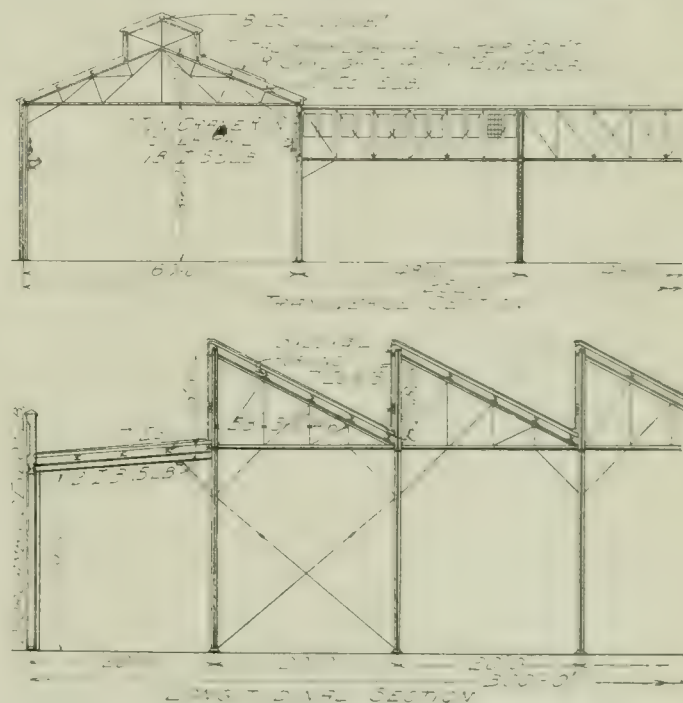
We present herewith a plan and sectional views of the main repair shops. The part of the building that will be erected this year is 156 by 300 feet; the remainder of the building will be erected next year. This building will contain car storage space, offices, armature and wheel rooms, and blacksmith, woodworking, machine, varnish and paint shops, arranged as shown in the plan view. The southeast corner of the building, containing the offices, will be 67 feet high, with two stories. The remainder will be 32 feet high. The



Decatur Shops, Illinois Traction System—General Layout of Shops and Yards.

ing. The steel framework will be painted black and it is expected that the contrast between the steel framing and the roof framing will give a very pleasing effect.

There will be 13 tracks entering the building, eight of which will be equipped with inspection pits, which have not yet been detailed, but which will be designed along entirely new lines, so as to make the construction as convenient as



Decatur Shops, Illinois Traction System—Sectional Views of Repair Shop.

possible for the workmen. The entire machine shop side of the building, that is, the portion including the armature department, wheel department, and end of machine shop, will be commanded by a 15-ton crane, spanning the 60-foot bay and running from office to blacksmith shop wall. This building is expected to be completed ready for occupation by fall.

The permanent storehouse, which is also to be built this

year, will be a brick and steel structure of the slow combustion type. The oil house and heater house will be strictly fireproof brick and steel structures, with concrete floors and roof. The storage of sand, coke and coal will be taken care of in the heater house. The lumber shed will be simply a steel canopy without sides. These smaller buildings have not yet been designed.

A part of the 40 acres purchased by the company will be set apart for dwelling houses for employees. The company will sell the land to its employees on easy terms and will aid them in building the houses. By this means it expects to obtain a better class of men to work in the shops.

FAILURE OF MUNICIPAL RAILWAY AT WEST SEATTLE, WASH.*

By J. E. GLICK.

In 1904 the residents of West Seattle, Wash., were seized with the idea that a street railway system owned and controlled by the municipality would be a great thing. Funds were appropriated and a contract let for the building of 1½ miles of track. The contract price was \$18,000, but when ready for service and equipped with two cars, the line had cost \$23,000. A power station was erected and filled with second-hand machinery. The two cars were single-truck, Hammond type affairs, bought from the scrap pile of the United Railroads of San Francisco.

Although the "system" looked very well on paper, the service was poor, repairs had to be made continually and the people who supplied the money for the experiment looked in vain for a reduction of taxes by reason of dividends.

The officials of West Seattle did their best to keep up the illusion that the municipally owned railway was a success, by a system of reports which showed the receipts of the road, but not the expenses for repairs. For one entire year the "profits" of the road amounted to only 84 cents a day. For 1906 the reports showed a slight increase in "profits," but the showing on the right side of the ledger was not enough to overcome the bills for repairs.

It cost the taxpayers of West Seattle \$24 a day to operate the line and to furnish street lights along the route, but even with this small daily outlay the line was not a success. There were no "high salaried officers" to be paid, but about all of the daily revenue was required to keep the line in operation.

During the last six months of municipal ownership the taxpayers became very much dissatisfied with the system. A survey showed that in order to be of reasonable service the line would have to be entirely rebuilt, as the old cars and machinery were really unfit for use. Several public meetings were held and it was deemed inexpedient to continue the experiment further and spend a considerable amount of money replacing worn out cars and dynamos. It followed that the question of disposing of the system was discussed and finally put to a vote about the middle of February, 1907. The proposition to quit municipal ownership was carried by a large majority.

The Seattle Electric Company, which operates the traction lines in Seattle and adjacent territory, bought the West Seattle "system" and a franchise for \$30,000. General satisfaction was expressed by the taxpayers when the deal was consummated and the town was at last rid of its white elephant. For 30 months the people of West Seattle had worried along with poor service in hopes that municipal ownership would be made to pay, but when they finally realized the hopelessness of continuing the struggle they surrendered gracefully and admitted that the venture was not a success.

As soon as the West Seattle "system" passed into the hands of the Seattle Electric Company, alterations, repairs and extensions were made. The town now has a much better service than it had before and the patrons of the line are getting value for their money spent in fares.

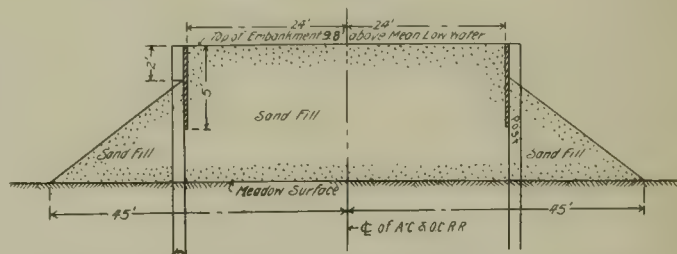
*Abstract of article in Public Service.

OCEAN CITY EXTENSION OF THE ATLANTIC CITY & SHORE RAILROAD.

The Atlantic City & Shore Railroad is a high-speed line extending from the Boardwalk at Atlantic City, via Pleasantville, to Somers Point on Great Egg Harbor bay, from which terminus passengers may reach Ocean City by ferry. The line makes a detour to avoid the lake and salt marsh region which lies between the mainland and the islands on which Atlantic City and Ocean City are located. In Atlantic City the company operates a 2-mile loop, known as the Central Passenger Railway. On this loop a local business is done with small city cars, equipped with GE-800, GE-62 and Westinghouse 12A motors. The route terminating at the Steel Pier on Virginia avenue is used by the through cars between Atlantic City and Somers Point. These cars have seats for 52 persons. Each car is equipped with four GE-87 motors of 60 horsepower each, and fitted with both trolley poles and third-rail contact shoes. The equipment is designed for multiple-unit control.

Routes.

After leaving the tracks of the Central Passenger Railway these cars operate over a private right of way to the Beach thoroughfare, which is crossed on a drawbridge. A viaduct over the steam lines of the Pennsylvania and Read-



Ocean City Extension—Hydraulic Fill Across Meadows—Scale Distorted.

ing railroads and the West Jersey & Seashore third-rail line to Meadows Tower is next crossed. Between Meadows Tower and Pleasantville the route is by the third-rail line of the West Jersey & Seashore Railroad. From Pleasantville to Somers Point the roadbed is a reconstructed single-track steam road. This has been double-tracked with 85-pound rails and provided with catenary overhead construction.

An extension of the line is now under construction from Somers Point to Ocean City. When this is completed the two popular summer resort cities, Atlantic City and Ocean City, will be connected by a high-speed route for electric cars. At Somers Point the company is now spending \$250,000 in building a park, which will be a strong incentive to travel.

The new line across Great Egg Harbor is being built under the name of the Atlantic City & Ocean City Railroad. The distance from Somers Point to the proposed terminal at the Pennsylvania station in Ocean City is two miles. For about one and a quarter miles of this distance the rails will be laid on trestle work and for three-quarters of a mile on a fill of unique construction. The trestle is single-tracked, but a 1,000-foot passing siding will be laid on one of the islands crossed.

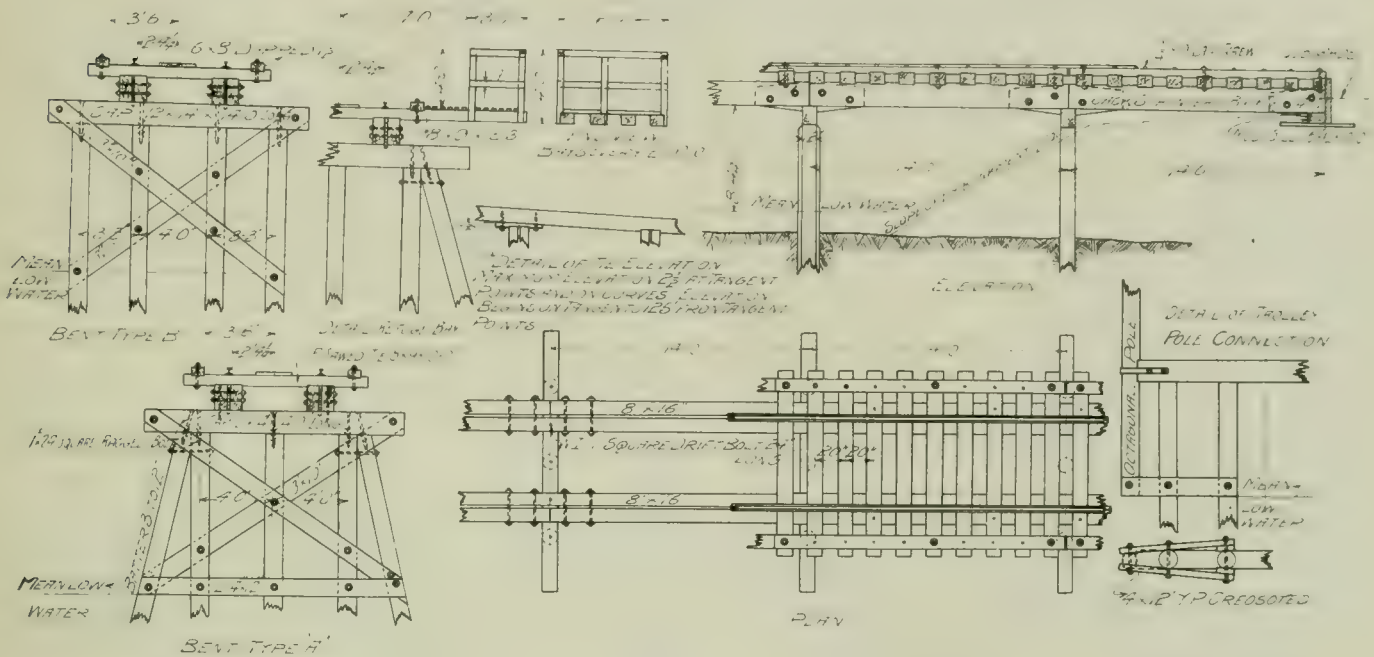
As shown on the accompanying map, the line crosses four islands and five channels. The two main channels between Somers Point and Island No. 1, and between Ocean City and Island No. 4, will be spanned by trestle work and steel drawbridges. In addition to the drawbridges the line will have one fixed span in the Rainbow channel.

Trestle Work.

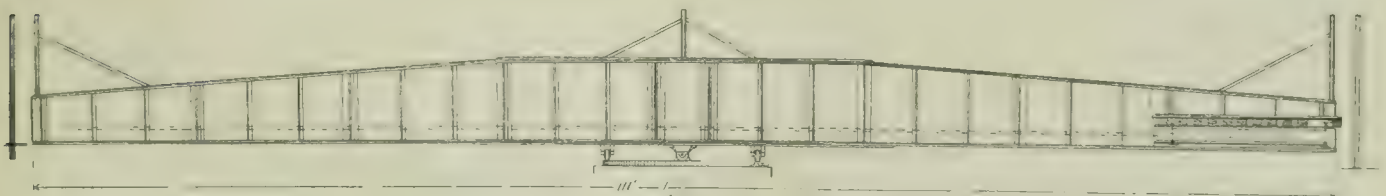
Steam railroad standards are being maintained in all of the construction work, and the trestle is an example of substantial engineering practice for work of this kind. In



Ocean City Extension—Deck Girder Drawbridge.



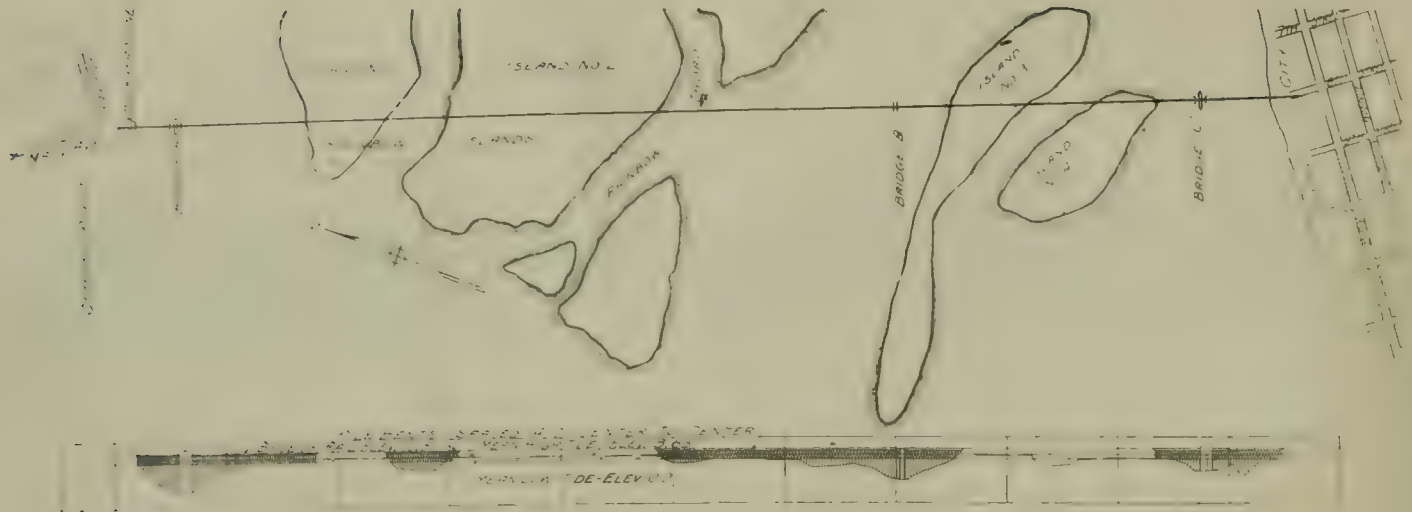
Ocean City Extension—Details of Standard Pile Trestles.



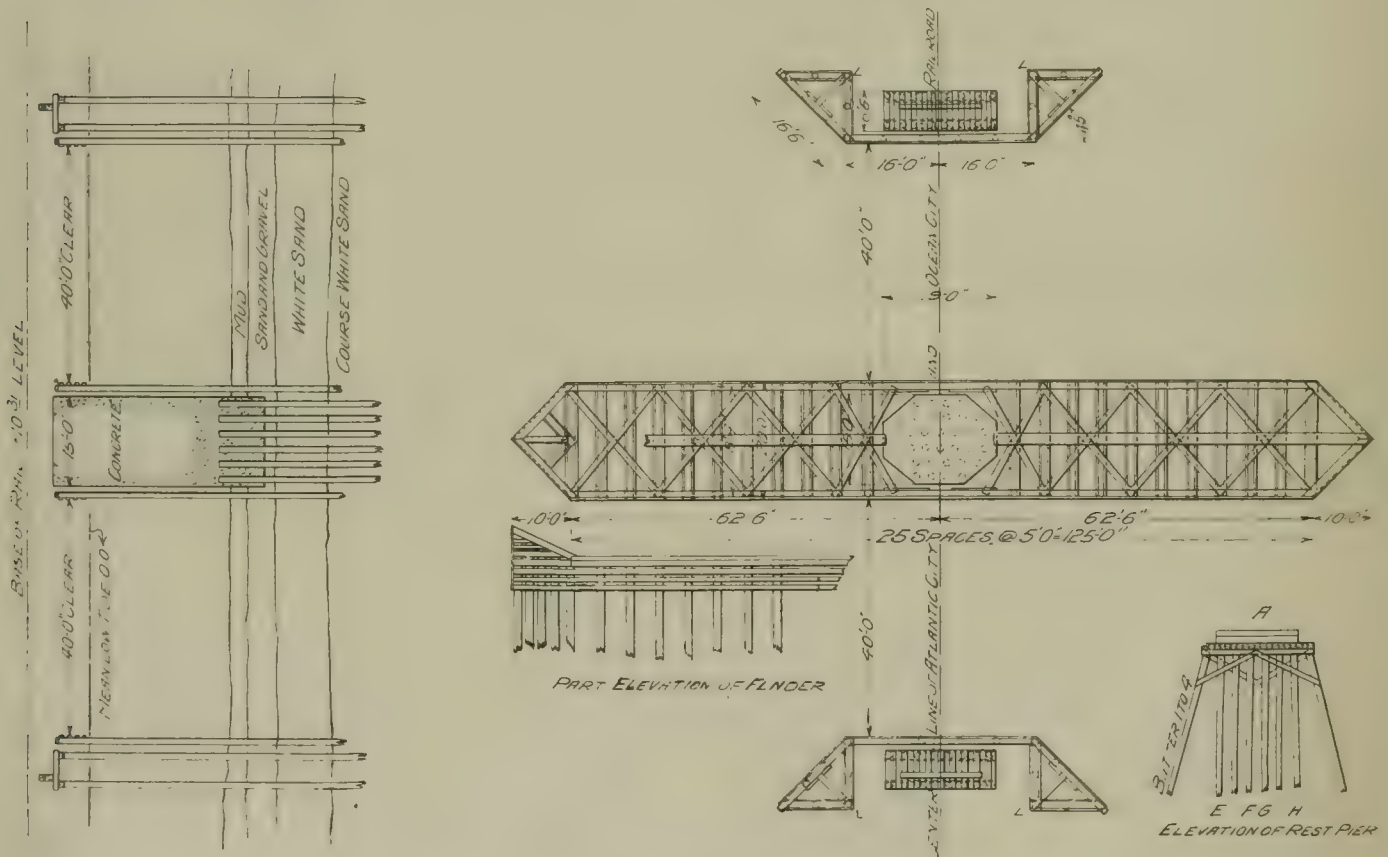
Ocean City Extension—Type of Plate Girder Drawbridge.



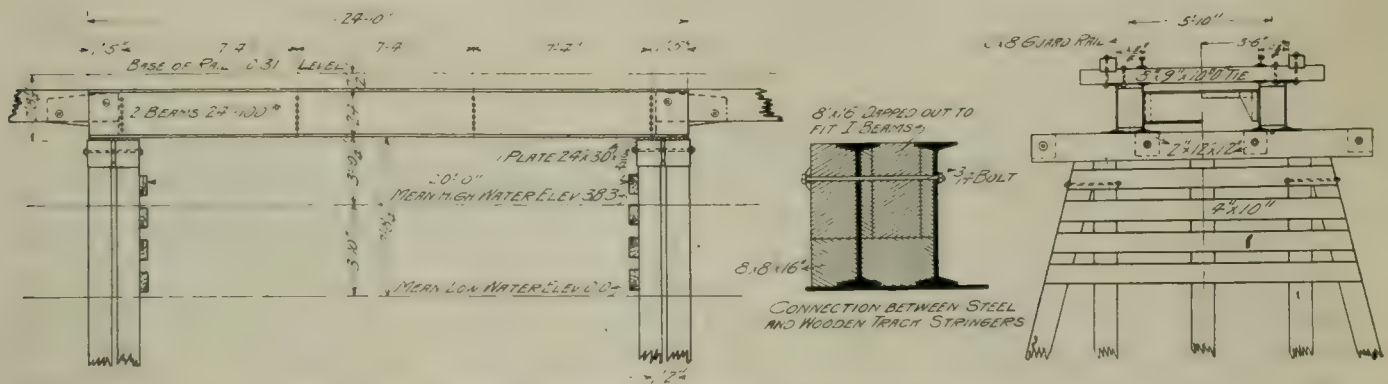
Ocean City Extension—Through Girder Drawbridge, Opened.



Ocean City Extension—Map of Extension and Profile Showing Fills and Trestles.



Ocean City Extension—Plan and Section Showing Detail Arrangement of Pivot and Rest Piers.



Ocean City Extension—Connection Between Steel and Wooden Stringers.

many places the engineers found solid bottom with a good deal of difficulty. The creosoted piles forming the trestle bents vary in length from 45 to 70 feet. Accompanying engravings showing the standard trestle bents, which are 14 feet apart on centers, indicate very clearly the type of construction adopted.

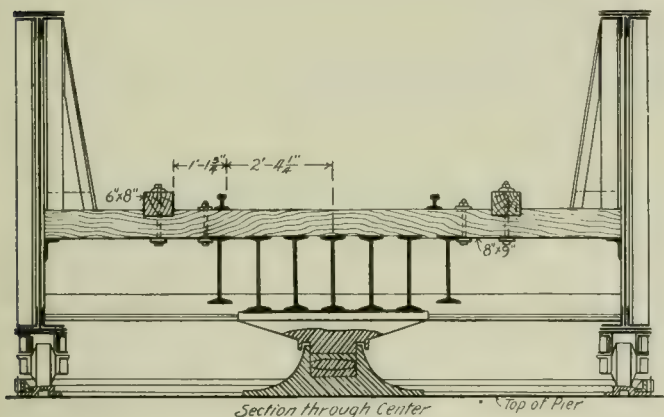
The trolley poles, which are of octagonal shape, are bolted to the piles and strapped to the cross timbers at every eighth bent, as indicated in one of the accompanying engravings. It will be noted that a refuge bay is built every 200 feet. The trestle work is being built by Armstrong & Latta of Philadelphia. The piles for this work, about 2,100 in number, constituted one of the largest orders ever supplied by the Norfolk (Va.) Creosoting Company. The piles were sunk with an ordinary hammer and a steam pile driver.

Fill.

The embankment over each of the four islands is made, as shown in the engravings, of beach sand pumped from the bottom of the harbor by a hydraulic dredge. This embankment is 200 and 300 feet wide at the base, the roadbed at grade being 50 feet. The hydraulic dredging work is being done by N. Risley & Sons.

Bridges.

As previously mentioned, there will be two steel draw-bridges. These will provide two 40-foot and 30-foot channel



Ocean City Extension—Section Through Plate Girder Draw-bridge at Pivot.

openings, respectively, and the length of draw will be 112 feet and 92 feet, respectively. The bridges are being built by the Penn Bridge Company of Beaver Falls, Pa., and are of heavy plate girder construction, swinging on concrete pivot piers 15 feet in diameter, supported by wooden piles capped with concrete, as shown in the accompanying engraving. The resting base for the concrete portion of the pier is in sand and gravel. The only other bridge on the line is one fixed span in Rain-bow channel over a 20-foot clear opening.

Operation Features.

The new line will be in operation during the present season. Current for the extension will be supplied from a substation at Somers Point. The present schedule from Atlantic City to Somers Point is about 35 minutes, and when the work is completed the operating department expects to carry passengers from the Boardwalk, Atlantic City, to the Boardwalk in Ocean City, in about 40 minutes. The operation of the line is in charge of S. S. Neff, superintendent, who has been prominently identified with engineering and operating problems on steam and electric roads for more than 20 years, and whose experience as superintendent of the Union Elevated Railroad in Chicago, and as consulting engineer of the Boston Elevated Railroad, gives the Atlantic City road a resourceful operating official.

It has for some time been understood that it is the

ultimate intention to extend the line to Cape May, and it is probable that the construction of the Atlantic City & Ocean City Railroad is but the beginning of a comprehensive scheme of development for this interesting property. The construction of the extension is in direct charge of R. I. D. Ashbridge, chief engineer, with headquarters at Somers Point. The designing engineers and general contractors were Stern & Silverman, Inc., Philadelphia.

COMMENTS ON SALE OF POWER.*

BY S. B. STORER, NIAGARA LOCKPORT & ONTARIO POWER COMPANY.

In a paper presented before you last year on the "Sale and Measurement of Electric Power," the writer outlined a system of charging that he believed to be based on equity, and which was developed only after a careful study of the factors entering into the cost of power at the switchboard and of those pertaining to its wholesale and retail distribution. Since that time a more extended opportunity has been given for its study and adaptation to varied types of power plants, at the same time affording opportunity for criticism by those interested in the making of power contracts. In general the criticism has amounted to unqualified condemnation of the contract, as submitted by the Niagara Lockport & Ontario Power Company, on its first reading by a prospective user of power; to be followed a little later by the reluctant admission that perhaps it was not entirely one-sided after all. Almost invariably the final judgment has been a complete approval of the system in so far as its intent and results under it are concerned, but the statement has frequently been made under just such circumstances that there was much room for improvement in the way in which it was expressed in the contract. This point has been well taken and recently a new contract form has been prepared in which, it is believed, many changes for the better have been made along those lines without in any way affecting the intent of the contract.

Recognizing the Load Factor.

Practically every large power company is today embodying in some form in its contracts the agreement that the price at which power is sold shall be dependent on the load factor. In a number of such contracts the question of measurement of the maximum demand is left entirely open—thus avoiding, for the time being, any vexatious disputes about peak loads. All this tends to simplifying the contract very greatly, but it will be found that the disputes will come sooner or later, and, realizing that fact, the writer has taken the ground that all disputes or possible misunderstandings should be thoroughly settled previous to the execution of any power contract.

It is to be regretted that many delays in delivery of apparatus and line material have so far postponed the supply of power by the Niagara Lockport & Ontario Power Company to its numerous customers that no adequate idea can be given at present as to the general working of the system. To the few consumers, however, who are now being supplied, it seems to be entirely satisfactory.

Peak Loads.

As might be expected, considerable difficulty has been experienced in getting a meter that will successfully measure a 1-minute peak load. But this is only another example of the delays incident to the development of new instruments under existing manufacturing conditions. Such an instrument is entirely feasible, and will certainly be on the market very shortly, regardless of delay and difficulties experienced in the past.

The question is often asked as to why so short a time as one minute should have been selected in the determination of maximum demands, but such questions are nearly always prompted by the desire of a prospective buyer to get just as much for as little as he can. One way of answering the question is by asking another one, i. e., why should so long a time have been selected? As a matter of exact justice there is no reason why power sold on a maximum demand basis should not be charged on the true maximum demand, whether it lasted one second, or an hour, or a day. Where power is sold on a kilowatt-hour basis, the consumer might just as well ask for an agreement whereby the kilowatt-hour should be calculated on the basis of 70 kilowatt-minutes as to ask that a maximum demand should not be deemed to have occurred unless it had lasted for several minutes.

Some power companies avoid disputes over duration of peak loads in determining the maximum demand by incorporating in their contract form an optional use of 1-second peaks, 1-minute, 3-minute or 5-minute peaks, with a different

*Paper presented at the annual meeting of the Street Railway Association of the State of New York, June 25-26, 1907.

rate per horsepower per year for each case. This use is, however, optional only with the power company. This is exactly in accordance with a statement made by the writer in the discussion following the presentation of papers on power matters last year, in answer to a criticism offered at that time, that is, a longer period than one minute for the power in order that a proper revenue might be realized by power company.

It is also noticed that the highest maximum in the month is used in many places, rather than the average of the daily maxima, as the amount to be charged for. This also tends to simplify matters, but to the writer it does not seem to give an accurate or an equitable basis for charging. Of course, it may be equalized to a certain extent by the price, but it could not be made to apply alike to all classes of consumers, at a uniform schedule of prices, without working an injustice to some.

The better method seems to be to set aside an amount of power for each consumer, that may be termed "firm" power or "reserved" power, which fairly represents the ordinary daily requirements; and to permit demands in excess of this amount within specified limits, to be charged for only on the days on which they occur. In other words, it is much more equitable to charge for the average of the daily maximum demands for a given month than to make the single extreme in the month the basis of such charge.

In conclusion it may be said that the movement for a fair and consistent way in which to supply electricity for all kinds of purposes has reached such a proportion as to make it almost a certainty that within a comparatively short time it will be possible for any consumer, no matter what his needs, to obtain whatever he may require on such terms as to put him on an equality with all other consumers. And such an equality can never be obtained by the use of a straight kilowatt-hour charge, but only by the combined use of a kilowatt-hour charge and a maximum demand or service charge.

PHILADELPHIA ORDINANCE IS A LAW.

Mayor Reyburn of Philadelphia signed the new Philadelphia Rapid Transit Company ordinance on July 1. The contract between the city and the company was also executed, so that the ordinance became effective on the same day. At the meeting of city councils, William H. Carpenter, president of the Union National Bank, and Clarence Wolf of Wolf Brothers & Co. were elected to represent the city on the board of directors. The mayor also becomes a director. Stockholders will hold a special meeting on July 18 to ratify the contract. The main provisions of the ordinance are as follows:

Fifty-year profit-sharing contract, dating from July 1, 1907, between city and company, to supersede and cancel all existing contracts, agreements and bonds between them or between the city and the subsidiary companies.

Company required to establish a sinking fund for retirement of its capital stock of \$30,000,000 at the end of 50 years.

Company required within 30 days to call in its unpaid capital stock by \$5.00 instalments so that the whole amount shall be paid up by December 31, 1908. Whole amount thereof to be expended upon completion of present projects and further improvements and betterments.

City May Purchase in 50 Years.

City reserves right to purchase all of the property, etc., of the company, subject to all indebtedness now existing or hereafter lawfully created, upon July 1, 1957, or upon any July 1 thereafter, by serving six months' notice, on payment of an amount equal to par for its capital stock of \$30,000,000, plus any additional capital stock issued with the consent of the city.

These rights of the city are assignable and may be sold at public auction to the highest bidder therefor.

The ordinance entitled "An ordinance to regulate passenger railways," approved July 7, 1857, all supplements thereto and all other ordinances and parts of ordinances and all contracts inconsistent with the contract are repealed, canceled and annulled, but the city retains the right to make all rules and regulations relating to the operation and management of the company's lines necessary for public health and safety.

In lieu of car licenses and paving streets, etc., the company is required to pay to the city the following fixed annual charges in equal monthly instalments: During the first full term of 10 years next succeeding the date of contract, \$500,000 a year; next 10 years, \$550,000; third full term of 10 years, \$600,000 each year; fourth full term of 10 years, \$650,000 each year; and fifth full term of 10 years, \$700,000 each year. For paving of streets hereafter occupied by track extensions the

company is charged a further fixed amount annually based on a scale of a stated sum per square yard according to the character of paving.

Nothing in the contract is to make the city liable for any of the debts, obligations or liabilities of the company.

Broad street subway franchise is canceled. Frankford elevated franchise confirmed and time for construction extended for three years from June 1, 1907.

Sinking Fund Property of City.

When the sinking fund reaches \$5,000,000 the company is required to pay the money to the city treasury, and the same is thereupon to become the absolute property of the city.

Company is prohibited from assuming further leases, obligations or guarantees, or parting with any of its stocks, leaseholds or franchises without consent of the city.

Councils may determine upon routes of new surface, elevated or subway lines, and if company fails to accept same within 90 days the city may offer the franchises to those who will undertake them.

The mayor and two citizens of Philadelphia, to be chosen from time to time by councils to serve for four years and until their successors are elected, without incurring any liability as directors, to be directors of the company.

The city to receive one-half of all dividends paid by the company in excess of 6 per cent per annum on the actual amount of capital paid into the company's treasury.

City comptroller to have access to company's books, accounts and vouchers to verify its financial statements by examination and report the result to councils.

Company prohibited from further increasing its capital stock or funded indebtedness without consent of councils.

All certificates of stock and leases held by the company to be stamped across the face that they are held subject to the terms of the contract.

The company has voluntarily waived its rights to lay tracks on Broad street on condition that the privilege shall not be granted to any other corporation.

MEETING OF EXECUTIVE COMMITTEE OF THE MANUFACTURERS' ASSOCIATION.

The report of a meeting of the executive committee of the American Street and Interurban Railway Manufacturers' Association, held in the Engineering Societies building, New York, on June 28, has been received from George Keegan, the secretary.

The resignation of C. C. Peirce (General Electric Company) as chairman of the entertainment committee was accepted, and he was made executive committee member in charge of entertainment. A. L. Whipple (Curtain Supply Company) was appointed chairman of the entertainment committee to report to the executive committee through Mr. Peirce, executive committeeman in charge of entertainment.

Mr. Peirce, as chairman of the badge committee, submitted a number of designs of badges and one of the badges submitted was accepted. The chairman of the badge committee was authorized to make the necessary arrangements and purchase the required number of badges at a cost not to exceed \$1,400.

An informal discussion was had concerning some of the difficulties encountered by the supply men at Atlantic City and the contract entered into by this association was read and discussed. It was not clear to a number of members that the contract was specific enough in reference to the control of the exhibits. Inasmuch as some of the exhibitors during the last convention were in doubt as to who was in control of the exhibits, it was the opinion of the committee that there should be a definite understanding to the effect that the exhibits were absolutely in the control of the executive committee. There was also some contention regarding hotel arrangements and a committee was appointed with instructions to go to Atlantic City and have a definite understanding regarding these various matters. The motion also provided that all expenses of this committee were to be borne by the association.

It was decided to change the membership applications issued hereafter so that on the face of the application blank the applicant would have to agree to abide by the constitution and by-laws of the Manufacturers' association.

PIPING AND POWER STATION SYSTEMS—XLIV.

BY W. L. MORRIS, M. E.

The artesian well is very seldom found within the power station, though there is no reason why it should not be, and there are many good reasons why it should be in the main building, as the cost of the pump house would be dispensed with. Further, being in a high-roofed room it would be very easy to remove the pump rods from the casing or raise the casing itself if necessary. The reason that artesian wells are generally located in separate buildings is that designs for the power house are completed, decided upon and work on the power house started before work on the deep well is undertaken. If a deep well and its drive head are to be located in the main building, it is necessary to decide this point long before work is started on the buildings in order that the well drillers may complete their work and remove their drilling derrick before work on the buildings is started.

In order to avoid having the well interfere with the location of some other machinery, it is absolutely necessary that its location be very carefully considered before the well drilling is started. Such is, however, not the general method of doing things.

In most cases the well is not located and the contract is not let until the water is absolutely needed. It is because of the order of doing things that the artesian well is located outside the power house, not that it is not wanted inside, but simply because it would seriously delay the construction work. When drilling a well a steam line should be run from the power house to the driller's outfit, rather than rely upon the small vertical boiler of the latter's apparatus. Much time and money can be thus saved by avoiding delays, etc.

Unless an artesian well has previously been drilled in the chosen locality, little information will be obtainable to guide in determining what difficulties will be met in drilling or what the capacity of the well will be. Drilling for water is much the same as drilling for oil. Both quality and quantity are unknown. An abundance of water may be had at one elevation and by going deeper a different kind of water and a different quantity may result. Ordinarily the water closer to the surface, say at a depth of 50 to 100 feet, would contain a large amount of lime or magnesia. Generally the best water is obtained after drilling through rock. If satisfactory water, but in an insufficient quantity, is obtained close to the surface, requiring a very short lift, it is far better practice to sink another well a considerable distance from the latter, say 1,000 feet or so, and drill the second well deeper with the hope of securing a greater quantity. The adage, "A bird in the hand is worth two in the bush," applies most forcibly when drilling for good water of sufficient quantity. Thus the second well may not strike the same vein as the first and can be run deeper as an experiment.

Two wells are in any case more reliable than one, there being a partial supply if one is out of service. If one well is to supply all the water it will be necessary to use a larger casing pipe, the capacity of which may be so great that the surface of the water outside the casing will be 200 or 300 feet below the surface of the ground, thus making the pumping costs and the wear on the pumping machinery excessive. Much valuable information is obtainable from those who have previously drilled wells in a chosen vicinity, and though the cost stated by them may be somewhat higher than can be obtained from another contractor, the value of previous experiences must be taken into consideration. The value of a well is wholly dependent upon what can be taken from it.

In sinking wells, it is found perfectly practicable to use outside connected couplings, when casing is driven through the loose earth only. When rock is reached the casing is allowed to set upon it and the drilled hole is made the size of the bore of the casing pipe, no casing being used through

the rock unless a great depth is to be reached. In this event the casing pipe is reduced in size and is passed through the rock, as shown in Figure 289 (L 1-3). The joints in the lower casing are made as shown in detail in this figure. The purpose of the casing through the rock is to prevent loose pieces of rock from falling into the drilled hole. In many instances the rock can be drilled, leaving a clean hole without the use of the casing.

Whenever it is possible to place the pumping cylinder in the upper or larger casing, this is done, since it permits the use of a larger cylinder. To be able to reach water of a lower elevation and not to be compelled to reduce the working cylinder to suit the size of the smaller casing pipe, the pump suction with a strainer at its lower end is carried down a full length of the pipe, about twenty feet. There is no danger of this strainer striking the bottom of the well, since it is invariably sunk considerably deeper than absolutely necessary, possibly 50 feet or so below the pump cylinder. How much deeper it is sunk than necessary to obtain

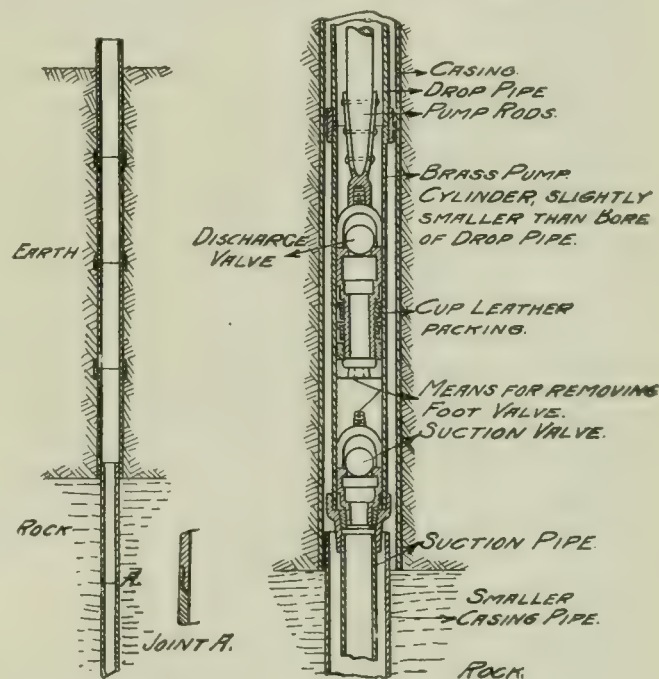


Figure 289 (L 1-3).

Figure 290 (L 1-4).

water depends upon the performance of the well and the judgment of the well driller, whose judgment is generally accepted.

The pump cylinder is attached to the drop pipe, as shown in Figure 290 (L 1-4), the bore of the cylinder being about one-fourth inch less than the bore of the drop pipe, to permit removal of the pump piston or foot valve. Cup leather packings are universally used for these pumps. The drop pipe does not rest on its lower end, the pipe being fixed at its upper end and left hanging free from this upper support. Figure 291 (L 1-5) shows a drop pipe supported from the pump head. The cap A is removable to facilitate the removal of the sucker rod, piston or valves when necessary without disturbing the pipe connections. If the drop pipe is to be removed it can be done by disconnecting the bearing B and the joint C without unscrewing any pipe work. Ordinarily the base of the pump head is fixed at the top of its foundation and the upper portion is arranged to slide back out of the way. The use of a drop pipe is the most approved practice for the construction of artesian wells and only in emergency cases should the locked cylinder be used.

If a well having an abundant supply of water is fitted with a pump of insufficient capacity, there are two methods of increasing the capacity of the pump. The stroke may be increased or the diameter of the pump may be increased.

The best method is to increase the stroke. A 16-inch stroke pump is ordinarily run at 30 strokes per minute or at a plunger speed of 480 inches per minute, and a pump with a 36-inch stroke would ordinarily operate at 20 strokes or 720 inches per minute, a gain in capacity of 50 per cent. If an 8-inch casing is used a 5.75-inch cylinder would be used with a

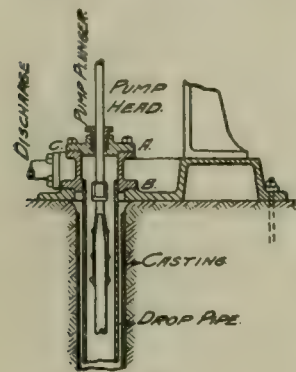


Figure 291 (L 1-5).

drop pipe, and if it is of the locked form about a 7.25-inch cylinder would be used, giving about 60 per cent increased capacity. By increasing the stroke as well as the diameter the capacity of the pump can be increased nearly two and one-half times.

There are numerous types of locked cylinders which, if they become too securely locked, would probably have to stay whether or not they leaked between the cylinder and the casing. Such makeshifts may be

justified in the case of an emergency, but should be avoided in designing new work. The locked cylinder is lowered into the casing and locked or packed to the driven casing, no drop pipe being used in this case. The cylinder in this case is made as large as can be lowered through the driven casing.

For power station use motor-driven pumps are far superior to steam-driven pumps, as they are more economical to operate and are in many ways less troublesome.

Artesian Water to Power House—Class L-3.

If the artesian well water is the only available water for the power house, some means should be provided for a double supply. This is necessary not only to make repairs but to insure water for operation in case some part of the system should give out and require being thrown out of service. Figure 292 (L 3-1) shows a storage cistern and well

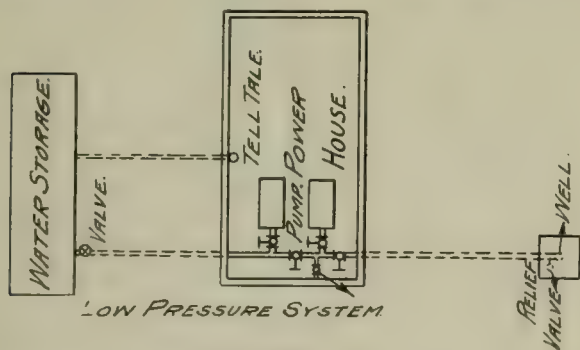


Figure 292 (L 3-1).

connected to opposite ends of the suction main. If it became necessary to shut off the main from the well to the pump or from the storage cistern to the pump, it could be done without interfering with the other supply.

A relief valve should be placed in the discharge line from the deep-well pump without any valve between it and the feed pump. This relief valve would ordinarily protect the deep-well pump and permit the excess water to return to the well when the storage tank is shut off from the feed pump and the latter necessarily takes water from the deep-well pump direct. Provided the storage cistern is sufficiently elevated to give the desired head, the low-pressure system should be piped as shown, so that its service will not be interrupted if either the pump or tank should be shut off. If the storage cistern is at a low elevation so that the feed pumps take water by suction, then one of the feed pumps could provide the low-pressure water using the auxiliary feed main for the low-pressure supply.

(To be continued.)

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Motorman Within Scope of Employment Waving to Child.

Wahl v. St. Louis Transit Company, 101 Southwestern Reporter, 1.—The supreme court of Missouri, Division No. 2, says that, from allegations amounting to a charge that the defendant was operating a car in charge of one of its motormen upon a public street, it followed that it was the imperative duty of the motorman to so manage and control the said car, of whose motive power he was in charge, as to prevent said car from running over persons in the street, and the allegation that, instead of so doing, the motorman negligently left his post, and negligently waved to the plaintiff, who was a child of tender years, and incapable, by reason of his youth and want of discretion, from understanding his danger of being struck by said car, so frightened the plaintiff as to cause him to start to run across said track in front of the car, was sufficient to show that the act of the motorman was within the scope of his employment. The court thinks that a motorman engaged in controlling and operating a public conveyance on the public streets of the city has authority to do all acts reasonably necessary or incidental to the proper discharge of his duties as such motorman, among which is his duty to so operate his car as not to injure pedestrians or children on the public streets who may assume positions of danger, and to warn persons away from places of danger, and, if he negligently fails to do so, and thereby pedestrians are injured by his car, it is the negligent act of his employer.

Must Ask Permission to Meet Changes at Bridge.

Chester Darby & Philadelphia Railway Company and others v. Darby Borough, 66 Atlantic Reporter, 357.—The supreme court of Pennsylvania says that the plaintiffs, as owners and lessees, have a charter right to operate an electric railway from the city of Chester to Main street in the borough of Darby. The road enters the borough on a county bridge over a creek, and extends east on Chester avenue to Main street. Municipal consent to enter the borough was obtained in 1894, subject, among other things, to the provision of a general ordinance that the company should not "at any time take up or remove any of the tracks or rails laid by it, except for renewal or repair, without the consent of the council first had and obtained." Consent of the county to use the bridge was obtained in 1893, and by agreement the track was located at the middle of the bridge.

In 1904 a new bridge was built by the county, and the borough of Darby agreed with it to pay all damages for which it might become liable by reason of the construction and of the widening of the approaches. The new bridge is wider than the old one was, and the railway track located in the middle thereof does not connect with the track on Chester avenue, but is 3 feet 6 inches south of it. The elevation of the new bridge is six inches greater than that of the old one.

Without having made any application to the borough council for consent to change the location of the track on Chester avenue, so as to bring it into alignment with the track on the bridge, the plaintiffs attempted to make the change at night. This attempt was resisted by the borough authorities and other citizens, and the plaintiffs' workmen were forced to abandon it. This bill was then filed to restrain the borough, through its officers and agents, from interfering with the change of the track.

The moving of the track of the railway company to make a connection with the track on the bridge would have made necessary the tearing up of the surface of the street for a distance of 80 feet, and the elevation of the street to the height of the floor of the bridge. The time and manner of doing this work, as well as the establishment of a new and

permanent street grade, were matters under municipal control, and permission should have been asked. Until this had been asked and refused, the plaintiffs had no standing to apply for equitable relief. On this ground the decree dismissing the bill is affirmed.

It is not to be understood that the court assents to the proposition that, if municipal consent to move the tracks is refused, the plaintiffs are bound hand and foot, and that the grant obtained, for which they paid in full by paving the avenue, can be made nugatory by the arbitrary withholding of consent, or that a consent given can be burdened with conditions that impose further pecuniary obligations for the right to occupy the street. While permission to change should be asked, yet it should be promptly granted without any burdensome conditions.

Purchasing Company Not Liable to Holders of Claims.

Hagemann v. Southern Electric Railroad Company, 100 Southwestern Reporter, 1081.—The supreme court of Missouri, division No. 2, says that this was a proceeding in equity having for its object the subjection of certain dividends accruing on the preferred stock of the United Railways Company to the payment of a judgment rendered against the Southern Electric Railroad Company. The plaintiff based her right of recovery against the United company upon the theory that when it acquired the capital stock of the Southern company and, thereafter, for a nominal consideration, acquired all the franchises, money, choses (rights) in action, and all other real, personal and mixed property of the latter, it thereby rendered said company insolvent, and left it with no property out of which her execution could be satisfied, and that the property so acquired by the United company was the moneyed value upon which a part of the increase of its capital stock was bottomed; the value of which at the time of the transfer was \$2,000,000, and that in equity and good conscience it should be held liable for the payment of the debts and obligations of the Southern company up to the amount of the \$2,000,000 worth of assets received by it. In other words, her contention was that the obligations of the Southern company should follow its assets as trust funds into the hands of the United company. But the fact was that the latter purchased the franchises, capital stock, money, choses in action, and all the other real, personal and mixed property of the Southern company in good faith, and paid a sound price therefor, namely, \$150 a share. It did not stand in the same relation to the creditors of the Southern company that the stockholders of the latter company did. It had no property or money in its possession which it had not paid full value for; while, upon the other hand, those stockholders had in their hands the \$2,000,000, the sum the United company paid them for the franchises, stock and properties of the Southern company. That money was a trust fund for the payment of the debts and obligations of the Southern company.

Furthermore, the Southern company was by statute authorized to sell, transfer and assign by a vote of a majority in interest of the stockholders all its franchises, rights, privileges and properties to the United company, and the same statute empowered the latter company to purchase said properties. The deed from the former to the United company transferred and conveyed everything that could be transferred and assigned under that statute, which included all its franchises, money, choses in action, and all other real, personal and mixed property, for which it paid the stockholders of the Southern company the sum of \$2,000,000. It could not have paid it to anyone else, because no one else owned it. It was not owing to the Southern company because the United company had purchased the company, and a payment made to it would have been no payment at all. Nor could payment have been made to the plaintiff and other persons who had similar claims against the company, because that company's liability to the plaintiff at that time had not been established by the judgment of the court. So, it must necessarily follow that

when the United company, in good faith, for a full and adequate consideration, purchased the Southern company with all its properties, it acquired a good title thereto, free and clear of all claims and demands of whatever nature, which were not liens on the property at the time of the sale and transfer, and, as the plaintiff's claim was not a lien on the property at that time, it must follow that she was not entitled to any relief in this case.

Interurban Stopping Places and Platforms.

McGovern v. Interurban Railway Company, 111 Northwestern Reporter, 412.—The supreme court of Iowa says that while it was not the duty of the defendant operating a car which, for the accommodation of passengers, was stopped at any highway crossing where they desired to alight, to provide a passenger platform at each of such crossings, it was its duty to exercise at least reasonable care to enable the plaintiff to alight with as little danger as practicable, and if the car was stopped and the plaintiff invited to alight, at a place more hazardous than that at which the car might conveniently have been stopped, then the defendant was negligent. The question was properly for the jury.

A passenger on an interurban car, which is stopped for him to alight at a highway crossing, may reasonably assume that the car has been stopped in a portion of the highway where he is invited to alight, unless warned of danger, and is not conclusively negligent in accepting the invitation to alight at a place which is in fact unsafe.

The plaintiff did not assume the risk involved in stopping the car for her to alight at a more dangerous place than that where it usually stopped, for she had no knowledge of the added danger due to the defendant's negligence. She had the right to assume that the car had not been stopped at a place for her to alight, which was not the usual place and was more dangerous.

If the plaintiff had known that she had been carried beyond the usual place for alighting, she would, no doubt, have assumed the risk of such reasonably apparent dangers as were involved in alighting at such place, but the same facts would constitute contributory negligence.

As to alleged negligence in not providing a safe place to alight, such as a platform or something equivalent to it, there could be no assumption of risk by a passenger, for the defendant owed a duty to such passenger to furnish him a safe place for alighting, and the doctrine of assumption of risk does not apply to a case where the negligent course of conduct which it is claimed had been assumed and recognized is connected with the discharge of a general duty to the public.

The defendant owed the public duty to the plaintiff to furnish her a safe place to alight at her destination fixed in the contract of transportation, and was not relieved of that duty by knowledge on the part of the plaintiff that it had previously been discharging that duty as to herself or other passengers, stopping at that destination. That this was so must be self-evident, for, were it otherwise, the defendant could relieve itself from the consequences of a violation of its duty to its passengers by so continuously and notoriously violating such duty that the passengers would be charged with notice that the duty would not be observed.

The contract in this case was to carry the plaintiff to "Dailey's," as a specific destination, which was thus indicated as a place where the plaintiff might alight. This contract implied the duty to furnish the plaintiff a safe place to alight at her destination. It was for the jury to say whether, in view of the nature of the transportation, the place provided was a safe place. It might well be, as argued, that, at highway crossings not designated by the defendant as regular stopping places, it would not be negligent if it used due care in selecting as safe a place as practicable for a passenger to alight, although it did not provide any special conveniences or appliances for the use of passengers.

News of the Week

Brooklyn Subway Approved.

The New York rapid transit commission at its last meeting on June 27 approved the plans and the form of contract for the first six sections of the Fourth avenue subway route to Coney Island and Ft. Hamilton, in Brooklyn. Chief Engineer Rice had the plans and specifications for the entire route ready, but George L. Rives, counsel to the commission, was able to submit the form of contract for six out of the 14 sections. He was instructed to prepare the remainder. A public hearing on the form of contract for the first six sections was fixed for July 25. The commission also authorized the Interborough Rapid Transit Company to construct three additional tracks in the subway at Ninety-sixth street.

Electric Railway Development in Indiana.

The American Engineering Company of Indianapolis, Ind., has just issued its semi-annual interurban map of the central states, which again calls attention to the rapid development of the electric railways in those states. According to the company's figures the number of miles of road placed in operation since last January in the state of Indiana is 166, which, added to the previous mileage of 1,650, makes a total of 1,816 miles. When all the work now under way, 370 miles, shall have been completed, the total mileage in Indiana will be 2,186 miles. The mileage shown in Ohio on the last map was 2,240, to which must now be added 68 miles, making 2,308 miles. When all the work now under construction shall have been completed in the state of Ohio, it will have a total electric mileage of 2,400 miles.

Electrification Plans of the Chicago Milwaukee & St. Paul.

The Chicago city council on July 1 passed the ordinance granting a 37-year franchise to the Chicago Milwaukee & St. Paul Railway and the Northwestern Elevated Railroad, providing for electrical operation of the former's lines within the city limits and a connection with the latter's elevated tracks at Wilson avenue by an inclined structure, so that the trains may be run into the city and around the Union loop. The incline will connect with the surface tracks at Ainslie street. The steam road is permitted to lay and operate an additional main track. The surface tracks must be operated by trolley. Carrying of freight is forbidden. It is proposed to operate a fast express service between Chicago and Evanston within six months, according to an official of the Chicago Milwaukee & St. Paul. The line is to be equipped and operated by the Northwestern company. The expense of the electrification is estimated at \$960,000.

Gigantic Subway Project for Chicago.

Plans for a complete subway system under the streets of Chicago were announced at a meeting of the city council on July 1, when the Chicago Subway Arcade & Traction Company applied for a blanket franchise for an indefinite term for the construction and operation of a system of subways or arcades in any part of the city. William Penn Nixon is president of the company and the directors are E. F. Getchell, John M. Ewen, D. H. Perkins, S. M. Rowe and S. D. Gookins. The company was incorporated in 1894 with a capital stock of \$15,000,000.

The company proposes to build a double-deck subway system consisting at the first of three complete north and south lines extending from the northern to the southern extremity of the city, and three west side lines from the downtown district to the western city limits. In the downtown district a system of loops is to be provided above the surface of the present freight subway system of the Illinois Tunnel Company. The main terminal station is to be on the lake front between Randolph and Monroe streets. The routing of the subways and the fixing of stations is to be determined by a commission of seven members, of whom two are to be named by the council committee on local transportation, two by the mayor and three by the company. One of the company's three is to be chief engineer and president of the commission.

New York Public Utilities Commissions Appointed.

Governor Hughes of New York on June 28 announced the names of the members of the new public utility commissions, under the "public utilities" law which went into effect on July 1, as follows: For the first district (New York, Kings, Queens and Richmond counties): William R. Willcox of Manhattan, chairman; William M'Carroll of Brooklyn, Edward M. Bassett of Brooklyn, Milo R. Maltbie of Manhattan, John E. Eustis of the Bronx. For the second district (all other counties): Frank W. Stevens of Jamestown, chairman, Charles Hallam

Keep of Buffalo, Thomas Mott Osborne of Auburn, James E. Sague of New Hamburg, Martin S. Decker of New Paltz. Both commissions were formally appointed and sworn in on July 1. The terms for which each member is to serve will not be known until the appointments are confirmed by the senate. One member of each commission will retire each year, the longest term being five years. The salary of each commissioner is fixed by law at \$15,000.

The main provisions of the public utilities law were published in the Electric Railway Review of June 8, page 745. In brief, the commissions will have control of all the public service corporations in the state except telegraph and telephone companies. These two commissions, one for New York City and the other for the remainder of the state, will supersede the New York rapid transit commission, the state lighting commission, the state railroad commission, the state gas and electricity commission and the state inspector of gas meters.

Boston Elevated Railway Files Plans for Cambridge Subway.

The Boston Elevated Railway last week filed with the mayor and city engineer of Boston its plans for the new Cambridge subway.

According to the plans submitted subway cars will cross from Boston over the Cambridge bridge, will descend an incline of 3 degrees to Amherst street and run under Main street as far as Lafayette square. This will bring the proposed tracks under Massachusetts avenue, where the first station will be situated. This station will be called the Central square station. It will be 500 feet long and will have exits and entrances on both Essex and Brookline streets.

From the Central square station the tracks will continue in a direct line to Harvard square, which will be the passenger terminus. A spur line will be built down Eliot street as far as Eliot square, where the car barns are situated.

Cars from Arlington will descend into the subway at Kirkland street, cut straight through the Common and run around an elongated curve to Harvard square. From there the curve will be continued around through Brattle street to Brattle square, whence it will run out Mt. Auburn street. On the two levels at Harvard square the inbound cars will run on a 10-foot lower level than the outward bound.

The entire structure will be made of reinforced concrete, with an average width of 25 feet and an average height of 14 feet 3 inches.

Although the present plans contemplate only two subway stations, it is expected that this scheme may be enlarged before the actual work is commenced.

Data Sheets on Maintenance and Inspection of Electrical Equipment.

The committee on "Maintenance and Inspection of Electrical Equipment" of the American Street and Interurban Railway Engineering Association has sent out to the general managers and engineers data sheets No. 1, No. 2 and No. 3, asking for information to be embodied in the report of the committee at the Atlantic City convention in October. The committee is composed of John Lindall, chairman; W. D. Wright, E. T. Munger and L. L. Smith, and blanks are to be filled out and returned to John Lindall, superintendent of motive power and machinery, Boston Elevated Railway, 439 Albany street, Boston, Mass.

Data sheet No. 1 asks for detailed information about cars—number, weight, type of control apparatus, inspection of wiring, brakes and other apparatus, types of safety devices used, etc.

Data sheet No. 2 is devoted to armatures and their parts, circuit-breakers and air compressors, and contains 31 questions in regard to insulation, tests for short circuits, shaft journals, manufacture of field coils, tests of coils, impregnating coils, etc.

Data sheet No. 3 contains 20 questions in regard to brushes, etc., such as characteristics of motor carbon brushes giving best service, specifications laid down to manufacturers, tests, treatment of brushes, causes of commutator and brush holder troubles. This sheet asks for details in regard to frequency of lubrication inspection and overhauling of the various parts of the car apparatus, rules governing car house men in inspection work and method of obtaining car mileage.

Hearing of Arbitrators in Chicago.

Judge Grosscup of the United States circuit court and Prof. John C. Gray of Harvard University, the arbitrators under the Chicago Railways Company ordinance, held their first hearing on July 1. Edward B. Burling, attorney for the protective committees of the North Chicago City Railway and the Chicago West Division Railway, underlying companies, argued that the shares of the Chicago Railways Company should be allotted to stockholders of these two companies on the basis of present earnings. He urged that the arbitrators

lay down a plan which should be followed absolutely without regard to financial conditions.

In response to this plea Judge Grosscup said: "It will be our duty to take the plan that can be financed best. It is my idea that if we make changes we should first consult the men who are to finance the work, the bankers. In considering the bankers the arbitrators must not obliterate the rights of the parties, but to be practicable any plan of reorganization adopted must be capable of being financed."

Mr. Burling argued that the stockholders of these two companies should receive under the allotment securities carrying an income of 30 and 35 per cent, respectively, on the par value of the stocks of the north and west side properties, as provided at present.

W. W. Gurley, general counsel for the Union Traction company, argued that the leases of the properties of these companies were made only on the assumption that the 99-year alleged rights were valid and that they were practically invalidated by the decision of the United States supreme court. Mr. Gurley asserted that the original rights of the underlying companies were barren, standing alone.

The stocks necessary to acceptance of the ordinance have been deposited with the Chicago Title & Trust Company.

Increases of Wages.

The Schenectady (N. Y.) Railway last week announced an increase of wages for its 500 motormen and conductors, to take effect on July 1. The men on the city divisions will receive 20 cents an hour for the first six months, 22 cents for the next six months and 24 cents thereafter until promoted to an interurban run. The present scale is 20 cents for the first year, 20½ for the second, 21 for the third, 21½ for the fourth and 22½ thereafter. On the interurban divisions the new scale provides for a flat rate of 26 cents an hour, instead of 22, 22½, 23, 23½, 24 and 25, according to length of service.

A strike of the motormen and conductors of the Jackson (Mich.) Consolidated Traction Company which was threatened last week has been averted by a compromise agreement under which the men will receive an increase of wages. The agreement provides for a "closed shop" and a wage scale of 18 cents an hour for the first year, 20 cents for the second year and 22 cents for the third year and thereafter. The former scale was from 15 to 20 cents an hour.

On July 1 a general advance in wages of the motormen and conductors employed on the Utica & Mohawk Valley Railway and allied lines went into effect. The increase affects about 800 men on the Utica & Mohawk Valley, the Rome City Street Railway, the Oneida Railway and the Syracuse Rapid Transit Company. At present the crews of the various city lines in the system are receiving 18 cents an hour during the first six months of their service, 20 cents during the second six months and 22½ cents thereafter. On and after July 1 the schedule will be, for the first six months 20 cents an hour, for the second six months 22 cents and thereafter 24 cents. On the interurban lines, including the electrified West Shore between Utica and Syracuse, the Rome, Little Falls and the Clinton branches, the wages will be advanced from 25 cents an hour to 26 cents.

The South Side Elevated Railroad of Chicago last week announced an increase of wages for its employees amounting to about 5 per cent.

The Metropolitan West Side Elevated Railway of Chicago this week announced an increase of wages, effective on May 1, by which motormen will receive as high as 30½ cents an hour and conductors as high as 24 cents. The other elevated roads of Chicago have made similar increases.

United States Express Company.—The United States Express Company has signed a contract to operate over the lines of the Chicago South Bend & Northern Indiana Railway of South Bend, Ind.

Engineers' Club of Philadelphia.—The Engineers' Club of Philadelphia has issued its directory for 1907, corrected to May 13 inclusive. The directory, which is bound in leather, 5 by 3 inches, contains lists of the officers and committees of the club, past officers and alphabetical list of members; also the charter and by-laws of the club. Henry H. Quimby is president for the year 1907.

Lafayette & Logansport Line Opened.—The first car was operated over the new line of the Lafayette & Logansport Traction Company, an extension of the Ft. Wayne & Wabash Valley Traction Company from Logansport to Lafayette, Ind., on June 28, and regular service was started on July 1. This line was described and illustrated in the Electric Railway Review of May 18, page 653. For the present it is necessary to transfer at Logansport to go to Ft. Wayne, but on August 1 limited cars from Lafayette to Ft. Wayne will be installed.

Construction News

FRANCHISES.

Brooklyn, N. Y.—Certificates of railroad extensions aggregating 22½ miles, have been filed at Albany, N. Y., by the Long Island Railroad. These extensions include the Ocean Electric Railway, Far Rockaway, 1.3 miles; Huntington Railroad, Huntington, 15.53 miles; Van Brunt Street & Erie Basin Railroad, Brooklyn; and the Babylon Railroad, Babylon, N. Y., 5.81 miles.

Cape Elizabeth, Me.—The Cape Shore Railway Company has petitioned the railway commissioners for permission to build an electric line from Cape Cottage to Crescent Beach and from South Portland Heights to Cape Elizabeth. The commissioners will act on the application at their next meeting on July 9. L. M. Leighton, president; Charles B. Dalton, vice-president; Jabez True, Norman True and Edward C. Reynolds are the directors of the company.

Corning, N. Y.—The Corning & Painted Post Street Railway Company has applied for a franchise to double-track its line through Corning.

Essexville, Mich.—A 30-year franchise for the use of the streets it now occupies in this village has been granted to the Bay City Traction & Electric Company, in consideration of the improvements now under way and contemplated by the company. This is an extension of the present franchise, which has six years to run.

Lima, O.—The Lima & Toledo Traction Company and the interurban lines entering the city, which are controlled by the Schoepf interests, have applied for 25-year extensions to the present franchises. Permission is also requested to build an interurban passenger station in the public square at a cost of \$50,000, the syndicate agreeing to pay the city an annual rental of \$3,000 for the privilege.

Salem, O.—An ordinance allowing the Salem Street Railway Company, which is owned by the Youngstown & Ohio River Railroad, to build its line over a part of Depot street, Franklin avenue and Broadway, has been introduced to the city council, and will probably be passed, as an agreement now has been reached between the Youngstown & Ohio River company and those who formerly objected to the company's operating its lines in lower Broadway under its former franchise.

Terre Haute, Ind.—The Terre Haute & Merom Traction Company, which proposes to build a 30-mile interurban road between Terre Haute and Merom, Ind., has applied to the board of county commissioners for a 50-year franchise over the crossings of the public highways and to use the streets of the towns through which it will pass. The line is to be on private right of way. Work is to be started not later than May 1, 1908.

Tonopah, Nev.—A franchise for an electric railway in this city has been granted to Key Pittman, Arthur Raycraft, L. R. Scott and others. Work is to begin within six months and completed within two years. A bond for \$2,500 has been furnished by the grantees.

RECENT INCORPORATIONS.

American Motor Car Interurban Railway, Marion, Ia.—Incorporated in Iowa to build interurban electric lines in this and adjoining states. The first line will be built from Waterloo through Gilbertville, Brandon, Urbana, Center Point, Alburnette, Marion, Mt. Vernon, Lisbon, Mechanicsville and Tipton to Muscatine or Davenport. An intersecting line also will be built from Independence through Urbana, Vinton, Keystone and Belle Plaine. It is proposed to operate the lines by the E. J. Christie system of self-propelled motor cars, patents for which have been granted to the inventor. The capital stock is \$5,000,000.

Bridgeport & Danbury Electric Railway.—A resolution incorporating this company to build an electric railway in Connecticut has been passed by the legislature over the governor's veto. The authorized capital stock is limited to \$1,500,000.

Cairo (Ill.) Terminal Traction Company.—Incorporated in Illinois to construct an interurban road from Cairo to the north line of Pulaski county, Illinois, with the principal office in Cairo. This will be a part of the Illinois Traction System of interurban lines operating in Illinois and it is planned eventually to extend the new line northward to connect with the St. Louis and East St. Louis traction lines. Capital stock, \$5,000. Incorporators: L. E. Fischer, Danville; Daniel Hogan,

Mound City; W. W. Dewey, D. H. Sawyer and H. F. Vogel, Cairo, Ill.

Quincy Interurban Railway, Quincy, Ill.—Incorporated in Illinois to build an interurban line from Hamilton through Quincy to Pearl in Pike county. The road may be operated by either steam or electricity, over private right of way. Capital stock, \$25,000. Incorporators: Henry F. Dayton, Ezra Best, William Wewers, Herman Heidebreder, August R. Dick, Frank J. Ricker, John S. Cruttenden, Leaton Irwin and others, all of Quincy, Ill.

Sonora (Cal.) Line Belt Railroad.—Incorporated in California to build and operate a railroad about two miles long, to be operated by steam, electricity or other motive power. Capital stock, \$25,000. Incorporators: James E. Lennon, Albert and Thomas Knowles.

TRACK AND ROADWAY.

Amarillo (Tex.) Street Railway.—John K. Shireman, secretary, states that construction on the Amarillo street railway line is progressing rapidly and should be completed by September 1. Two and a quarter miles of track have been completed out of the seven.

Atlantic City & Ocean City Railroad, Philadelphia, Pa.—This extension of the Atlantic City & Shore Railroad from Ocean City to Somers Point, N. J., about two miles, was opened for traffic this week.

Beloit (Wis.) Traction Company.—It is now announced that this company's 6-mile street railway system in Beloit will not be opened until about September 1. Rails are now being laid in the northeastern part of the city and part of the trolley wire has been strung. Joel B. Dow of Beloit is president.

Berkshire Street Railway, Pittsfield, Mass.—The extension from North Adams, Mass., to Bennington, Vt., 16 miles, was opened for traffic last week. This line is controlled by the New York New Haven & Hartford Railroad, which now has a continuous line of electric railway from Great Barrington, Mass., to Bennington, Vt., 56 miles, as well as a line from Bennington to Hoosick Falls, N. Y.

Bristol & Plainville Tramway Company, Bristol, Conn.—This company has begun work on an extension of its line out of Terryville, ¼ mile toward Thomaston.

Brownsville Masontown & Smithfield Street Railway.—We are officially advised that this company, which proposes to build an electric railway from Brownsville to Smithfield, Pa., 20 miles, now has franchises in Masontown, Smithfield, Carmichaels, Waynesburg and Point Marion, and has secured most of its private right of way between those towns. A Pennsylvania charter has been secured and the company has filed a mortgage for \$3,000,000 in New York City. The road will pass through the coke territory. The Westinghouse single-phase system will be used, and the equipment will be a duplicate of that used on the Pittsburgh & Butler Street Railway. W. J. Sheldon of McKeesport, Pa., is president, and E. L. Schmidt is chief engineer.

Chase City, Va.—It is reported that plans are being made to build an electric railway from Chase City to a point on the Tidewater Railway, about 18 or 20 miles.

Cleveland Alliance & Mahoning Valley Railway, Cleveland, O.—This company will soon close up the lease for the old track of the Baltimore & Ohio Railroad between Ravenna and Newton Falls, O., and financial arrangements have been made for beginning work at once. The track and roadbed are to be straightened and the road will be put in first-class condition and electrically equipped. When this work is completed the branch from Ravenna to Alliance will probably be built. B. M. Frink, Salem, O., is chief engineer.

Columbus (Ind.) Street Railway & Light Company.—The contract for constructing the How Creek bridge has been awarded to the Lafayette Bridge & Engineering Company of Lafayette, Ind.

Consolidated Railways Light & Power Company, Wilmington, N. C.—This company now has about 200 men at work double-tracking the line in several parts of the city. The double-tracking on Princess street and Carolina place is about finished.

Denver, Colo.—It is announced that John Brisben Walker, owner of the pleasure resort at Morrison, Colo., has secured financial backing by eastern capitalists for the construction of an electric railway from Denver to Morrison. It is stated that the road will be ready for operation next year.

Evansville Princeton & Vincennes Interurban Railway, Princeton, Ind.—It is reported that this company will extend its line from Princeton to Patoka, Ind., work to begin at once.

Fresno, Cal.—It is stated that H. E. Huntington of Los Angeles, Cal., is contemplating the expenditure of \$3,000,000 for the construction of an electric railroad from Fresno to the Yosemite Valley. Surveys have been completed via Crane Valley, 96 miles, under the direction of Emil Newman. Power will be furnished by the San Joaquin Power Company.

Ft. Wayne & Springfield Railway, Decatur, Ind.—This company is pushing work rapidly on the surveying of the extension from Decatur, Ind., to Celina, O., 29.7 miles, via Pleasant Mills, Ind., and Willshire, Rockford, Tama and Celina, O. President W. H. Fledderjohann stated recently that construction on the extension would begin before fall.

Geneva Phelps & Newark Railroad.—This company has filed with the New York railroad commission a notice of its intention to build an extension from Phelps to Clifton Springs and Manchester, N. Y., a distance of 18.700 feet.

Grand Rapids & Battle Creek Interurban Railway.—Right of way is being secured between Hastings and Battle Creek for this company's proposed interurban line, the promoters having secured practically all concessions from Grand Rapids to Hastings.

Greenfield Bernardston & Northfield Street Railway.—This company, which proposes to build an electric railway connecting the towns named in the title, has secured a part of the right of way. The road will be about 13 miles long. Charles H. Webster of Northfield is president.

Indianapolis Crawfordsville & Western Traction Company, Crawfordsville, Ind.—The first trip over this new line, known as the "Ben-Hur" route, was made Sunday afternoon, June 30, when a car carrying President A. E. Reynolds, Vice-President Eli Baker, a number of the directors and the mayor of Crawfordsville and other prominent citizens, ran to New Ross, a distance of 10 miles, and return on a trip of inspection. Two of the cars to be used in the limited service between Indianapolis and Crawfordsville have arrived and two more are on the way from Newark, O.

International Railway, Buffalo, N. Y.—This company will erect a steel bridge across the New York Central cut, near Devil's Hole at Niagara Falls.

Kalamazoo Gull Lake & Northern Railway, Kalamazoo, Mich.—Work on the laying of this company's track on Rose street, between Main and Water streets, has been started.

Mankato (Minn.) Electric Traction Company.—W. L. Hixon states that contracts are to be let at once for building about six miles of track in Mankato and vicinity. Work on surveys, etc., has been completed and capital has been secured.

Milwaukee (Wis.) Light Heat & Traction Company.—The extension from Muskego Center to Mukwanago, Wis., 11 miles, was opened for regular traffic this week. A two-hour service will be maintained on week days and an hourly service on Sundays.

Missouri Tennessee & Georgia Railroad, Humboldt, Tenn.—This company, which recently was reorganized, plans to build an electric railway through Crockett county, touching Gadsden, Alamo, Johnson's Grove, Maury City, Crockett Mills, Eaton, Brazil and Gibson Wells, forming a belt line beginning and ending at Humboldt and connecting with the Illinois Central Railroad at some point to be determined later. Col. I. H. Dungan, president; C. H. Ferrell, first vice-president; Dr. J. H. Thomas, second vice-president; G. D. Ferrell, secretary; O. C. Sharp, treasurer.

Mississippi Valley Electric Railway, Nauvoo, Ill.—This company has filed a mortgage for \$1,500,000 to the Carnegie Trust Company to secure a bond issue to build the proposed road from Carthage to Hamilton, Nauvoo and Niota, Ill. It is stated that construction will begin this month.

New York & North Shore Traction Company.—The Mineola Roslyn & Port Washington Railroad, which proposes to build an electric railway from Oyster Bay to Flushing, L. I., has been authorized by the New York railroad commission to change its title to the New York & North Shore Traction Company, and to increase its capital stock from \$150,000 to \$1,250,000. It is also authorized to issue a mortgage for \$1,000,000.

Northwestern Elevated Railroad, Chicago, Ill.—Real estate men are seeking to induce this company to build a new loop, bounded by Wells street and Fifth avenue, Lake street, Dearborn street and Chicago avenue. Officers of the road have expressed their willingness to consider such an improvement if the necessary frontage consents can be obtained. "Something must be done to relieve the Union Loop," said President Mason B. Starring, when asked about the project. "The real estate men who wish an elevated road built in Chicago avenue and Dearborn avenue came to us with their project and we

told them we would consider it. We expect to build, if possible, a stub-end terminal, but its location has not been determined."

Omaha Lincoln & Beatrice Railway.—It is announced that the interests in this company controlled by the late Henry Robinson have been taken over by Chicago and Cleveland capitalists and that work will be resumed in the near future. Rails have been laid from South Omaha to Sarpy Mills and for several miles from the Lincoln end of the route. Upon the completion of the Omaha-Lincoln portion of the line work on the extension to Beatrice will be started. The road will be 56 miles long and afford an almost direct route to Lincoln. It will cost about \$2,000,000. Harvey Musser, Akron, O., is president. E. C. Hurd, chief engineer, Lincoln, Neb.

Parkersburg Marietta & Interurban Railway, Parkersburg, W. Va.—Construction work on the extension of this company's line from Rainbow to Lowell, O., has been started. C. H. Shattuck, general manager, Parkersburg, W. Va.

Philadelphia Rapid Transit Company.—A new extension in West Philadelphia has been put in operation this week, which will bring Darby into direct connection with the Market street elevated road at Fortieth street. The company is also making arrangements to construct a double-track line from Cardington to Collingdale. A part of the right of way has been secured.

Pittsburg & Butler Street Railway, Pittsburg, Pa.—It is reported that this company, which on May 1 opened its road between Pittsburg and Butler, Pa., has decided to double-track the line, because of the heavy traffic. It is also stated that a 9-mile extension from Thorn Creek to Saxonburg will be built before fall.

Quincy, Ill.—Twenty-five of the leading business men have organized a stock company, with a capital of \$25,000, to pay the preliminary expenses of interurban lines to Hamilton, Ill., and south to Pearl, Pike county, which are to be financed by local capital.

Redlands & Yucaipe Electric Railway, Redlands, Cal.—This company has authorized the issuance of bonds to the amount of \$50,000 for building and equipping its 19 miles of electric road from Redlands through the Yucaipe Valley to Oak Glen Heights.

Sheffield Company, Sheffield, Ala.—This company is planning an extension of its line in Florence, Ala. J. B. McClary, general manager.

South Carolina Public Service Corporation.—It is announced that surveys will be resumed about September 1 on the line between Charleston and Columbia, S. C., and that contracts will probably be let about January 1. Joseph J. Timmes of New York, president.

Springfield & Southeastern Traction Company.—The contract for the construction of this company's proposed line from Pana to Springfield, by way of Taylorville, has been let to J. W. Beardsley of Houston, Tex. J. J. Finn, Decatur, Ill., is president.

Springfield (Ill.) Consolidated Railway.—The contract for the construction of the proposed extension of this company's line from the state fair grounds to the "Zoo," has been awarded to Mulvihill & Co. of Alton, Ill. Although the line will be built 1½ miles long, owing to the heavy grades, the cost of grading alone will be approximately \$10,000. The entire expenditure for the work is estimated at about \$25,000.

St. Johns Light & Power Company, St. Augustine, Fla.—It is reported that this company expects to complete this summer an extension from St. Augustine across the bridge to Anastasia Island and to South Beach. The rails have arrived for this line and tracklaying will be started as soon as the work of reinforcing the bridge is completed. J. F. Miller, chief engineer.

Suffolk County Traction Company, Patchogue, N. Y.—The state railroad commission has granted this company permission to construct an electric railroad 27 miles long between Brookhaven and Babylon, N. Y. The capital stock of the company is \$1,200,000.

Syracuse & Milford Railroad, Syracuse, Ind.—Over one-half of the grading on this line has been completed and construction work is being pushed as rapidly as possible. Ties and rails for the laying of seven miles of track are on the ground ready for distribution and the engines and a portion of the car equipment are expected within the next 10 days. It is stated that the company has purchased a timber tract south of Syracuse and will establish a sawmill there to supply ties for tracklaying.

Terre Haute & Merom Traction Company, Terre Haute, Ind.—An officer states that this company, recently incorporated, will let contracts within two or three months for building its proposed electric line from Terre Haute, Ind., south

via Princeton, Middletown, Fairbanks and Graysville, to Merom, about 35 miles. L. Brown, president; J. Caswell, chief engineer.

Toledo (O.) Urban & Interurban Railway.—A steel bridge, costing \$22,500, will be erected by the city of Toledo and the company jointly. Charles Kilgour, chief engineer, Findlay, O.

Twin City & Lake Superior Railway, Minneapolis, Minn.—It is stated that contracts are being let for the construction of this line from Minneapolis and St. Paul, Minn., to Duluth and Superior, Wis., 130 miles. Surveys have been completed and right of way secured. H. W. Alberty of Minneapolis, chief engineer.

Wagner Lake Shore & Armour Railway, Wagner, S. D.—This company, which proposes to build from Wagner to Mitchell, S. D., 75 miles, has elected the following officers: President, John Absher; vice-president, John Sedronsky; secretary, E. P. Wanzer; treasurer, A. Amundson; auditor, A. H. Pease. The right of way has been secured for 20 miles out of Wagner. The power house will be located at Armour.

Westchester Traction Company, Ossining, N. Y.—An order issued by Justice Keogh of the New York supreme court on June 20 declares the franchise held by this company in Ossining to be forfeited, enjoins the company from operating in the streets and orders that the rails be removed at once. The company has been operating since 1892, but has run no cars for the past six months. The Hudson River & Eastern Traction Company has a franchise to lay tracks in the village and as soon as the old rails are removed the work of putting down the new road will be begun. The new company proposes to run its line to Pleasantville and Sherman Park, connecting at the latter place with the line to White Plains.

Yakima Valley Transportation Company, North Yakima, Wash.—This company has been organized to take over the franchises and assets of the Yakima Intervalley Traction Company, which proposes to build a system of electric railways radiating from North Yakima. A. J. Splawn has been elected president, succeeding A. B. Scudder.

POWER HOUSES AND SUBSTATIONS.

Chippewa Valley Electric Railway, Eau Claire, Wis.—Work on the power house being erected by this company is progressing. As previously announced this company is spending about \$200,000 putting in a new water power development plant on the Menomonie river, which will furnish power for operating its cars. This company owns water power on the Red Cedar river aggregating 10,000 horsepower, and the work now in progress at Menomonie is only the beginning of a water power development which will ultimately represent an investment of more than \$500,000.

Edmonton (Alberta) Electric Railway.—It is announced that the contracts for the apparatus to be installed in the power house of this company have been awarded as follows: Allis-Chalmers Company, Milwaukee, Wis., gas engines; Power & Mining Machinery Company, Milwaukee, Wis., gas producers. The contract for the overhead work and rolling stock will not be let until later in the season and the track and power house will be built by the city.

Mobile Light & Railroad Company.—J. H. Wilson, president and general manager of this company, has just announced that this company will spend more than \$100,000 on improvements to its power department. Plans and specifications for the alterations and improvements are being made by Sanderson & Porter, consulting engineers of New York, the arrangements having been made by W. A. Haller, in charge of the New Orleans office of Sanderson & Porter. The improvements contemplated include a new steel and concrete boiler house, in which will be installed a large condenser and two 500-horsepower Sterling boilers, equipped with Roney automatic stokers and furnaces.

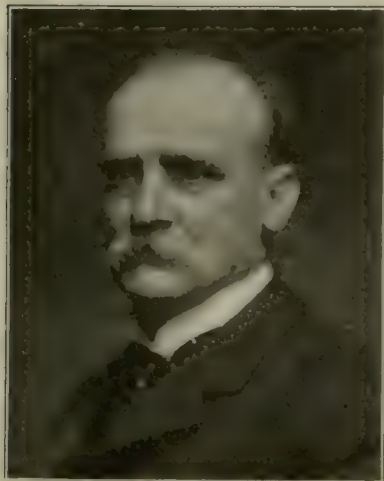
Texas Traction Company, Dallas, Tex.—It has been announced that the contract for the erection of a new power house at McKinney will be let in the early part of next week.

Virginia Passenger & Power Company, Richmond, Va.—It is announced that this company has recently ordered Allis-Chalmers steam turbines and Babcock & Wilcox boilers equipped with Foster superheaters.

United Railways & Electric Company, Baltimore, Md.—It is announced that this company has just closed a contract with the McCall's Ferry Power Company for current to operate its line. The power company is constructing a large dam in the Susquehanna river at McCall's Ferry for the purpose of generating electric current for use in all the cities and towns within a radius of 100 miles, and it is stated is securing some large contracts.

Personal Mention

Mr. John H. Fry, general passenger agent of the Detroit United Railway, Detroit, Mich., has resigned, effective on July 1. He became connected with the Detroit City lines in



John H. Fry.

1884 as manager, retaining this position until his appointment as general superintendent in 1891. In 1895 he resigned to become manager of the Majestic building, one of the largest and most important office structures in Detroit. This position he held until 1901, when he returned to the Detroit United Railway as assistant general passenger agent of the entire system, including its interurban and city properties. He was later made general passenger agent, which position he has held until the present time. He has resigned to resume the management of the Majestic properties. Mr. Fry's successor is Mr.

John F. Keys, who, although but 28 years of age, has been connected with the Detroit United for 12 years, and has received his training under the direct supervision of Mr. Fry. He has been special car agent for the company since 1905.

Mr. B. T. Reamey has been appointed accountant of the Interborough Rapid Transit Company of New York City.

Mr. A. F. McCallum has been appointed engineer of the Hamilton Waterloo & Guelph Railway at Hamilton, Ont.

Mr. J. N. Jones has been appointed division superintendent of the Utica & Mohawk Valley Railway at Mohawk, N. Y., in place of Mr. E. O'Hara.

Mr. C. R. McKay, whose appointment as electrical engineer and superintendent of lighting of the Toledo (O.) Railways & Light Company, was announced in a previous issue,

was born in North Adams, Mass. He received his earlier education at a military school and later graduated from Johns Hopkins University at Baltimore, Md. His engineering experience has covered a wide range of work in both the west and the east. From 1894 to 1895 he was consulting engineer for the Ontario & Daly Silver Mining Company at Salt Lake City, and was construction engineer in 1896 for the Pioneer Electric Power Company, also of Salt Lake City. In 1897 he was appointed superintendent of construction of the Sprague Electric Elevator Company at New York City, remaining there until his appointment in 1899 as chief engineer of the Sprague Electric Company. From 1900 until his present appointment he was district engineer for the General Electric Company for Ohio, Indiana, Kentucky and Tennessee. Mr. McKay has executed much of the heavy installation work of the principal electric traction and lighting companies in the territory covered by his district, including the following: Nashville Railway & Light Company, Knoxville Railway & Light Company, Toledo Railways & Light Company, Muncie Hartford & Ft. Wayne Railway, Louisville Railway, Columbus Railway & Light Company, Toledo Urban & Interurban Rail-



C. R. McKay.

way, Columbus Newark & Zanesville Electric Railway, Columbus London & Springfield Railway, Columbus Delaware & Marion Railway and the Cincinnati & Columbus Traction Company. Among these are included several large steam turbine plants. Mr. McKay's present appointment was effective on July 1.

Mr. William H. Forse, Jr., heretofore assistant treasurer of the Indiana Union Traction Company, Anderson, Ind., at a



William H. Forse, Jr.

recent meeting of the directors, was elected secretary and treasurer of the company. Mr. Forse, who is a native of St. Louis, Mo., was formerly with A. Leschen & Sons Wire Rope Company of that city. Four years ago he severed his connection with this firm to take a position in the auditing department of the Indiana Union Traction Company and two years later, upon the resignation of Mr. Isaac McQuilpin, comptroller of this company, succeeded him with the title of auditor. Last November he was appointed assistant treasurer, being succeeded as auditor by Mr. Walter Shroyer. His recent election as secretary and treasurer of this important interurban system, comprising 365 miles of track and connecting the principal cities of Indiana, indicates still further recognition of his efficient work during the four years of service with this company. He is a member of the Central Electric Railway Association and of the recently organized Central Electric Accounting Conference. He also is a member of the American Street and Interurban Railway Association and as chairman of the committee on interurban accounts has assisted in revising the system of accounting now in use on American electric railways. Mr. Forse has also been a contributor to the Journal of Accounting, System, and other technical journals.

Mr. Benage S. Josselyn, formerly vice-president and general manager of the Baltimore (Md.) Electric Company, has resigned to become president of the Portland (Ore.) Railway Light & Power Company, succeeding the late Henry W. Goode, who died last April. Mr. Josselyn was born February 7, 1858, at Heyworth, Ill., and entered railway service in 1873, since which time he has had an extensive experience in the management of steam and electric railways, electric light and telephone enterprises. On January 1, 1893, after serving in various capacities on the different roads of the west and middle west, he was appointed general manager of the Kansas City Osceola & Southern Railway, where he remained for five years. From January 1 to April 15, 1899, he was general superintendent of the Omaha & St. Louis and Omaha Kansas City & Eastern lines, and from February 1, 1900, to September 15, 1902, manager of the Kentucky & Indiana Bridge & Railroad Company, which marked the beginning of his connections with electric railways. From September 15, 1902, to March 1, 1903, he was general manager of the Hudson Valley Railway, when he resigned to become general manager of the Union Terminal Railway of Sioux City and other electric properties owned by the same syndicate. Mr. Josselyn severed his connection with these companies about two years ago to become assistant to the president of the Maryland Telephone Company, two months later being elected vice-



Benage S. Josselyn.

president, and more recently vice-president and general manager of the Baltimore Electric Company, as earlier stated.

Mr. E. T. Selig has resigned as manager of the Mt. Vernon (O.) Railway & Light Company, to engage in electric construction work. Mr. G. C. Fuller of Cleveland has been appointed to succeed him.

Mr. W. W. Foster of Syracuse, N. Y., has been elected treasurer of the Oswego Traction Company, succeeding Mr. J. P. Doyle, resigned. H. J. Clark of Syracuse has been elected secretary, in place of Mr. D. A. Williams, resigned.

Mr. B. B. Winchester, superintendent of the New York & Long Island Traction Company, has been transferred from Hempstead, L. I., to the Long Island City offices of the company. Mr. J. P. Kineon will succeed him at Hempstead.

Mr. Charles E. Warwick, for the past two years superintendent of transportation of the Galveston (Tex.) Electric Company, has resigned. Mr. F. C. Randall will be acting superintendent until a permanent successor is appointed.

Mr. William H. Forse, Jr., heretofore assistant treasurer of the Indiana Union Traction Company, Anderson, Ind., has been elected secretary and treasurer of the company, succeeding Mr. William C. Sampson, secretary, and Mr. John J. Collier, treasurer.

It is officially announced that Mr. Frank Arnold, heretofore manager of the Oswego (N. Y.) Traction Company, has been appointed superintendent of the electrical department of the Ft. Dodge Des Moines & Southern Railroad, with headquarters at Boone, Ia.

It is officially announced that Mr. William L. Derr, who has been superintendent of the Chicago & Alton Railroad at Bloomington, Ill., since February 15 of this year, has been appointed general superintendent of the New York City Railway, with headquarters at 761 Seventh avenue, New York; effective on July 1.

Mr. Robert Jemison, according to newspaper reports, has resigned as president of the Birmingham (Ala.) Railway Light & Power Company, to become chairman of the board of directors, effective on September 1. He will be succeeded by Mr. A. H. Ford of Ford, Bacon & Davis, New York, who is now vice-president of the company.

Mr. J. M. McElroy, general manager of the Manchester (England) Corporation Tramways, president of the Municipal Tramway Association of Great Britain and prominent in the electric railway developments of that country, will make an extensive tour of the United States for the purpose of studying electric railway traction as exemplified here.

Mr. L. E. Holderman, heretofore superintendent of the electrical department of the Eastern Wisconsin Railway & Light Company, has been appointed superintendent of lighting of the Terre Haute Indianapolis & Eastern Traction Company at Terre Haute, Ind., succeeding Mr. S. B. Tuell, resigned to accept a position with Stone & Webster of Boston, Mass.

Mr. Henry G. Bradlee of Boston, Mass., has become a member of the firm of Stone & Webster, 84 State street, Boston, effective on June 30. Mr. Bradlee is vice-president of the Jacksonville (Fla.) Electric Company, second vice-president of the Tampa (Fla.) Electric Company, vice-president of the Houghton County Street Railway of Hancock, Mich., and president of the Cape Breton Electric Company, all controlled by Stone & Webster.

Mr. H. C. Higgins, vice-president and general manager of the Sterling Dixon & Eastern Electric Railway and the Lee County Lighting Company, Sterling, Ill., has resigned his position as general manager of the two companies, effective at once to accept a similar position with a gas and electric company at Gadsden, Ala. Mr. Higgins organized and promoted the Sterling Dixon & Eastern road and has been general manager for the past four years. He will retain his financial interest in both properties, as well as the office of vice-president of the electric lines. Mr. Edward B. Kirk, general manager of the Winnebago Traction Company, Oshkosh, Wis., has been appointed to succeed Mr. Higgins as general manager of the two properties.

Obituary.

George Goodwin, formerly division superintendent of the Brooklyn Rapid Transit Company, died at his home in Brooklyn, N. Y., on June 27, at the age of 52 years.

Louis J. Magee, a distinguished electrical engineer, died in New York on July 3. He is said to have constructed the first electric tramway in Europe, was organizer of the Union Elektricitäts Gesellschaft and was a writer of ability.

Financial News

American Railways Company, Philadelphia.—Gross earnings of the subsidiary companies for the year ended June 30, 1907 (June partly estimated), were \$2,850,000, of which the net income to the American Railways Company was \$601,570. After the deduction of charges, taxes, and a dividend of 6 per cent the surplus was \$78,527.

Cleveland Electric Railway.—The directors have declared another quarterly dividend of three-fourths of 1 per cent, thus continuing the basis of 3 per cent per annum which was established with the dividend for the first quarter of 1907.

Denver City Tramway Company.—It is reported that D. H. Moffat has sold a controlling interest in this company to Marsden J. Perry of Providence, R. I., and others. The report states that Mr. Moffat will invest the proceeds of this sale in the Denver Northwestern & Pacific Railway, which now operates 127 miles of road and has an additional 90 miles under construction. Mr. Moffat is president of this road.

Havana Central Railroad.—The plan for sale of the common stock and first mortgage 5 per cent bonds to the United Railways of the Havana & Regla Warehouses, Ltd., has been declared operative, as \$5,336,375 of the common stock and \$5,357,000 of the bonds have been deposited.

Ithaca (N. Y.) Street Railway.—The New York railroad commission has approved the issue by this company of \$750,000 bonds. The proceeds will be used to acquire the Ithaca & Cayuga Heights Railway and the Cayuga Lake Electric Railroad, and to pay for improvements.

Mansfield (O.) Railway Light & Power Company.—Directors of the Cleveland Southwestern & Columbus Railway Company have authorized the purchase of 5,050 shares of common stock of the Mansfield company, constituting a controlling interest. The Mansfield company has \$742,000 first mortgage 5 per cent bonds and \$650,000 common and \$350,000 preferred stock outstanding. The Citizens' Electric Railway Light & Power Company, an underlying company, has \$200,000 bonds outstanding, for the retirement of which the Mansfield company holds an equal amount of its first mortgage bonds. The Mansfield company owns 9 miles of track in Mansfield and 12 miles of interurban road to Shelby, O.

Public Service Corporation of New Jersey.—The directors have declared an initial dividend of 1 per cent on the outstanding \$12,500,000 capital stock. The United Electric Company, a subsidiary company, has declared a dividend of 5 per cent. The Public Service Corporation owns \$19,500,000 of the \$20,000,000 of the capital stock of the United Electric Company.

Springfield & Northeastern Traction Company, Lincoln, Ill.—A trust deed has been filed to the Central Trust Company of Chicago, trustee, to secure the issue of \$1,500,000 of first mortgage 5 per cent bonds, payable on December 1, 1936.

Dividends Declared.

Birmingham (Ala.) Railway Light & Power Company, preferred, 3 per cent.

Cincinnati Newport & Covington Light & Traction Company, Covington, Ky., common, three-fourths of 1 per cent; preferred, quarterly, 1½ per cent.

Citizens' Electric Street Railway, Newburyport, Mass., 2½ per cent.

City Railway, Dayton, O., common, quarterly, 1¼ per cent; preferred, quarterly, 1½ per cent.

Cleveland Electric Railway, quarterly, three-fourths of 1 per cent.

Columbus Newark & Zanesville Electric Railway, Newark, O., preferred, 1½ per cent.

Detroit United Railway, quarterly, 1¼ per cent.

El Paso (Tex.) Electric Company, preferred, 3 per cent.

East St. Louis & Suburban Railway Company, East St. Louis, Ill., preferred, quarterly, 1¼ per cent.

Forest City Railway, Cleveland, quarterly, 1½ per cent.

Lincoln (Neb.) Traction Company, preferred, 2½ per cent.

Manchester (N. H.) Traction Light & Power Company, quarterly, 1¼ per cent and 1 per cent extra.

Northampton (Mass.) Street Railway, 3 per cent.

Philadelphia Company, Pittsburg, common, quarterly, 1½ per cent.

Public Service Corporation of New Jersey, 1 per cent.

Scioto Valley Traction Company, Columbus, O., preferred, quarterly, 1¼ per cent.

Toronto (Ont.) Railway, quarterly, 1½ per cent.

United Electric Company of New Jersey, 5 per cent.

Union Traction Company of Indiana, common, three-fourths of 1 per cent.

Manufactures and Supplies

ROLLING STOCK.

Milford & Uxbridge Street Railway, Milford, Mass., is in the market for two 30-foot closed car bodies.

Northern Ohio Traction & Light Company, Akron, O., has authorized the purchase of two sprinkling cars.

Edmonton Electric Railway, Edmonton, Alberta, under construction, will be in the market for rolling stock later in the season.

Tampa & Sulphur Springs Traction Company, Tampa, Fla., as reported in the Electric Railway Review of June 29, has placed an order for six cars with the McGuire-Cummings Manufacturing Company, Chicago.

Exeter Hampton & Amesbury Street Railway, Haverhill, Mass., has placed a contract for seven new cars, two of which are being built in the shops of the company at Hampton, N. H. These cars will replace the ones lost in the burning of the car houses at Hampton, as reported in the Electric Railway Review of March 9.

Ferrocarril Electrico de Lerdo a Torreon, Gomez Palacio, Mex., was reported in the Electric Railway Review of June 22 to have placed an order with The J. G. Brill Company for six cars. The company advises us that the contract calls for two 35-foot 12-bench open motor cars, two 30-foot closed motor cars, all equipped with GE-80 motors, and four 30-foot 80-bench trail cars. Shipment is to be made on or before November 15.

Rochester Syracuse & Eastern Railway, Syracuse, N. Y., has placed an order with the Niles Car & Manufacturing Company, through J. G. White & Co., Inc., New York, who originally built and equipped the road, for 15 double-truck combination passenger and baggage cars and 2 double-truck express cars. Delivery is to be made on or about August 1, 1907. The specifications include the following details:

Length—	Width—
Over buffers...51 ft. 8 in.	Over side panels...8 ft. 4 in.
Over vestibule...50 ft. 4 in.	Over all .....8 ft. 6½ in.
Smoking compartment...	Height, rail to top trolley
.....11 ft. ½ in.	bridge.....12 ft. 3 in.
Main compartment....26 ft.	Motors...Four 75-horsepower

British Columbia Electric Railway, Vancouver, B. C., which was reported in the Electric Railway Review of June 15 as expecting to build 24 cars, officially advises us that it has placed a contract for 15 city cars, 6 large interurban cars, 1 shunter and 2 freight cars, with its New Westminster shops. Delivery is to be made during this year and next. Specifications call for the following details:

Weight—	Length, body—
City .....34,000 lb.	City .....40 ft.
Interurban .....53,000 lb.	Interurban .....50 ft.
Wheel base—	Over all, city.....43 ft.
City .....4 ft.	Height, track to trolley
Interurban .....6 ft.	base .....13 ft.
Width, inside.....8 ft.	Body .....Wood
Over all .....8 ft. 8 in.	Underframe .....Composite

Special Equipment.

Air brakes.....Christensen	Fenders...Company standard
Brakes, rigging—	Hand brakes.....Sterling
City .....Hand	Heating system.Consolidated
Interurban .....Air	Motors.....General Electric
Couplers .....Van Dorn	Trucks .....Brill

Consolidated Railway, New Haven, Conn., has recently placed a contract with the Wason Manufacturing Company for 133 closed cars and 14 snow plows. This order is in addition to the one reported in the Electric Railway Review of March 9. The cars will be distributed among the company's various lines as follows: Consolidated Railway, New Haven, 16 double-truck 30-foot cars; Consolidated Railway, Hartford, 24 double-truck 30-foot cars and 3 double-truck snow plows; Connecticut Railway & Lighting Company, Bridgeport, 10 double-truck 30-foot cars and 1 double-truck snow plow; Consolidated Railway, Norwich, 1 double-truck 33-foot car and 1 double-truck snow plow; Derby Street Railway, 10 double-truck 30-foot cars and 3 double-truck snow plows; Connecticut Railway & Lighting Company, Norwalk, 3 double-truck 30-foot cars and 1 double-truck snow plow; Connecticut Railway & Lighting Company, New Britain, 2 double-truck 30-foot cars; Connecticut Railway & Lighting Company, Waterbury, eleven 30-foot cars and 2 double-truck snow plows; Consolidated Railway, Middletown, eight 33-foot cars and 1 double-truck snow plow; Milldale line, 2 double-truck cars and 1 double-truck

snow plow; Stafford Springs line, four 30-foot cars and 1 double-truck snow plow; New York & Stamford Railway, Port Chester, N. Y., twelve 30-foot cars and 1 double-truck snow plow. Thirty closed cars have been ordered for the Rhode Island lines. The specifications call for the following details:

Trucks.Standard motor truck	Registers
Motors .....General	...New Haven Recording
Electric and Westinghouse	Wheels...Schoen rolled steel
Brakes..Christensen No. AA4	Trolleys ....Sterling-Meaker
Heating system.Consolidated	

SHOPS AND BUILDINGS.

Evansville Suburban & Newburg Railway, Evansville, Ind.—This company was reported in the Electric Railway Review of June 8 as having had plans prepared for a new station at Evansville, to replace the present office and freight depot. M. J. Hoffman was the lowest bidder at \$12,122 and received the contract.

Indiana Columbus & Eastern Traction Company, Cincinnati, O.—It is reported in Springfield, O., that a real estate transfer, which put M. C. Gwyn in possession of property in that city, was made for the purpose of ultimately turning the property over to this company. A new station has been under consideration for over a year.

Pittsburg & Butler Street Railway, Pittsburg, Pa.—This company has appropriated \$10,000 for a station at Etna.

Terre Haute & Western Railroad, Terre Haute, Ind.—This road, which is under construction, has begun the erection of a large passenger station and car house at Paris, Ill. It will be a frame building, somewhat similar in design to the small passenger stations of steam railways. The company hopes to have it completed by August 1.

TRADE NOTES.

Chicago Pneumatic Tool Company, Chicago, has declared a quarterly dividend of 1 per cent, payable on July 25.

Hooven, Owens, Rentschler Company of Hamilton, O., announces the removal of its office at Atlanta, Ga., to 1510 Candler building.

American Locomotive Company, New York, has declared a quarterly dividend of 1½ per cent on its preferred stock, payable on July 22.

Van Dorn Electric & Manufacturing Company, Cleveland, O., succeeds to the business of the Van Dorn-Elliott Electric Company. There will be no change in business policy.

W. E. Forman has been appointed district engineer of the Westinghouse Electric & Manufacturing Company at Atlanta, Ga. Mr. Forman has been erecting engineer of this company at Pittsburg.

Goubert Manufacturing Company, New York City, manufacturer of steam separators, has moved its offices to the new West Street building, 90 West street, where larger quarters have been engaged.

C. W. Johnson, for the past three years general superintendent of the works of Allis-Chalmers-Bullock, Limited, Montreal, has resigned to become connected with the Westinghouse Electric & Manufacturing Company, Pittsburg.

Lord Electric Company, New York, has recently moved its office, factory and construction department to 213 West Fortieth street, New York, where it is in better condition to take care of the wants of its customers than ever before.

Power Improvement Company has opened an office at 2018 Fisher building, Chicago, where George B. Foster will have his headquarters in the interests of the De Laval steam turbines, generating units and centrifugal pumps and the Wilkinson mechanical stoker.

Baldwin Locomotive Works, Philadelphia, Pa., has awarded the contract for its new office building to Roydhouse, Arey & Co. of that city. It will be on Spring Garden and Broad streets, five stories high, 124 by 53 feet, and the cost is estimated at \$80,000. Wilson, Harris & Richards, architects.

Arthur B. Shepard, manager of the Cleveland office of the General Electric Company, has resigned in order to devote more time to his traction interests in Indiana. Mr. Shepard has been connected with the General Electric Company 14 years—seven in the engineering and commercial departments at Schenectady and the balance in charge of the Cleveland office. He is president of the Toledo & Chicago Interurban Railway, one of the first single-phase roads in the country.

Mr. Shepard will have offices in the Schofield building, Cleveland, and will still act for the General Electric Company in a special capacity.

Heine Safety Boiler Company, St. Louis, Mo., we are officially advised, will erect a new plant on Marcus avenue, east of Bircher road, at St. Louis, Mo. The cost is estimated between \$200,000 and \$300,000. Details as to the exact size have not yet been determined.

Speer Carbon Company, St. Marys, Pa., has been experimenting for the past year on a new reinforced carbon brush which it is now putting on the market. This brush is meeting with phenomenal success. If any consumer is having brush trouble, samples of this new carbon brush can be had by writing to the company.

Consolidated Car Heating Company, Albany, N. Y., has received the following large contracts for electric heating equipments: Interborough Rapid Transit Company, 4,400 heaters for use in 200 cars on Manhattan Elevated division and 1,300 heaters for use in 50 steel cars on subway division; Chicago City Railway, 6,000 heaters for use in 300 cars; Consolidated Railway, New Haven, Conn., 1,142 heaters for 103 cars; Brooklyn Rapid Transit Company, 600 heaters for 100 cars.

J. G. White & Co., Limited, London, Eng., the British affiliation of J. G. White & Co., 43 Exchange place, New York, have placed an order for about 5,000 tons of steel rails with the United States Steel Products Export Company, which handles the export business of the United States Steel Corporation. These rails are to be used in the construction of the United Electric Tramways of Montevideo, Uruguay, S. A. The system will be 85 miles long, and is expected to be in operation this fall.

Lumen Bearing Company, Buffalo, N. Y., is erecting a two-story building, 125 by 30 feet, to be used for the storage and manufacture of wooden patterns and also as a carpenter shop. The building, which is connected by a passageway with the main foundry, is of fireproof construction, steel and concrete only being used, and the windows and door cases are made of pressed steel and wire glass. This addition will greatly facilitate the handling of the company's output and will provide a storage capacity for 50,000 patterns of the ordinary run of brass foundry work.

Queen & Co., corner Eighth and Arch streets, Philadelphia, are sending to the trade a hanger illustrating their testing sets. The tests executed by these sets cover the entire field, some of the various uses being as follows: Measuring resistances, measuring insulation resistances, comparing electromotive forces, checking up voltmeters, checking up ammeters, measuring battery resistance, executing Murray and Varley loop test, measuring capacity, measuring self-induction, measuring resistances of electrolytes, testing out grounds; also many other uses. Queen & Co. will be pleased to send one of these testing sets to any one interested in the line.

O. H. Gentner, Jr., of Philadelphia has become connected with the General Fireproofing Company, Youngstown, O., as assistant engineer, in charge of estimating and drafting in the reinforced concrete department. His headquarters will be in Youngstown. Mr. Gentner is well known in the east through his connection with important building operations. He has been associated with J. A. Patterson, consulting engineer on structural work; with G. W. & W. D. Hewitt and Ballenger & Perrot, architects, Philadelphia, on concrete construction and structural work, and with the Unit Concrete Steel Frame Company, Tucker & Vinton and the Vulcanite Paving Company, in charge of reinforced concrete work. In the past nine years Mr. Gentner has been connected with the design and construction of more than 200 reinforced concrete structures.

ADVERTISING LITERATURE.

National Electric Lamp Association.—The engineering department of the National Electric Lamp Association has issued the second edition of Bulletins Nos. 1 to 6, which bear date of January 14, 1907. No. 1 describes the objects of the association; No. 2 describes the engineering department; No. 3 is on the Gem metallized 50-watt lamp; No. 4 is on the Gem metallized high candlepower and prismo lamps and units; No. 5 describes the Tantalum lamp and results of tests; and No. 6 describes the Tungsten lamp.

Ingersoll-Rand Company, 11 Broadway, New York.—"Crown" pneumatic hammers are fully described in Bulletin No. 2010, comprising 24 pages, 6 by 9 inches, profusely illustrated. The bulletin covers every detail of construction and operation. The design of this hammer is new and the construction simple. It is claimed to strike a harder, quicker blow than any other, with 20 to 30 per cent less air and with slight cost for repairs. It is made in five sizes for chipping,

calking, scaling, flue beading, etc., and in four sizes, long stroke, for driving rivets from the smallest up to 1½ inches diameter. The bulletin also gives an interesting exhibit of a displacement air meter by which the performances of these tools have been tested and verified.

Green Fuel Economizer Company, Matteawan, N. Y.—Several mechanical draft plants of extraordinary size are described in a booklet recently published by this company. A pair of fans supplied to the East St. Louis & Suburban Railway are said to be the largest ever built with overhung wheels, the wheels measuring 19 feet 6 inches in diameter by 7 feet wide at the tips of the blades and being driven by Corliss engines. Photographs are shown of nearly a dozen other large plants as well as drawings and layouts of a number of large and interesting installations, including the new Hoboken terminal of the Lackawanna Railroad. A portion of the book is devoted to the Green fuel economizer, which is often put in with mechanical draft fans because they are both beneficial under similar conditions and complementary in promoting fuel economy. The economizer recovers heat from the flue gases and at the same time acts as a reservoir for hot water, which is available in meeting sudden demands for power. It often shows its greatest economy when a low grade of fuel is burned, since under such circumstances there is usually a large surplus of air and a higher velocity of the products of combustion through the boiler passages. A greater proportion of heat is therefore carried through the boiler to be recovered by the economizer. By adding heating surface the economizer increases boiler capacity. The mechanical draft outfit makes it possible to utilize an economizer to the fullest extent; to burn the cheapest grades of fuel; to handle heavy, sudden overloads on the boilers; to get along with fewer boilers; to dispense with an expensive chimney; to obtain all the draft wanted in all conditions of weather; and to secure more thorough combustion; the result of all these factors being to use less coal and thereby to save money. Anyone owning or operating boiler plants will find valuable information in this booklet.

THE NEW DEPARTURE MANUFACTURING COMPANY.

Beginning the first of August the product of the New Departure Manufacturing Company will be sold direct from the home office and salesrooms at Bristol, Conn. The salesmen of the company will travel from Bristol and all orders will be received at and invoiced from the factory. John H. Graham & Co. of New York, who have successfully marketed New Departure products for many years, will still look after the sales in New York City and export trade.

By taking over its selling department the company places itself in line with the practice and policy of other large manufacturing enterprises of keeping the sales and manufacturing branches closely in touch with each other.

The salesrooms, now about completed, have been modeled on modern lines and every courtesy will be shown those who

visit the home plant. Other extensions in process of construction will shortly necessitate an increase in the number of hands employed and will bring the total number of employees to 1,000 or more. The automatic department has been operated full handed and overtime for months past, in order to meet a growing demand for the



Plant of the New Departure Manufacturing Company.

New Departure products. The company recently purchased the plant and business of the Liberty Bell Company, and will continue the manufacture of the Liberty chime bells in addition to the extensive New Departure line. This company is a very large manufacturer in bicycle, automobile, car, fire, door, tea, office and call bells. The Liberty trolley harps, a new and improved device, rapidly coming into favor with the street railway men, will also be manufactured.

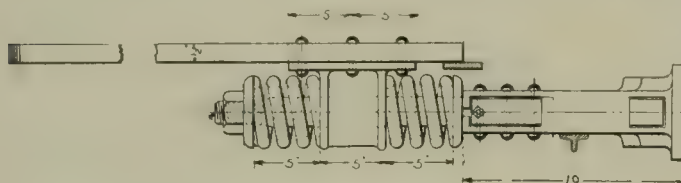
Mr. De Witt Page, secretary of the company, and identified with it in an official capacity since its establishment, will be at the head of the sales department. The trade has already become pleasantly and profitably acquainted with Mr. Page through the advertising department, over which he has so successfully presided for several years. He retains this position and will continue to distribute the really helpful "selling helps" for which he is reputed.

VAN DORN AUTOMATIC COUPLERS.

The rapid growth of the electric traction industry points to a possible universal interchange of cars on electric railways, and hence it is imperative that some standard coupler be adopted.

The conditions to which a coupler for electric cars must be adaptable are far more exacting than in the case of steam railways. Changes of grade are often more abrupt and severe, short cars have a tendency to pitch, short curves must be negotiated and these cause severe strains, to which the draft gears and couplers are subjected.

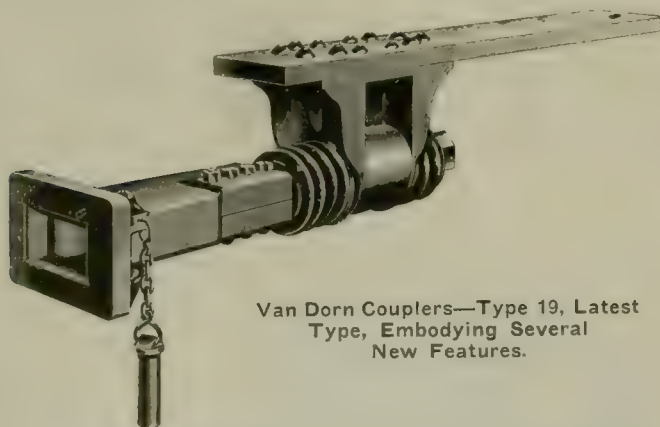
It is a well-known fact that it is far more dangerous to attempt to couple two cars which will not couple automatically than it was to couple two freight cars with the old link-and-pin coupling. If two couplers on radius bars fail to couple serious results are likely to follow, since the bars are liable to buckle. The advantages and necessity of selecting



Van Dorn Couplers—Type 11, Standard for 200 Roads.

a coupler which will work automatically under the most disadvantageous conditions are therefore evident, as is also the fact that the draft gear, radius bar and swivel must be designed according to the results of long experience, or the coupler is as useless as a weak link in a strong chain.

Unless the management of a railway can assure itself that the coupler which it selects has been used on a number of roads having the most severe service, and that the coupler has given perfect satisfaction over a long period of time, it is advisable to conduct tests, even at a considerable expense, rather than select a coupler simply because it "looks good" on the drawings. The tests to which a coupler should be subjected, and which it must pass without failure, are: Coupling cars at about three miles per hour, cars brought together hard and reversed, cars coupled on sharpest turn, train run at high speed over track with sudden changes of grade and sharp curves. If the coupler works automatically and does



Van Dorn Couplers—Type 19, Latest Type, Embodying Several New Features.

not uncouple on the rebound when cars are brought together rapidly, nor uncouple during high-speed tests on rough track, and is designed with a large factor of safety with regard to strength, it can be adopted as standard without hesitation.

One of the first men to experiment with and design automatic couplers was W. T. Van Dorn. He designed his first coupler nearly 30 years ago, and has made the design of automatic couplers a life study. The accompanying illustrations show the Van Dorn coupler of today as manufactured by W. T. Van Dorn Company, 1074-1076 South Paulina street, Chicago, Ill.

These couplers have now been adopted as standard on such roads as the Manhattan Elevated Railroad, New York Subway, Metropolitan West Side Elevated Railroad, Chicago Indianapolis & Northwestern Traction Company, etc.

From an examination of the illustrations it will be seen that the most striking characteristics of these couplers are the extreme simplicity of their design, the absence of numerous moving parts and an exceptionally rugged construction of all the parts subjected to strains.

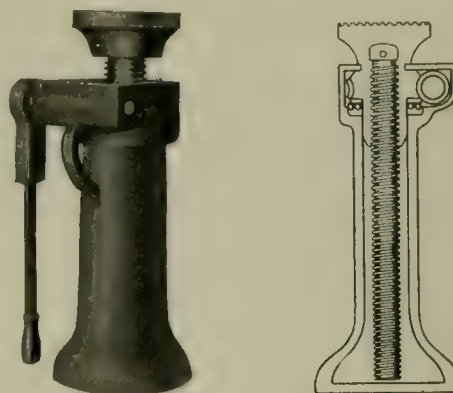
The end face of the coupling bar, as shown, is designed to steer the point of the link entering the mouth of the draw-

bar, so that it may strike the side wall and be deflected past the round pin with which it locks. These couplers will all couple within 1-32 inch, but the standard coupling distance is 1-16 inch. A long life is assured the couplers because of the large surfaces over which the wear is distributed. Further, each head is provided with two different pin holes. When the link is in either head and couples automatically on the other, the wear is occasioned by pulling only, and this affects only the two holes that make the connection. By placing the link in the opposite head the wear is reversed on the head, pin and link. This doubles the life of the parts.

It is suggested that companies using Van Dorn couplers keep the faces well lubricated with a heavy grease. This will reduce the wear on the faces, links and pins and will make them couple more easily.

HIGH-PRESSURE ONE-MAN JACK.

The accompanying engravings illustrate a purely mechanical, high-pressure, one-man jack, which it is claimed will lift a greater load with less effort than hydraulic or other jacks.

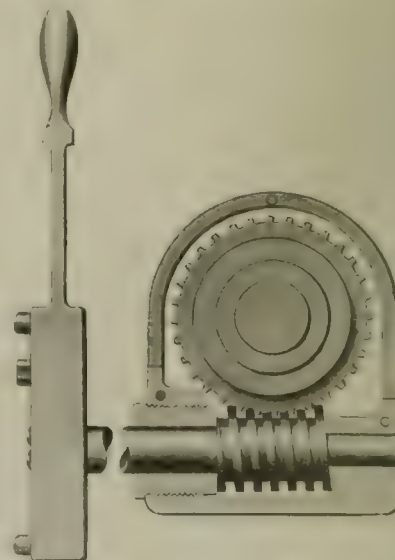


Roth Screw Jack.

This jack has been on the market for about two and one-half years and is the result of 30 years' experience in making jacks. The good will and patents, both foreign and domestic, covering the Roth high-pressure one-man jack, as well as tools and patterns, have been acquired by the Security Register & Manufacturing Company of New York and St. Louis.

The Roth jack, it is stated, can be lifted a thousandth part of an inch and will stay thus elevated any length of time under load, thus indicating the care with which the screw is

made and fitted. Preliminary to the making of compression tests of a 20-ton Roth screw jack at the United States Navy Yard, a hand test was made of the jack's lifting power, with the result that one man raised 27.34 tons with an 8-inch lever and 41.73 tons with an 18-inch lever, while 62½ tons have been lifted with the 20-ton jack without straining it. The jack has ball bearings throughout, the balls being of the best grade of steel. In the navy yard test one ball from the bearing was subjected to 40,410 pounds pressure and embedded itself ⅓ to 3-16 inch deep in a lathe without injury to the ball. The steel used in the screw was also tested with satisfactory results. The advantages claimed for this type of jack are that it has no pump to get out of order, no liquids to freeze or dry up, no stuffing box or valve to leak or require repairs, and that it will not let down a load at a critical moment. The jack has been quite extensively tested by engineers and master mechanics in the comparatively short time it has been on the market and has been found well adapted to the heavy lifting required on steam and electric railway systems.



Roth Screw Jack—Enlarged View of Gear.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 2

CHICAGO, JULY 13, 1907

WHOLE No. 220

TABLE OF CONTENTS.

Editorial:

—Co-operation of City and Company.....	31
—Rules of Utilities Commission.....	31
—Italian Socialism Not a Diversion.....	31
—Reading Technical Journals.....	32
—Labor and Municipal Ownership.....	32
—Accounting for Depreciation as Prescribed by the Inter- state Commerce Commission.....	32
—Labor-Saving Tools in Railway Work.....	33
—Losses in Ohio Steam Railway Traffic Due to Electric Roads.....	33
New York Auburn & Lansing Railroad (Illustrated).....	34
First Reports of Civic Federation Commission on Municipal Ownership.....	39
Fire-Killed Timber for Railroad Ties.....	40
Power Plant Improvements at Laconia, N. H. (Illustrated).....	41
Form for Recording Waybills Passing Junction Stations (Il- lustrated).....	43
New Track Construction in Atlantic City (Illustrated).....	43
Cars for City Service. By T. J. Nicholl.....	44
Work of New York Public Utilities Commissions.....	45
Ft. Wayne & Wabash Valley Timetable.....	45
Piping and Power Station Systems—XLV. By W. L. Morris, M. E. (Illustrated).....	46
Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	47

News of the Week:

—American Street Railway Investments, 1907 Edition.....	49
—Trolley Lines in Steam Railway Accounting.....	49
—Chicago Settlement Plan Nearly Ready.....	49
—Interborough-Metropolitan Demurrer Overruled.....	49
—Plans Approved for Illinois Traction Company's Mississippi River Bridge.....	49
—Appeal from Des Moines Perpetual Franchise Decision....	49
Construction News:	
—Franchises.....	51
—Recent Incorporations.....	51
—Track and Roadway.....	51
—Power Houses and Substations.....	53
Personal Mention.....	53
Financial News.....	55
Manufactures and Supplies:	
—Rolling Stock.....	55
—Shops and Buildings.....	55
—Trade Notes.....	55
—Advertising Literature.....	57
Remarkable Wearing Qualities of Allis-Chalmers Engines (Il- lustrated).....	57
A New Type of Cab Heater Switch (Illustrated).....	58
The Holland Trolley Base and Harp (Illustrated).....	58
The Model Automatic Smokeless Furnace (Illustrated).....	59
The Cooper Heater Company (Illustrated).....	60

The statement of George H. Earle, Jr., regarding the Philadelphia Rapid Transit Company's new ordinance, points to a truth which citizens of many communities are in danger of forgetting in these times. That is, that if a city is to grow the investment of capital in transportation facilities must be invited and encouraged. Mr.

Earle, a director of the company, said that neither the corporation nor the municipality alone could have developed Philadelphia, for capitalists will no longer advance money to build railways in hostile cities. The success of the Philadelphia plan, he added, depends upon the "spirit in which it is carried out, and the desire of every one to help instead of to hurt his neighbors." A street railway which is harassed by city officials on franchise relations and besieged by the public because it does not furnish adequate service can be hampered so seriously by these conditions that it will find the raising of capital impossible, except at prohibitive terms. The company may thus be unable to provide the facilities of which its management freely admits the need. The problems involved in franchise relations concern equally the company which furnishes the transportation service and the residents of the community, and a policy of co-operation is not only fair to each side, but it should permit the solution of all problems involved.

Rules of procedure, issued by the public utilities commission of the first district, New York, carry a step further than the letter, though not the spirit, of the law, the intimacy of knowledge and closeness of touch with corporation affairs which are the public desire of the day. If the law is regarded as drastic in its provisions for

Rules of Utilities Commission.

regulation, then the rules adopted must be considered a refinement of the ideas expressed in the law. If a corporation is so unfortunate as to have an accident, whether through the blunder of an employe or tampering with track or signals by criminal meddlers, it must, according to the law, give "immediate notice" to the commission; but the rules state

that such notice shall be given by telephone or telegraph, followed by a written communication. When any complaints are made the corporation or person complained of must answer the order of the commission within a time "to be specified," in the language of the law. The rules now name 10 days as this limit, although the commission may require a shorter time in a particular case; and the answer must specifically "admit or deny the material allegations of the petition." If rules of procedure are necessary for the protection of the public against the corporation, it would seem that some rules are just as essential for the protection of the interests embraced in the corporation against unmeasured hostility on the part of the public.

Americans who are indulging in an intellectual flirtation with the economic fallacies of public ownership are not to be taken too seriously. Though they may be ready to venture a few timid steps in the direction of socialism they would scurry to cover long before their experiments rivaled those of the more adventurous socialists of southern Europe. The United States consul at Palermo, in the island of Sicily, Italy, in a recent report, tells how that city has "municipalized" bread, macaroni and meat, in addition to the enterprises which the more hesitating adherents of public ownership in America have ventured to designate as "public utilities." But, strange to relate, even Palermo is not wholly happy. Citizens dare to complain that the municipal gas costs \$1.36 per 1,000 feet, in addition to a liberal rental charge for meters; that it is of "poorer quality" than prior to municipalization; and, also, of "a lack of sufficient pressure to deliver it properly to the more distant users and an excessive pressure on meters near the distributing point." Municipal meat temporarily brought the price down, but "some of it spoiled before it could pass into consumption," and as "it would present an uninviting appearance consumers ceased to call for it." That is, they preferred good meat at competition prices to bad meat sold at a loss which they would eventually have added to their taxes. This growth of "ap-

Italian Socialism Not a Diversion.

parent paternalism" the consul attributes to the high cost of living, which he thinks is partly a result of world-wide causes and partly due "to a certain insecurity of society, which prevents the circulation of capital and the development of the great resources of the island." This substantially reverses American conditions. Here security of property is mildly threatened by the growth of socialistic sentiment. It appears that in Sicily the socialistic movement is a consequence of an earlier condition of insecurity.

Many companies subscribe to technical journals which treat of various branches of their work. These journals are preserved for the benefit of employees, with the idea that each man shall read the articles which relate to his own department, thus broadening his knowledge and making him of greater value. All companies do not realize the advantages which may be gained through a system which comprises the reading of technical papers and directing the special attention of employees to those articles which are of distinct value and aid in connection with their work. It may be found desirable to have the journals to which a company subscribes reviewed regularly in order that special articles may not be missed. A brief abstract of the contents of papers could be made. From a weekly list of important articles the employees could select the topics upon which information is desired. A record or a card index could be kept of a valuable article, giving the title, the name of the author, the name and date of the journal, and the abstract as contained in the weekly report. The chief engineer of a large engineering corporation states that he considers the efficiency of engineers and employees is increased 25 per cent by the proper use of technical journals. This company employs a man for the purpose of reviewing and indexing the journals subscribed for.

The facts revealed in the two reports which have thus far been issued by the National Civic Federation municipal ownership commission are not favorable to the public ownership and management of utility corporations. The statements that "there are indications that the tide in practical municipalization (in Great Britain) has turned," and that "in America the municipalized enterprises visited by our labor investigators have been rich mines for significant facts relating to politics rather than to labor," are prominent conclusions in the report of J. W. Sullivan of New York, himself a labor leader. That the law of Great Britain and the powers and attitude of the municipal authorities have made British tramways semi-municipal undertakings is clearly recognized by Mr. Sullivan. This fact is frequently cited, and is more widely appreciated than the condition which Mr. Sullivan emphasizes when he says that "compared with the remarkable changes for the better in wages and hours in the American street car industry under companies, the best of the British municipal labor improvements seem hardly more than trivial." If municipal ownership brought security-holders losses or profits, they might be called the misfortunes or the gains for which owners of capital assume investment risks; and, similarly, it might be said that if municipal ownership had the effect of bettering the conditions or lessening the happiness of street railway employees, it would be the inevitable outcome of a chance which all who work for others must accept. But the foregoing conclusion as to the relative effect of private and public ownership upon employees in this country and in Great Britain is that of a labor leader, and it should have the unprejudiced and thoughtful consideration of all who hold the erroneous view that the condition of employees would be improved by the revolution of ownership. The statement is also a frank admission, based on familiarity

and investigation, of great improvements in the wages and hours of street railway employees in this country.

ACCOUNTING FOR DEPRECIATION AS PRESCRIBED BY THE INTERSTATE COMMERCE COMMISSION.

In his discussion of depreciation before the American Street and Interurban Railway Accountants' Association at the Columbus convention in October, 1906, H. J. Davies, secretary of the Cleveland Electric Railway, outlined a method of providing for depreciation or renewal reserves that would preserve the integrity of the capital accounts of an electric railway. He said concerning the charges on account of maintenance: "The rule should provide that there be charged to expense all expenditures for repairs as distinguished from renewals, and, in addition, each month, by way of reserve, a sum large enough to take care of or provide for the wear of the month, this sum to be such a proportion or percentage of the cost of renewal as the month bears to the probable life of the property; so that, when a piece of track or equipment is entirely worn out and replacement must be made, a reserve sufficient to pay for the replacement will appear on the books. The reserve and the value of the property ought to equal at any time the cost of replacement. It would be still more accurate and scientific to charge to maintenance expense a certain sum per car-mile run in each month, large enough to cover both ordinary maintenance charges and the month's proportion of the probable cost of renewals, crediting this sum to a 'Renewal Reserve' account."

No announcements have been made as to the intention of the interstate commerce commission to require electric railways which are engaged in interstate business to comply with the rules which the commission has promulgated to govern steam railway accounts. Should the commission decide that the Hepburn law is applicable to electric railways which operate across state lines, these companies will have an opportunity to account for depreciation, at least as regards equipment.

The interstate commerce commission determined that the plan for setting up formal depreciation accounts should for the first year, that is, the fiscal year ending June 30, 1908, apply only to equipment accounts, leaving final action concerning roadway and building accounts to be taken later. The scheme as outlined in the "Classification of Operating Expense Accounts, Third Revised Issue," which was approved on June 3 last, provides for three accounts for each class of equipment subject to depreciation, these accounts being designated as "Repairs," "Renewals" and "Depreciation," respectively.

Under "Repairs" there will be charged to operating expenses all repairs.

Under "Renewals" will be charged to operating expenses the original cost (estimated if not known), record value or purchase price of equipment condemned or destroyed less (a) amount previously charged for depreciation up to date of retirement and (b) scrap value of salvage or the amount received from the sale of the condemned equipment.

Under the head of "Depreciation" will be charged one-twelfth of — per cent per annum on the original cost (estimated if not known), record value or purchase price, to provide a fund for replacement when retired.

It was pointed out by Mr. Neal in his discussion before the Accountants' association at Columbus that when a plant is built in instalments and renewed from time to time as portions become worn out, the result is the depreciation of the property to the extent of 45 to 50 per cent. The scheme of accounting outlined by the interstate commerce commission, however, will not only provide against such dissipation of equipment assets in the future, but will gradually restore the assets already dissipated, because through the renewals account it will be necessary on the abandonment of any piece of equipment to charge to operating expenses the difference

between the original cost and the sum of the scrap value and such amount as has theretofore been charged for depreciation. The first year such a rule is enforced nearly the entire cost of equipment retired that year will have to be charged to operating expenses through renewals. In succeeding years the amount charged through renewals will grow less and less, because the existing credit in the depreciation reserve on account of the given equipment will be larger. In the course of a number of years, approximately the average life of the equipment, there will have accumulated a sufficient fund in the depreciation reserve to meet the condition laid down by Mr. Davies (if the difference between cost and cost of replacement be waived), that is, the reserve at any time plus the then value of the property will equal the cost.

LABOR-SAVING TOOLS IN RAILWAY WORK.

In a paper recently read before the Southwestern Electrical and Gas Association, V. W. Berry, master mechanic of the Stone & Webster properties in Texas, made a strong plea for a more general use of labor-saving machinery in railway practice. We heartily agree with him, and therefore call special attention to some of his arguments.

The application of labor-saving tools and devices to use in car barns, shops and power houses has advanced but little until recently, and even now, in many instances, armatures, motors, wheels and axles are moved about and lifted by hand power, requiring a large amount of labor which could easily be dispensed with if suitable cranes, jacks or hoists were installed. In the power house the coal and ashes are frequently handled by manual labor, whereas a considerable saving in the operating costs could be obtained by the introduction of power-driven appliances. Similarly in the car shops common lathes are frequently employed for turning and boring car wheels. Armature coils and field coils are also tediously wound by hand, requiring the exercise of much greater care and more labor than would be necessary if a coil-winding machine were used.

These are but a few of the many instances in which labor-saving tools might successfully and economically be employed. Although a great saving in cost can be shown by the introduction, under the proper conditions, of special tools, it has happened that through overeagerness to benefit from reduced labor expenses, companies have installed a great variety of expensive automatic machinery in shops so small that the saving in labor resulting from their use was far less than the interest on the investment and depreciation of the tools. Many such cases have been so loudly heralded that they have had a marked detrimental influence toward the introduction of automatic and labor-saving machinery.

While, therefore, it is most earnestly suggested that labor-saving appliances be introduced into the shops and power houses of street railways, due consideration should be given to the class of work to be performed, and the frequency with which certain operations must be repeated. Thus it is evident, as an example, that a small shop repairing but few motors and consequently infrequently requiring special bolts or nuts, could not well afford to install an automatic screw machine, whereas the same company might well afford to install coal and ash handling devices in its power house, where the handling of coal and ashes is a constant necessity.

It would be indeed difficult to lay down hard and fast rules for guidance in the matter of selecting labor-saving appliances, for, as the example given illustrates, their value depends almost solely upon the number of times a given operation is repeated. No shop is so small but that the use of hydraulic, pneumatic or electric hoists and jacks will be found economical. These tools not only save an amount equal to their original cost, but increase the output a considerable amount. Portable pneumatic or electric drills, chipping tools, pneumatic riveters, etc., are indispensable in even the smallest shops,

and in the larger shops portable grinding wheels, drill presses and similar tools are equally as indispensable.

Besides labor-saving machinery which must be bought, there are many home-made devices which can be manufactured in the shop, which will many times repay their original cost. With proper care in the selection, and a little thought in designing jigs, special tools, etc., not only can the cost of operating the shops and the making of repairs about the power house be very much reduced, but there will also be a marked improvement in the quality and uniformity of work which is turned out.

LOSS IN OHIO STEAM RAILWAY TRAFFIC DUE TO ELECTRIC ROADS.

In order to show the effect of competition from electric railways over a period of years, the Railroad Gazette publishes statistics of passenger traffic on two steam roads between Cleveland and near-by points in Ohio. The statistics of the Lake Shore & Michigan Southern Railroad, as published, cover westbound, eastbound and total passengers carried and the average per month. In the year 1895 that road carried 203,014 passengers between Cleveland and Oberlin and intermediate points. In 1902 the total was 91,761, and in 1906 it increased to 116,131. Reduced to percentages, these figures show that in 1902 there was carried between the points mentioned 45.1 per cent of the number of passengers hauled in 1895; and that, with the traffic in the four years from 1902 to 1906 increased 26.5 per cent, the figures for last year showed only 57.2 per cent of the travel which was reported in 1895.

The same railroad carried in 1895 between Cleveland and Painesville and intermediate points a total of 199,292 passengers, while in 1902 the number had declined to 28,708. The total in 1906 was 41,186 passengers. Expressed in percentages, these figures show that but 14.4 per cent of the number of passengers carried between these points in 1895 was hauled in 1902, and that in 1906, while there was an increase of 43.4 per cent over the 1902 figures, the total was equal to but 20.6 per cent of the traffic 11 years previous.

The statistics given covering the passenger traffic on the New York Chicago & St. Louis Railroad between Cleveland and Lorain in the same three calendar years are presented in different form. The number of passengers, the total revenue, and the average revenue are shown. From 42,526 passengers in 1895 the business declined to 9,795 in 1902 and to 7,422 in 1906. The passenger traffic in 1902 was but 23 per cent of that in 1895, and in 1906 there was a loss, aggregating 24.2 per cent, from the 1902 figures. The traffic in 1906 was but 17.4 per cent of the result 11 years previous. The revenue derived from this traffic amounted to \$25,523 in 1895, to \$4,379 in 1902, and \$3,836 in 1906. In percentage the revenues of 1902 and 1906 were 17.1 per cent and 15 per cent, respectively, of the revenue in 1895. The average revenue per passenger varied from 60 cents in 1895 to 44 cents in 1902, and 54.7 cents in 1906.

It is therefore clear that the decrease in traffic from 1895 to 1902 was not arrested by a reduction in rates, which made the average revenue per passenger in 1902 but 73.3 per cent of that received in 1895; and that the increase in average revenue in 1906, making the average received per passenger in that year 91.1 per cent of the 1895 average, was accompanied by a further decline in traffic.

The figures indicate roughly the severe effect of electric railway service upon the traffic which was formerly carried by steam roads between these local points. In the case of the New York Chicago & St. Louis road, the indicated reduction in rates did not restore the lost business. The traffic of the wisely located electric interurban road is based on inherent favorable conditions and should generally be held securely against steam railway competition.

NEW YORK AUBURN & LANSING RAILROAD.

A third-rail line, designed with the purpose of doing a general freight business in carload and less than carload lots as well as for handling passenger traffic, is now under construction between Auburn and Ithaca, N. Y., a distance of 36.3 miles, under the name of the New York Auburn & Lansing Railroad. The road has the advantage of a steam road charter, which makes it possible for it to carry freight and inter-

above the lake level, along which ran the branches of the Lehigh Valley on either side. When the Lehigh Valley abandoned the line the assumption was that it preferred to handle the traffic of this territory on the two valley lines in which its own money was invested.

This method of getting rid of the competing line was never satisfactory to the farmers in the central part of the plateau, to whom most of the right of way reverted when the road was abandoned. For the past 15 years the old



New York Auburn & Lansing—Twin Arch Bridge—Placing Concrete.

change carloads with steam roads. The road is located on a private right of way, a portion of which from Auburn to Freeville, about eight miles from Ithaca, was formerly occupied by a steam road that was built in 1853.

Right of Way.

In order to secure the steam road originally the farmers along the route practically gave the right of way, and the cities and towns through which it passed assisted the enter-

abandoned cuts and fills have been under the protecting care of the members of a farmers' association who hoped that eventually a new line would be built on the old roadbed, and, in fact, a project to reconstruct a line to be known as the New York Auburn & Lansing was under way, but the prospect of a new road did not appear to be imminent. The passenger stations continued in a state of decay, the signs which once warned the driver on the public highway to look out for the cars assumed a dejected angle, the elevator which was built



New York Auburn & Lansing—Deck Girder Bridge and Dam at Woods Mill.

prise by issuing municipal bonds and turning the proceeds over to the company. The road, which was finally known as the Ithaca Auburn & Western, was built and operated until 1891, when a controlling interest was secured by the Lehigh Valley, which had money invested in two branches, one on either side of the independent line about six miles distant in each case. The line passed through various vicissitudes and was finally abandoned, and its rails were ordered torn up by the Lehigh Valley management.

The old steam line had served a rich farming territory on a plateau approximately 12 miles wide and about 400 feet

at Genoa six months before the road was abandoned became a mere dilapidated reminder of misplaced confidence, and the roadbed itself at one point suffered onslaught from country roadmakers, who thought that the shale rock ballast might as well serve a useful purpose on the public highways.

Traffic Conditions.

This was the somewhat melancholy condition of the physical property when the holdings of the farmers' association were purchased a year or two ago by interests represented by A. H. Flint of the banking firm of A. H. Flint &

Co., New York. A careful investigation made it plain to the promoters of the new company that a road through this farming country could depend upon securing a great deal of valuable freight traffic, particularly if proper connections were made with the New York Central and Lehigh Valley at Auburn and with the Delaware Lackawanna & Western at Ithaca. It was learned that the road would be able to serve two or three very important manufacturing establishments on the outskirts of Auburn, served only by the Lehigh Valley,

electric line, has conducted its construction work under the most unusual conditions with respect to traffic. There never has been any doubt that a large freight tonnage would be available as soon as the road was in a condition to handle it, and, in fact, the demands have been such that the company has handled considerable traffic by steam during construction and has extended this service as rapidly as a sufficient number of ties could be placed under the newly laid track to make operation safe. Some of the towns reached are six



New York Auburn & Lansing—Concrete Arch Culvert and Cattle Pass Before Placing Embankment.

and would thus be the means of making these industries tributary to the New York Central at Auburn and to the Lackawanna at Ithaca. These manufacturing establishments include the Eagle Wagon Works and the Columbian Rope Works, the largest rope plant in the United States, the tonnage of which is greater than the entire remaining tonnage of the Auburn and Ithaca branch of the Lehigh Valley with the exception of the coal traffic, and the capacity of which is being increased 50 per cent this year.

It is apparent that this invasion of the Lehigh Valley's

miles from any railroad and the local dealers are badly in need of transportation facilities. Moreover, the farmers for six miles beyond the point where track work is in progress are holding their last year's hay crop until the rails of the new road are laid rather than haul their hay a long distance to market.

The traffic which the line will handle, aside from that originating in the manufacturing establishments mentioned, will include coal, fertilizer, hay, wool, sugar beets, apples and miscellaneous produce. Although construction work is still



New York Auburn & Lansing—Concrete Abutments for Bridge over Highway at Venice Center.

territory would be vigorously contested by that road and there was a great deal of legal controversy before the new line was able to get into the city of Auburn. In order to gain its point the company finally turned aside from the old roadbed at the Auburn end and purchased new property at a considerable expense, by which to secure a connection with the New York Central tracks by means of a 60,000-yard and a 10,000-yard fill and a viaduct over the Lehigh Valley tracks, thus leaving a certain portion of the old roadbed in control of Lehigh Valley interests.

The new company, which decided to build a third-rail

actively in progress, some 20,000 tons of produce are waiting to be transported. Since the advent of the road the sugar beet industry has taken on a great impetus and more apple orchards are being set out. The company roughly estimates the freight tonnage which will be available in the immediate future to be sufficient to produce gross revenue of \$100,000 to \$125,000 a year. There are already five grain elevators on the line and other enterprises are in prospect.

The possibilities for passenger traffic are quite obvious. Auburn, the county seat of Cayuga county, is a city of 45,000 population, and Ithaca, the county seat of Tompkins county,

has about 15,000, besides the 4,000 students at Cornell University located in Ithaca. The company has arranged with the Auburn City Railroad in Auburn for a connection with the street railway system that will enable the new line to reach the heart of the business section, and a similar arrangement has been made with the street railway system at Ithaca. In order to secure the Auburn connection the company will



New York Auburn & Lansing—Excavating Through Shale.

pay the Auburn City Railroad $2\frac{1}{2}$ cents a passenger and the city line will extend its road for a distance of one-fourth mile in order to make the connection and will double-track its line for a distance of $1\frac{1}{2}$ miles to the center of the city at South and Genesee streets, where transfer may be made to the cars of the Auburn & Syracuse Electric Railway. At Ithaca the cars of the new line will be able to reach the



New York Auburn & Lansing—Concrete Cattle Pass and Waterway.

corner of State and Tioga streets, in the very center of the business district.

Schedules.

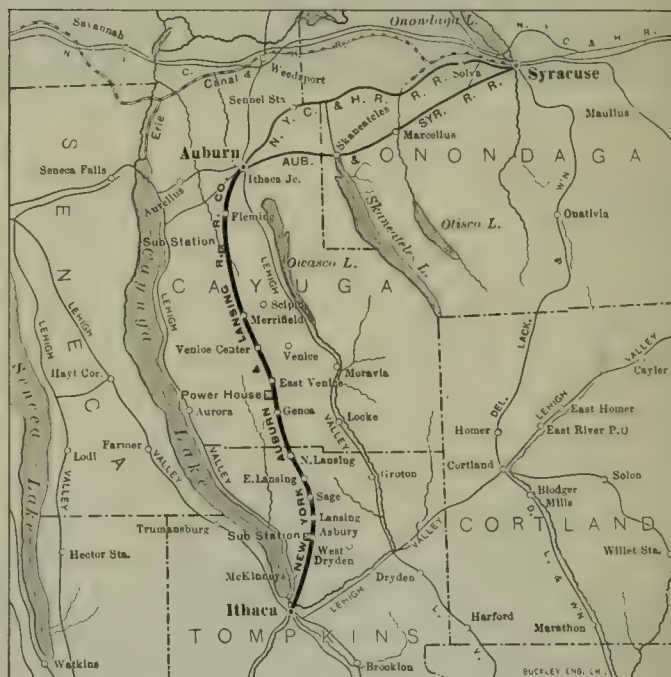
So far as through passenger traffic is concerned, an arrangement has been made with the New York Central by which tickets will be sold by the agents on the New York Auburn & Lansing to all points, and vice versa, and it is not improbable that a through sleeper will be run from Ithaca over the rails of the new line and the New York Central to

New York City. The company has planned a careful schedule of passenger trains and fares and limited cars will make the run between Auburn and Ithaca, 36.3 miles, in one hour, without intermediate stops. The schedule of these cars will be arranged to make connections with trains on the New York Central. The local trains will make the run in 1 hour and 20 minutes, stopping at Mapleton, Merrifield, Venice Center, Genoa, North Lansing, South Lansing and Esty, at which points station agents will be in attendance to sell tickets and to receive freight. It is pointed out that the Lehigh Valley requires 1 hour and 40 minutes for the run from Auburn to Ithaca over a route seven miles longer. The fare for the entire run will be 75 cents one way and \$1.25 round trip, the distance between terminals being 36.3 miles.

Roadbed.

The maximum grade of the new line will be $2\frac{1}{2}$ per cent and eliminating the first grade out of Ithaca will be 1 per cent. The road will have one 4-degree curve, but otherwise the maximum curvature will be 2 degrees.

The largest fill is at the Auburn end and is 1,500 feet



New York Auburn & Lansing—Map of Route and Connections.

long and 35 feet deep, passing over two highways and a stream by concrete arches. This will be the 60,000-yard fill previously mentioned, which is necessary to reach an elevation sufficient to carry the line over the tracks of the Lehigh Valley to a connection with the New York Central. The 10,000-yard fill will be on the opposite side of the Lehigh Valley tracks. A second large fill is at North Lansing, 415 feet long and 65 feet deep, containing 58,000 cubic yards. The stream beneath this fill is carried through a 10-foot concrete arch 170 feet long. New grading will be required for a distance of four miles out of Auburn, from which point the present profile of the old roadbed is satisfactory for high-speed operation.

No serious blasting work is encountered on any part of the road for the reason that nothing but shale rock is met with, and this can often be handled by the shovel with very little blasting. On the right of way purchased near Ithaca there is some side hill work to be done, the hills being crossed by a number of deep gullies which have to be bridged. In bridging these gullies, concrete arches are used wherever the slope is not too great, otherwise the tracks are carried over on 60-foot girders. There are 30 bridges, the most important

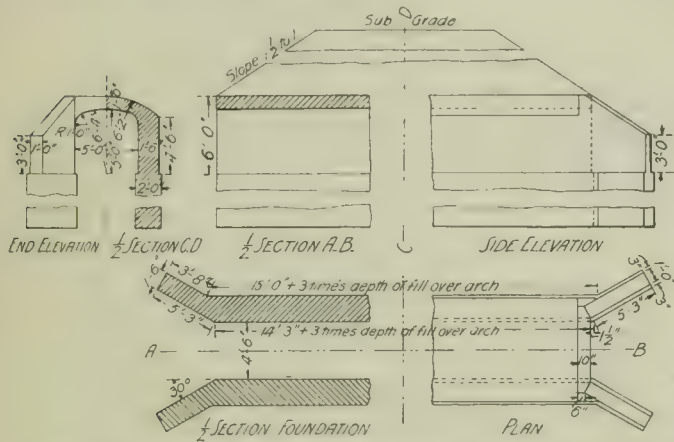
of which is that over the yard of the Lehigh Valley Railroad.

As the main highways in the territory traversed by the road run parallel with the line, it was not necessary to eliminate grade crossings. There will be three overhead and one under crossing on the line. One piece of concrete work of some interest is that of a twin arch over Crane creek at the Auburn terminus. This arch is of 15-foot span and constructed as shown in one of the accompanying engravings. As may be seen, it has a lock joint, and the concrete for

practice of sloping the ditch directly from the end of the ballast.

Track Work.

The ties used for the new line will be of chestnut with 6-inch face, spaced 2 feet apart on centers. To carry the third rail 6-inch by 8-inch ties 9 feet 6 inches long will be placed every 11 feet. The running rail will be of 70-pound section, 33 feet long, joined by Bonzano joints, which are used

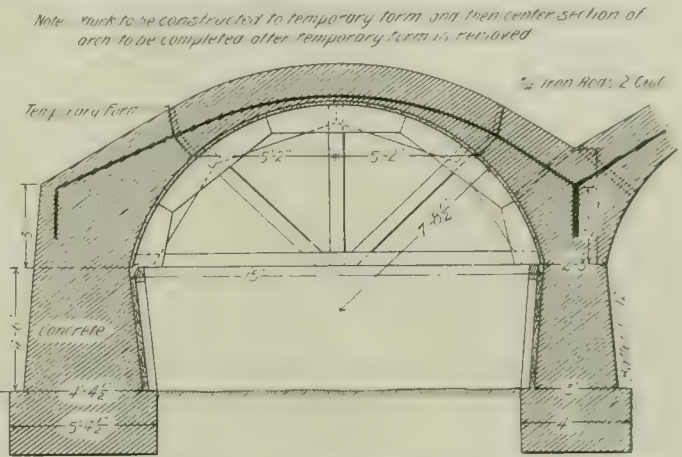


New York Auburn & Lansing—Standard Cattle Pass.

each arch was set in two sections. The work is constructed to a temporary form and then the center section of the arch was completed after the temporary form was removed.

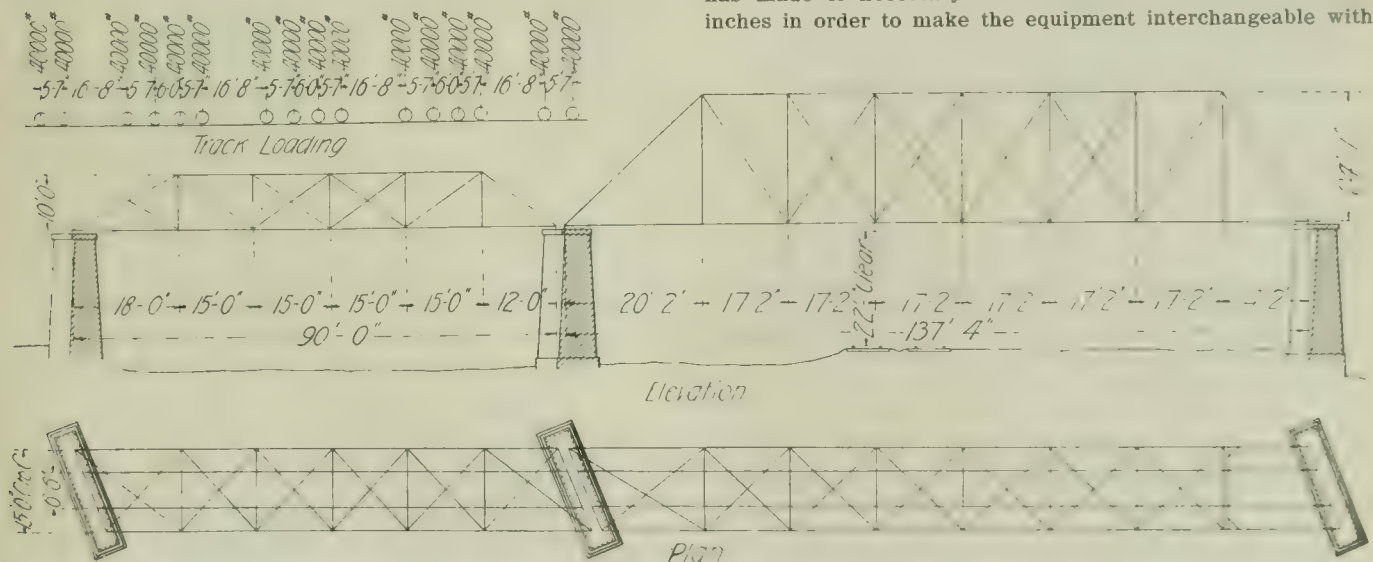
The standard box culverts are of concrete with 9-inch walls, surmounted by a 6-inch concrete slab. The cattle passes are of concrete of the design shown herewith.

The old roadbed is chiefly of shale rock and offers a very good foundation for tracklaying in its present condition. For the new section of the line the company will use gravel



New York Auburn & Lansing—Method of Placing Form in Constructing Concrete Arch.

extensively by the Pennsylvania Railroad. It is intended that the rails shall be joined for electrical purposes by a soldered bond, but the type has not yet been selected. The third rail is of a special double-head section of soft steel and is delivered in 60-foot lengths. As indicated in one of the accompanying engravings, the third rail protection and bracket is the same as that designed by W. J. Wilgus for the New York Central. The use of the 70-pound rail, however, has made it necessary to shorten the brackets about 1 3/4 inches in order to make the equipment interchangeable with



New York Auburn & Lansing—Plan and Elevation of Two-Span Through Truss Bridge over Lehigh Valley Railroad.

ballast from a gravel bank along the right of way. The use of this gravel deposit will remove what is popularly known in the region as the old Indian burying ground. Most of the sand and gravel used in the concrete work is secured from another bank which the company was also able to purchase along the right of way, and which yields a quality of gravel just suited to the work. The company has a gravel screening plant which screens the sand from the gravel and separates the stones into two sizes. Reference to the engraving showing a cross section of the roadbed will indicate that the company has secured drainage by the rather unusual

the New York Central equipment if found desirable.

The cattle guards will be of plain wooden type, and the right of way, which is 66 feet wide, is inclosed by an eight-wire fence 45 inches high, having 8-foot cedar posts of 5 inches diameter at the top. This fencing is supplied by the American Wire Fencing Company.

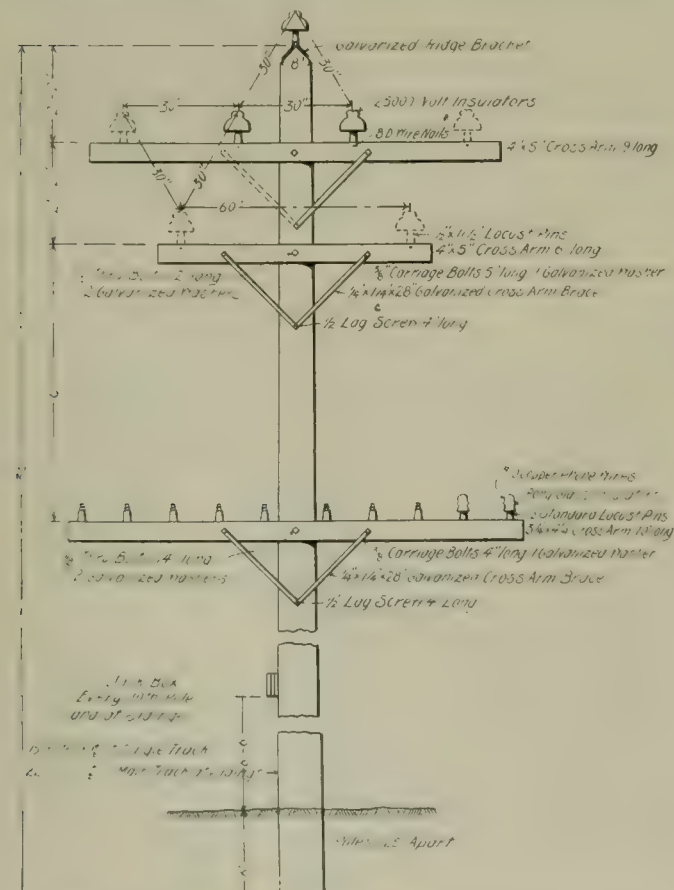
Pole Line.

The line at present is single-track, with sidings at stations where agents are located. These sidings have a capacity for trains of a maximum length of 15 cars. It is the ulti-

mate purpose to double-track the line, and to this end the poles for the high-tension transmission line are placed 15 feet 6 inches from the center line of the single-track and 22 feet from the center line of the main track at sidings. These poles are 35 feet long and of 8 inches diameter at the top, and spaced 125 feet apart. They are designed to carry ultimately two three-phase circuits, only one of which is needed at present. As shown in the accompanying engraving, the pole will carry an upper crossarm 9 feet long to support four 50,000-volt porcelain insulators, and a lower

the company has purchased a farm of 86 acres, through which runs a stream known as Salmon creek, which drains 18 square miles of territory, and will thus supply ample water. By means of a small dam 4 or 5 feet high, it is possible to flood five acres of ground, and a natural reservoir is thus provided. The company will have a pond 900 feet long and about 400 feet wide, through the center of which a dyke will be built. This will compel the cooling water after use to make a complete circuit of the pond, thus giving it time to cool before reaching the point where it can be used again.

crossarm 6 feet long to support two 50,000-volt insulators. These insulators will be furnished by the Ohio Brass Company and placed on high-tension locust pins. It will be noted that the pole is surmounted by a galvanized ridge bracket, supporting a high-tension pin and insulator, and for present purposes this will be used in conjunction with the two upper insulators nearest the pole to carry the high-tension line. In order to provide against the possibility of a short circuit, the brace on one side will be left off until the additional line is installed, in which event the insulators on the ridge brackets will support a lightning wire which will be grounded at



New York Auburn & Lansing—Pole Top Construction.

intervals. The pole will also support a 10-pin crossarm for the telephone wires. The latter will be carried on lighter poles along the portion of the route not reached by the transmission line.

Power Station.

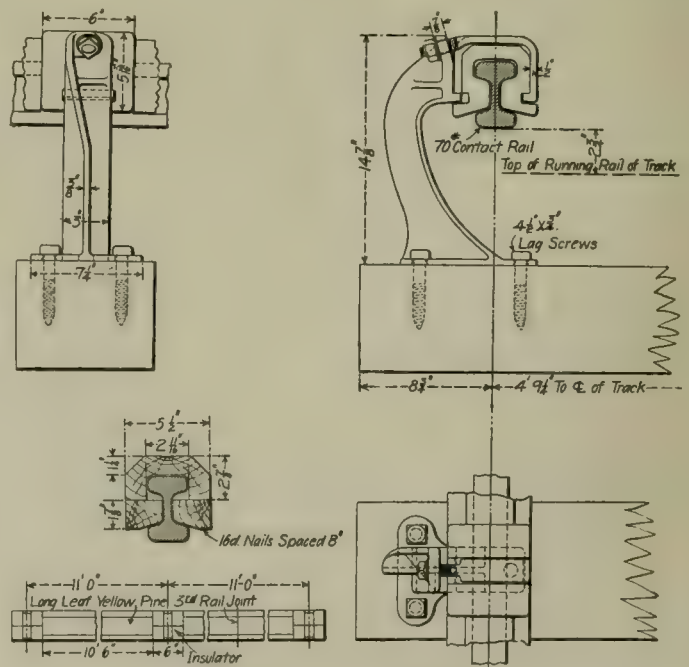
The power station will be located approximately at the center of the road at a point two miles north of Genoa, where



New York Auburn & Lansing—Track Layout at Auburn Terminal.

In this way the water may be used over and over again every 10 hours.

The generating equipment of the power station will consist of two 800-kilowatt Curtis turbines, and the boilers will have a capacity of 1,750 horsepower in five units. The boilers



New York Auburn & Lansing—Details of Under-Running Third Rail and Protection.

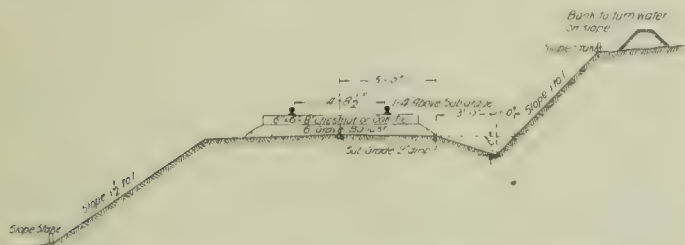
will be connected by a single header serving the turbines. This header will have a valve in the center so that it can be cut in half if anything happens to the header. The pumps will be located between the boilers. The station will be capable of operation at 50 per cent overload. Worthington surface condensers will be used.

There will be three substations, each equipped with two

300-kilowatt rotaries and step-down transformers to convert the 21,500-volt alternating current to 600 volts direct current for delivery to the third rail. One of the substations will be located in the power station, and the others will be located, one at Mapleton and the other at South Lansing. At these points the company will erect a combined building for its freight house, substation and railway station, which will be of concrete blocks with a tile roof.

Rolling Stock.

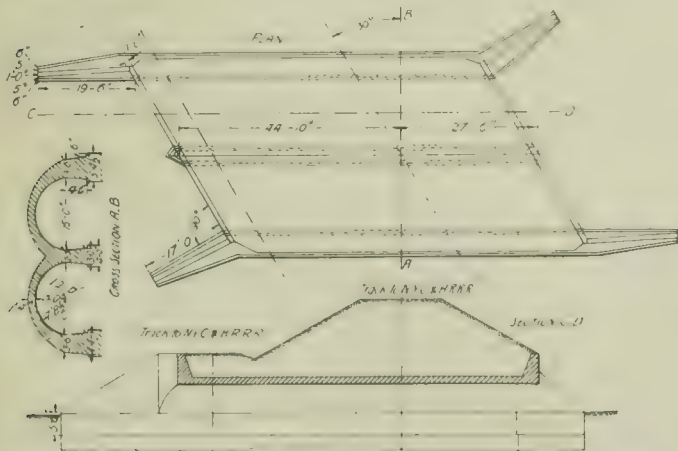
The equipment which the company now has on the line consists of three locomotives and 70 cars, besides two steam shovels, one Lidgerwood rapid unloader and two unloading plows. For the passenger service when the line is com-



New York Auburn & Lansing—Standard Roadbed.

pleted, eight cars have already been ordered of the Kuhlman Car Company. These will be double-truck cars, 59 feet long, equipped with four 75-horsepower General Electric motors and arranged for multiple-unit control. They will have Baldwin trucks and will be equipped with contact shoes for the third rail, and with trolley poles for city operation. It is planned to handle freight trains by electric locomotives, but until these have been secured the cars will be hauled by ordinary motor cars geared to 15 miles per hour.

All car operations will be handled by a telephone system and train orders will be delivered at the six stations where station agents are located. Jack boxes will be installed at



New York Auburn & Lansing—Twin Arch Concrete Skew Bridge at Auburn.

every tenth pole and at sidings to enable car men to plug in with a portable set and receive direct orders from a dispatcher in cases of emergency. The telephone system is being installed with the company's own line forces, but the apparatus has been purchased from the Stromberg-Carlson Manufacturing Company of Rochester, N. Y., and their desk instruments and jack boxes, also their new portable set, will be used. Instead of each train or car having a set installed, each train crew has its own portable set which they take with them when they board the train.

The company has purchased an 88-acre farm near Auburn and will use five or six acres of this as a site for a car house and shop. The shop will be equipped at first with three screw-cutting lathes of different sizes, one wood-turning lathe,

three drill presses, one shaper, one milling machine, two emery grinders, one band saw and a circular saw.

Personnel.

The New York Auburn & Lansing is an independent road, of which A. H. Flint of No. 15 Broad street, New York, is president; R. Halladay of the same address, secretary and treasurer; Senator B. M. Wilcox of Auburn, vice-president; E. C. Aiken, mayor of Auburn, counsel and director; W. L. Fairchild, 15 Broad street, New York, consulting engineer; and Herbert A. Clark, chief engineer, in active charge of the work. The power station and the third-rail work is in charge of M. E. White, while H. E. Boath is the resident engineer at Auburn. Stanley Murdock is resident engineer at Genoa; and J. W. Wadsworth is assistant on the third rail and track construction. We are indebted to Herbert A. Clark for courtesies extended in the preparation of this article.

FIRST REPORTS OF CIVIC FEDERATION COMMISSION
ON MUNICIPAL OWNERSHIP.

The first reports of the National Civic Federation commission on public ownership and operation to be made public are those relating to labor conditions. The reports on this feature of the topic are by J. W. Sullivan, editor of the Clothing Trades Bulletin, New York, on the subject "Labor Report," and by Prof. John R. Commons of Wisconsin University, on "Labor and Politics." The plan on which the commission carried out its investigations in Europe and in this country was published in the Electric Railway Review of June 15, 1907, page 791.

Tide of Municipalization Turned.

Mr. Sullivan says that little attention has been given in the report to English people who would introduce municipal ownership into fields wherever they might imagine speedy remedy for civic abuses or economic betterment for the masses could be secured. In speaking of the investigation in Great Britain, Mr. Sullivan adds:

If any of the Utopian schemes of these municipalizers had still bid fair to be fulfilled, the facts would have been given passing recognition and the hopeful outlook touched upon. Rather are there indications that the tide in practical municipalization is turned. Where advocates once looked for a constant expansion, this has been arrested by disillusion. Government ownership of undertakings of electricity and light railways covering supra-municipal areas may be called for, but there the practical political leaders show a disposition to halt. With regard to municipal lodgings, steamboats and miscellaneous supplies, there has been reaction. Platform demands may be more numerous than ever with extremely radical theorists who have the ear of the clamorous among the hungry masses, but the recent elections have gone against the radical sentiment and appropriations from councils and parliament are commonly expected to cease or follow slowly.

No street car undertaking in Great Britain has ever been a "private" enterprise in the sense in which the word is applied in this country. The 21 years' term of the franchise, the veto of company petitions by village authorities, the enormous cost of parliamentary powers and local assents, and various other restrictions non-existent in the United States, shackle and impoverish British tramway company management and consequently forbid an intelligent investigator to employ British example to illustrate possibilities in America through change from private to municipal ownership. British tramways have always been semi-municipal. As by the terms of their franchises all English tramway undertakings may be taken over by the municipalities, directors manage their properties with that end in view. Compared with the remarkable changes for the better in wages and hours in the American street car industry under companies, the best of the British municipal labor improvements seem hardly more than trivial.

Politics in Municipal Plants Here.

Sharp criticism is passed by Mr. Sullivan on the labor conditions prevailing in municipal plants in this country. He states:

In America the municipalized enterprises visited by our labor investigators have been rich mines for significant facts relating to politics rather than to labor. These facts are not

usually among those heretofore emphasized by the American advocates of municipal ownership. The testimony as to political rottenness, root and branch, in Syracuse, Allegheny and Wheeling is conclusive. The municipal plants examined in these cities, it is to be remembered, were selected as models by representative municipalizers of the commission. Nor is the politico-labor situation in Detroit, Cleveland, Chicago or Richmond at all settled as well as might be. In Cleveland the present mayor in the beginning increased his reform forces in the public water department so as to strengthen his vote in the primaries.

Any advantage in wages or hours to be figured out for the municipal enterprises investigated in America over the private ones compared with them look much like stale illustrations of the soft berths to be found in public employment. To what extent the jobs are political for the employees, singly or collectively, or a bid for the labor vote is constantly a question. A correct view takes in these points: Syracuse, the wages situation politically debauched; Wheeling, the same; Allegheny, the same, to an extent that when a difference of 50 to 100 per cent in favor of municipalization is soberly computed by one man it makes another laugh; Detroit, private and municipal plants but a shade difference; Cleveland, nine hours municipal as against ten in the general labor market, wages the same; Chicago firemen in the fire department do not receive union rates; New Haven, no municipal undertaking; hours, eight public departments, as against nine waterworks; Philadelphia, United Gas Improvement Company, better wages and hours than any city department, and a reduction from 12-hour shifts under municipal operation to eight under the company, with higher wages.

Further points to be kept in view: With the companies mentioned many times more hands are employed than with the municipalities; good men have been more certain of retaining their places; the employees pay no political assessments and are otherwise politically free; they work under better conditions as to comfort and future prospects. Public employees, frequently against their will and under duress from officials who may injure them, promote by election contributions the fortunes of certain men and parties, though at heart they may be opposed to both. The executive—mayor, councilman or department head—not only in appointing, but in promoting or dismissing employees, is exposed to partisan, personal, social or other pressure.

Even if the reformer in office is genuine, even if the scheme he has promises well for the working masses, there arises the question of the duration of his official powers and those of his successors with similar aims, together with the assiduous attention of the public to its own self-protection.

Mr. Sullivan declares that municipalization is seen to be a project to restrict men in their activities by methods foreign to the American genius, while in practice it has failed to make out the case of its advocates as in the least measure a step forward in promoting the best interests of the employees of the enterprises investigated, or of the occupations most closely interwoven with them, or of the nation's broadening masses.

Effect on Private Companies.

Professor Commons notes in his report that certain effects of the municipal ownership movement in Great Britain on the private companies are evident. The Sheffield company, under the far-seeing management of Sir Frederick Mappin, he says, has directed its policy for many years with the distinct purpose of meeting the arguments for municipal ownership. To avoid agitation it has refrained from going to parliament for permission to increase its capital stock. Consequently it has distributed its surplus profits in the form of reduced prices for gas and betterments to its plant. Most instructive of all, he adds, is the attitude of the companies toward their employees. With the sentiment of municipal ownership ready to explode, the companies cannot afford to risk a strike.

Expressing views favorable in many respects to municipal ownership, Professor Commons finds, however, that the proper method of dealing with employees is the most difficult and critical problem of municipal ownership, and he favors recognition of organized labor as a safeguard against the pressure of outside (political) recommendations. He says:

The appointment, promotion and dismissal of employees and the wages to be paid offer peculiar opportunities for political and personal influence inconsistent with efficiency. Our investigations have shown that the strongest safeguard for a manager against the pressure of outside recommenda-

tions is the recognition of organized labor within his department. Wherever we have found a class of employees organized and dealt with as such through their representatives we have found those positions exempt from politics. This follows from the nature of labor organizations which cannot survive if individuals are given preference on political, religious, personal or any other grounds than the character of the work they do. Even in the politically honeycombed municipal undertaking at Allegheny, the union of electrical workers stopped the practice of paying assessment by its members for political campaigns.

Professor Commons takes the position that political corruption under municipal control is not greater than under private ownership.

Committee of Investigation.

The committee of investigation of the commission is composed of the following members: W. D. Mahon, president of Amalgamated Association of Street and Electric Railways of America; Prof. John R. Commons of the University of Wisconsin; J. W. Sullivan, editor of Clothing Trades Bulletin, and a prominent labor leader; Walton Clark, vice-president of the United Gas Improvement Company, Philadelphia; Daniel J. Keefe, president of the International Longshoremen, Marine and Transport Workers' Association; Walter L. Fisher, president of the Municipal Voters' League, Chicago; Melville E. Ingalls (chairman), chairman of the Cleveland Cincinnati Chicago & St. Louis Railroad; Prof. Frank J. Goodnow, Columbia University; Dr. Albert Shaw (vice-chairman), editor of the Review of Reviews; Edward A. Moffett (secretary), editor of the Bricklayer and Mason; Edward W. Bemis, superintendent of waterworks, Cleveland; Milo R. Maltbie, formerly editor of Municipal Affairs, New York; Charles L. Edgar, president of the Edison Electric & Illuminating Company, Boston; H. B. F. Macfarland, commissioner of the District of Columbia; W. J. Clark, foreign manager for the General Electric Company, New York City; Timothy Healy, president International Brotherhood of Stationary Firemen; Dr. Talcott Williams, journalist; F. J. McNulty, president International Brotherhood of Electrical Workers; Prof. John H. Gray, Northwestern University; Prof. Frank Parsons, president of the National Public Ownership League; and Albert E. Winchester, general superintendent of the electric works of the city of South Norwalk, Conn.

Fire-Killed Timber for Railroad Ties.

A recent circular of the United States forest service states that it is not generally known that trees killed by forest fires are used to any large extent, the popular opinion being that timber of this character is unfit for use. Dead timber is usually associated with unsound and decayed wood. In the west, however, there are many large tracts of fire-killed timber which, owing to dry climate and high elevations, are just as sound 30 years after as the day they were burned.

One of the important uses made of dead timber is for railroad ties. It has been found that the strength of the timber has not been impaired by the fire-killing, while the durability has been often increased. Where these ties have been used along with green timber ties they have shown remarkably well. In some cases they have lasted much longer than ties of green timber.

Dead timber is used for this purpose in wholesale quantities in the Pike's Peak national forest, in Colorado, and in a more limited way in some other places. That ties made of this material are of known value is proved by the fact that the price is the same as for green timber ties. In quite a few places these ties have been made as long ago as 15 years. Where the ties are known there is a strong demand for them. One tie contractor had a contract for 75,000 and could easily have doubled it had he been able to get out the ties. The government, through the forest service, is acting for the greatest economy by disposing of this dead tie material before it becomes useless, as every dead tie that is sold saves that much green timber to keep up future supply.

POWER PLANT IMPROVEMENTS AT LACONIA, N. H.

The central station and electric railway service of Laconia, N. H., possesses several features of unusual interest. Electricity is generated in a combined water-power and oil-engine plant located at Lakeport, which is a suburban section of Laconia, a reserve steam plant being held at the car shops of the street railway in Laconia. The fitting of these services into the operating scheme of the plant illustrates how flexible a combination of water power and oil engines may be made under proper supervision.

Location.

The lighting and power service of this community has been given since 1884 by the Laconia Electric Lighting Company. This, with the Laconia Street Railway, is now headed by H. L. Pierce, president, and E. P. Hadley, treasurer, Leominster, Mass.; and L. S. Pierce, Laconia, vice-president, general manager and purchasing agent. The superintendent of the lighting company is Fred L. Thomas.



Laconia Power Improvements—Power Plant at Lakeport.

The power plant ordinarily operated by the two companies is located on a canal which connects Lakes Winnepesaukee and Opechee, in Lakeport. The entire flow from one lake into the other passes through this canal. From dark to daylight the electric light company has the right to take 250 horsepower from the canal.

Power Station.

The power house is a brick building with concrete foundations, about 100 feet in length by 50 feet in width. Originally the station was exclusively a water power installation, but within the past four years two oil engines have been added to its equipment. The hydraulic equipment of the plant consists of four Victor turbines of the vertical type, their ratings being 125, 75, 75 and 163 horsepower, respectively, and their sizes 42, 33, 33 and 48 inches. The normal head of water at the wheels is 10 feet, but at times of maximum flow it reaches 12 feet. All four wheels are connected by bevel gearing to a horizontal shaft mounted in bearings on the level of the generator room floor. Four clutches are provided, so that this shaft may be cut in sections when desired. A jack shaft located in the engine room parallel to the first shaft is driven from the latter by two belts, one at each end.

One section of this jack shaft is equipped with a quill and pulley, belted to a 225-horsepower 16 by 24 inch three-cylinder American Diesel oil engine. Three generators are belted to the jack shaft. Two are 125-kilowatt Triumph Electric Company's direct-current 600-volt railway generators, the third being a 200-kilowatt Stanley two-phase 2,400-volt 60-cycle inductor alternator. Another 200-kilowatt alternator of the same characteristics is driven from the first shaft directly. The last unit in the generating equipment is the one added last fall, which is a 150-kilowatt Stanley revolving-field alter-

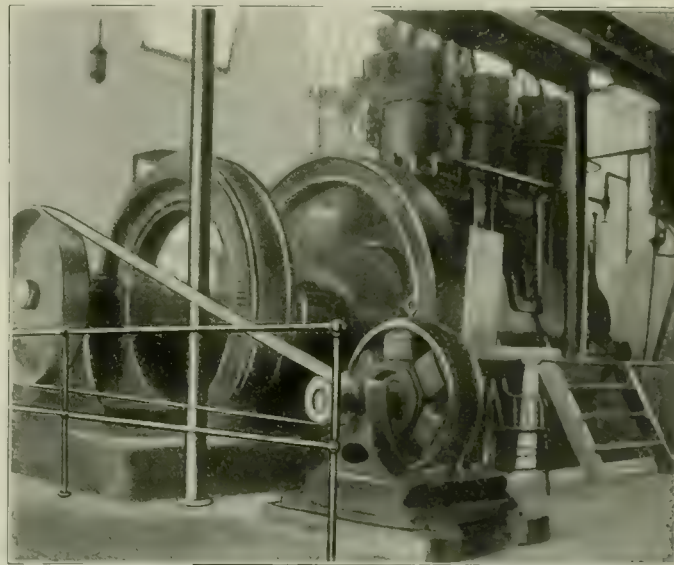
nator, 2,300 volts, two-phase, 60 cycles, direct connected to a 225-horsepower Diesel engine of the three-cylinder type.

It is doubtless true that, judged from the standards of modern direct-connected hydro-electric designs, the earlier mechanical features of this plant represent friction losses of considerable magnitude, but in enlarging stations of this character it is not always a simple or expedient course to substitute direct-connected water wheels for belted prime movers. Hydraulic alterations are commonly expensive, and under some conditions the proper engineering course dictates the retention, for at least a considerable period, of the early equipment. The Laconia installation is unusually flexible for a plant of this capacity. The first Diesel engine can be used either in conjunction with the water wheels or separately in carrying the street railway load, and the latter prime movers can be used to share the alternating-current load for which the direct-connected Diesel engine is solely employed. At periods of low water one or more of the water wheels can be cut out, leaving the Diesel engines, which have about 25 per cent overload capacity, to carry the bulk of the load.

The company does not burn crude oil in these engines, but uses Valoine gas oil, a special grade, costing about five cents per gallon, to avoid, as far as possible, corrosive action in the interior of the engines.

An example of the fuel economy of this station is shown by the figures for April 1. On that day the total oil engine output was 6,500 horsepower-hours, made up of a 20-hour run at an average oil engine load of 250 horsepower, and a three-hour run at 500 horsepower. The fuel consumption was 260 gallons, which reduces to 25 horsepower-hours per gallon of oil, making a fuel cost per horsepower-hour of 0.2 cent. Maintenance, labor and other charges are, of course, not included in this figure.

The operation of the station is carried on by four men,



Laconia Power Improvements—Direct-Connected Diesel Engine with Exciter.

the chief engineer of the plant being G. C. Sanborn. Two of the company's linemen are qualified for station operation also.

The oil supply for the engines is stored in an underground tank, 32 feet long by 8 feet in diameter, located beneath the yard at the south of the engine room. Oil is supplied to the station from this tank through a 1½-inch pipe. Each engine is directly furnished with oil from a 21-gallon vertical tank, located near it in the corner of the room. Oil is forced into these tanks by a hand-operated pump attached to each equipment. The usual compressed-air methods of forcing fuel oil into the engine cylinders are employed here. Two compressors are installed, one an Ingersoll-Sergeant

machine, belted to the jack shaft, and the later one, a Norwalk Iron Works three-stage machine, direct driven by a 25-horsepower 220-volt two-phase Ft. Wayne induction motor. The air pressure used is 900 pounds per square inch. Water circulation for the engine jackets is provided for by a Deane 6 by 6 inch single-acting pump, driven by belt from the jack shaft.

Oil Supply Regulation.

A special arrangement of lamps and contacts has been fitted up by Mr. Sanborn to show the condition of the oil supply in the small tanks, and also the temperatures of the discharged circulating water from the jackets. In gas and oil engine plants constant knowledge of these points is essential to reliable and efficient service. One of the illustrations shows the arrangement in diagram form. The height of the oil in the small tank is shown by an adjustable float, which is nearly balanced by a small weight connected with the float by a cord running over two pulleys. When the float sinks in the tank the weight is pulled up and a contact made in a lamp circuit which lights a 110-volt green-colored incandescent located in a conspicuous place on the engine room ceiling. This indication is given when there are left about four gallons in the tank, leaving sufficient time for the engineer on duty to pump in more oil.

The jacket water is discharged from each cylinder in a separate pipe. On each of the three pipes is a special home-made brass and steel thermostat, with double contacts. When the temperature of the discharge water reaches about 125 degrees F. a 110-volt circuit is closed through a red lamp on the ceiling, one lamp being planned for each pipe. Below this temperature the thermostatic indication is given by white lamps. The supply of cooling water can be increased or diminished by valves, according to the lamp indications.

Storage Battery.

At the main car house of the company in Laconia are a railway battery installation consisting of 250 cells of the



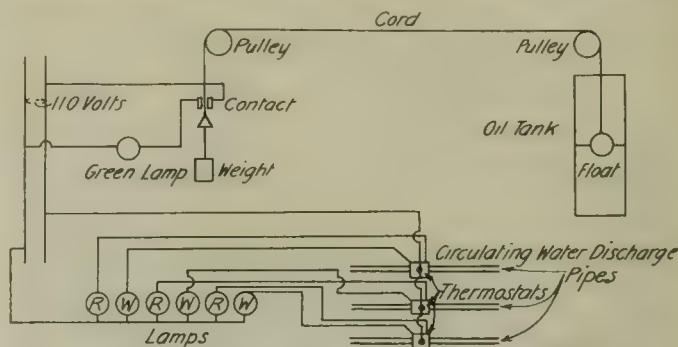
Laconia Street Railway—Home-Made Freight Car.

Electric Storage Battery Company's type E11 in E15 glass jars, one hour discharge rate 100 amperes, and a reserve steam equipment consisting of two 150-horsepower Manning boilers, built for 125 pounds steam pressure, and a Westinghouse 150-horsepower vertical compound engine, belted to a 100-kilowatt General Electric 550-volt direct-current generator. It is planned to install a 200-kilowatt lighting unit as an auxiliary at this point in the near future. When it is necessary to operate this plant car house employees are placed in this service.

In the Lakeport station there are two switchboards, one

for railway and one for power and lighting service. The railway board was installed by H. B. Rust & Co. of Providence, R. I., in connection with the Diesel engine work.

The railway load in the summer season reaches an average maximum of about 200 kilowatts. The total connected load on the power plant is about 300 horsepower in motors, 12,000 equivalent 16-candlepower lamps, eighty-five 6.6-ampere street arcs and 57 incandescents. The motors are all alternating-current outfits, varying from 100 horsepower downward in size. The largest single-phase motor allowed on the lighting circuit is 5 horsepower. Incandescent rates vary from 15 to 10 cents per kilowatt-hour, according to the consumption; power rates vary from 9 to 3 cents, the latter, of



Laconia Power Improvements—Diagram of Oil and Water Indicating Device.

course, applying only to the largest users. The company does its own power wiring, but leaves the lighting installation to local contractors.

The company owns five closed cars and six open cars. Three of the former and four of the latter are double-trucked units. The latest type of car purchased is a semi-convertible, 45 feet long over all and seating 48 passengers. This is equipped with multiple-unit control and two General Electric 35-horsepower motors. It was built by the Laconia Car Company, and, except for an increase in length of about six feet, represents the type of car used at first on the Goffs Falls Litchfield & Hudson Street Railway. The open cars are of the 13-bench size. The company carries over half a million passengers per year and its car mileage is about 150,000.

Economy in labor is attained on this road by encouraging the different employees to be capable of filling more than one position. Conductors and motormen are capable of filling each other's places, and some of the car crews are good mechanics and wiremen. Several of the linemen are familiar with the operation of the power house machinery. All around efficiency is constantly sought by the manager.

Twenty and forty minute service is maintained between Laconia, Lakeport and The Weirs.

Express Service.

An important feature is the company's electric express service, which was started in 1906. All classes of freight are handled on two round trips daily. The express car is started from the center of Laconia at 10 a. m. and 3:40 p. m., connecting with the boats on Lake Winnepesaukee. Anything less than 50 pounds in weight is carried at a 10-cent charge, and between 50 and 100 pounds the charge is 15 cents. The freight car is illustrated. It is a home-made affair, 28 feet long and equipped with two 35-horsepower motors. The cab was made from an old horse car body, which was cut in two and mounted on a flat car frame, the trucks being purchased. The schedule speed is 12 miles per hour.

The management of the Louisville & Southern Indiana Traction Company, New Albany, Ind., has announced that the handsome and commodious private parlor car recently put in service will be rented to private picnic parties to any part of the company's system or to be run over connecting lines in Indiana.

FORM FOR RECORDING INTERLINE WAYBILLS PASSING
JUNCTION STATIONS.

At the meeting of the Central Electric Accounting Conference at Indianapolis on June 1 the general opinion was expressed, after discussion, that it would be advisable to have a report of all interline waybills passing junction stations made in triplicate, so that one copy could be preserved for the agent's record, and a copy could be forwarded to the accounting department of the receiving and of the forwarding line. The conference decided to have a form printed which

to a depth of 24 inches from the top of the rail, to provide a concrete foundation. From the ends of the ties to the curb the excavation is 9 inches, which allows space for a 6-inch layer of concrete below the paving. It will be noted that the concrete is 6 inches thick under the ties and extends up between and over the ties to a height sufficient to provide a solid bed for the 3-inch layer of bitulithic paving. The ties are laid on a 1½-inch layer of ¾-inch stone and are of 7-inch by 9-inch section, 8 feet 6 inches long, and spaced 24¾ inches apart on centers.

The new track is laid with the Pennsylvania standard

FORM 50

**The Indiana, Columbus and Eastern Traction Co.
Indiana Union Traction Co.
Terre Haute, Indianapolis and Eastern Traction Co.**

DAILY REPORT OF FREIGHT PASSING

STATION.

FOR

190

Junction Agents must make this report **Daily**, in triplicate, for all freight passing on **Interline Billing**. At **Joint Agencies** send one copy to Auditor of each line. On business **to** other lines deliver one copy to Foreign Agent; take his receipt on one copy and send this to Auditor. On business **from** other lines, receipt and deliver one copy to Foreign Agent, sending one copy to Auditor. Retain original in book for station record.

[illegible]

NOTE: Agents must be careful to show in remarks column condition of freight when passing their station, and in addition should forward O. S. & D. report for all shipments checking over, short or damaged.

AGENT

Central Electric Accounting Conference Form for Recording Interline Waybills Passing Junction Stations.

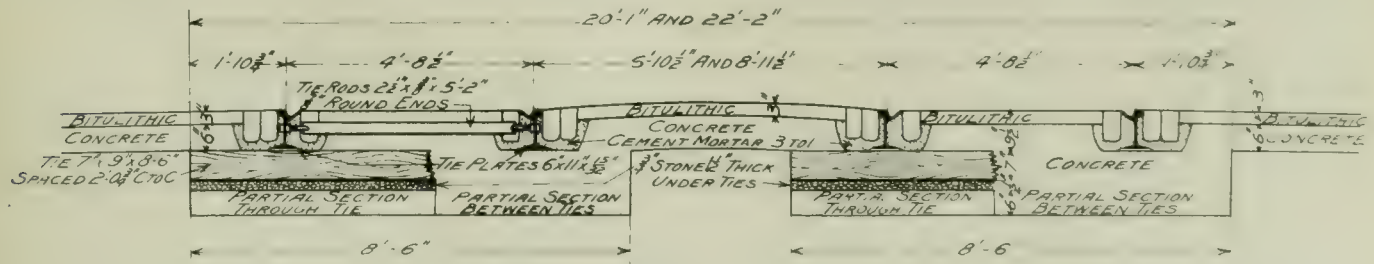
should embody this arrangement. A copy of this form, which has been adopted by a majority of the lines in the conference handling interline billing, is published herewith. It was received from M. W. Glover, auditor of the Indiana Columbus & Eastern Traction Company, Cincinnati, O., and chairman of the conference.

NEW TRACK CONSTRUCTION IN ATLANTIC CITY.

The Atlantic City Electric Railway, which is owned and operated by the Pennsylvania Railroad as a street railway

9-inch girder rail weighing 141 pounds per yard, which is replacing the wornout 7-inch 86-pound girder rail. Six tie-rods are used every rail length of 33 feet, and these are $2\frac{1}{2}$ by $\frac{3}{8}$ inches in size, the gauge of the track being 4 feet $8\frac{1}{2}$ inches. The rails are laid on tieplates 6 by 11 inches and $15/32$ of an inch in thickness.

In order to provide against deterioration of the paving around the rails, two granite blocks are placed on the outside and one granite block on the inside of each rail, and these are laid in a cement mortar mixed in the proportion of three to one. The track work and concrete foundation is being



Cross Section of Paving and Tracks at Atlantic City.

division of the West Jersey & Seashore, is now engaged in renewing the track construction in Atlantic avenue, Atlantic City, N. J., between Rhode Island avenue and Jackson avenue, a distance of 16,000 feet. In addition to providing a substantial roadbed for its line, the company has entered into an agreement to pave the entire street from curb to curb.

As indicated in the accompanying engraving, showing a cross section of the paving and tracks, the center of the street, for a width of from 20 to 22 feet, has been excavated

put in by the railroad company's forces and the foundation for the paving both on the street and on the space occupied by the track, together with a 3-inch surface of bitulithic paving, is put in by the Standard Bitulithic Company. The bonding for the new rails consists of two No. 0000 wires at the joints.

The light iron poles on this line are being replaced with heavier poles. These are the National Tube Company's 6, 7 and 8 inch poles, 32 feet in length, having extra heavy

crossarms, consisting of 2½-inch tubes 7 feet 6 inches in length. These poles and crossarms in addition to the trolley wires carry No. 0000 feed wires.

CARS FOR CITY SERVICE.

BY T. J. NICHOLL.

It is almost impossible, to one acquainted with detail, to understand why managers of electric railways persist in using double-ended cars in city service unless they are obliged to do so by local conditions or to wear out old cars. It is equally difficult to comprehend the following practices: Non-adoption of the large rear platform, permitting the use of unreadable, dirty and poorly located destination signs; not relieving the anxiety of some passengers by having destination signs that can be seen inside as well as outside of cars; abandoning the use of signal lights of different colors, thus preventing night patrons from knowing before car gets to them whether it is the car they want or not, often causing a motorman to stop his car unnecessarily. Also, why are passengers allowed to board cars at the front end and to remain there, in the way of motorman, smoking, etc.? Why are cars not stopped on first crossing of streets and before passing around curves? Here are several "whys," the adoption of one or all of which would save any company money and add greatly to the safety, comfort and convenience of its patrons.

After examining in detail the cars and methods of operation in nearly all of the larger cities of the United States and Canada, my conclusions are as follows, which are given only as suggestions to those thinking of making changes:

Arrangement of Cars.

Use single-ended cars, with motorman's cab in front and large platform in rear.

Exit door only in front; exit and entrance doors at rear; direction of travel indicated by iron railing.

Make cars three inches narrower at roof line than at sills, where tracks are close together, to prevent cars from striking each other when low point or bad track is being passed. For this same reason or to give additional room a car can be mounted three inches off center to good advantage.

The monitor deck and coved sides are relics of omnibus days, costly and useless. Straight-sided cars give more room, and plain roof gives more air space. Individual ventilators of ample size should be provided above each window and at car ends.

It is better that windows be raised to open instead of lowered, as the latter prevents proper bracing. This can better be arranged with higher sides and plain roof.

Signals and Signs.

Destination signs should be on top of car in front, with one on either side near back end. Glass or illuminated signs are all right if letters are made large and so that they will not run together or suffer by reflection. If outside signs cannot be so arranged as to be seen inside others should be provided.

Signal lights, indicating destination of car, should be displayed at night.

It is a good idea to paint front end of car a different color or shade from back end, so that one can tell immediately which way car is going.

Red signal light should always be displayed at night on rear end of car in regular place provided.

Car Fittings.

All electrical apparatus, switches, brakes, heater, tool box and fuel should be carried in cab; also holes should be provided in the cab floor over rails so that a motorman can turn track switch without leaving his cab.

Bell cord should always pass along center of car—register rods or cords at side—so that passengers may know which to pull when wishing car to stop.

Fenders or life guards should project as little as possible, with trips or apparatus guarding wheels.

Steps should not be over 12 inches high, covered with rubber or safety treads, to prevent slipping.

Grab handles should be placed at both sides of door opening and other places where passengers are liable to need them in getting on or off car.

Rods or wire screens should always be used on passing sides of cars to prevent arms and heads being put outside of window.

Company notices, warnings or instructions to passengers should be put in conspicuous places; not in advertising racks.

Proper pockets should be provided in best location for conductors' books and report blanks.

Seats should be of rattan, crosswise, cushioned on one side of back, not on other, with grab corner handles. If possible they should be fixed for use the way the car travels.

Registers and Fares.

Registers should be at front end of car, with different sounding gongs, if more than one is used.

Transfers should not be registered if only one register is used.

Simplest form of transfer should be used; only punched from a certain line with definite time limit. They should be dated and issued a. m. and p. m. separately or by coupon.

Conductors should have their numbers on both sides of cap, distinctly large, not on front, so that agents may see the numbers without difficulty.

Fares should be collected when passing from rear platform into car and transfers then given. If this is impossible conductor should be required to collect fares beginning at front end, so that he may see the faces of people and in that way identify them, should he be interrupted.

Advantages of Single-Ended Car.

The single-ended car has many advantages and few disadvantages. Some points in each class as they appeal to the writer are given herewith:

Front end of a single-ended car can be finished and furnished as a cab for the motorman only, thus permitting no distraction from passengers.

Only one instead of two of the following needed: Controller, sandbox, gong and punch, trolley stand and pole, air brake rigging, fender, tool box, handbrake rigging, headlight, circuit-breaker, front curtain.

The wiring of such cars is less complicated and at least one switch less is needed. Less liability of short-circuiting. Signal lights are placed permanently and not changed.

Heater in motorman's cab is out of way of passengers and can be attended without litter or dirt in car.

Good kit of tools, coupler, etc., can be kept locked up in cab.

Holes can be made in cab floor, enabling motorman to turn switch without leaving his post.

Electric appliances, brakes, etc., are where passengers cannot meddle with them; also they will not be alarmed should circuit-breaker go off or controller burn out. Often these are causes of serious trouble and damage.

Register is always in front where it can be seen by agents and passengers, and is located in a place particularly made for it.

Car seats are fixed one way, cushions only on one side of back; cheaper and do not get out of order.

Conductor being at back of car, is near steps and can better guard against accident. He is not obliged to crowd himself through car to collect fares from passengers getting on at the front end, passengers entering only at rear, and he is not in the way of passengers.

More fares are collected, that is, fewer are missed, and car is more easily checked up.

Passengers alight and enter more quickly. Do not get in each other's way.

Smokers being at rear of car, smoke does not annoy ladies so much.

Machinery always running in one direction is less liable to get out of order and runs more smoothly.

One can always tell which way car is going; no danger of both headlights being lighted at same time.

Car is much cheaper to build and keep in repair.

Car being less valuable, insurance should be less.

But little time wasted in turning car or holding other cars for this reason.

Disadvantages.

One only worthy of consideration—this is, that the car cannot be run backward safely and rapidly, which may be required when a fire or blockade from any cause happens. This objection is not considered bad by companies operating wholly single-ended cars, viz., Cincinnati, Indianapolis, Detroit and Montreal, and also many others.

There being only one trolley pole, no matter what length of car, should it be disabled, your car is "out," but this is just as likely to happen on a single-truck car and can be provided for by carrying a reserve trolley pole fitted with wheel, etc., under car, as is often done at present time.

Cost of constructing Y's or loops and interest on investment.

Cost of running on Y's or loops without revenue.

A comparison of the operation with two types of cars, single and double ended, on the basis of cost, is interesting.

Assume 40 cars making one round trip each every hour, 18 hours per day, for 10 years, turning on 300 feet of track at each end used for turning only:

For Single-Ended.

Forty cars will cost originally \$250 less each.....	\$10,000
Will cost less to repair by reason of less load, manner of building, etc., $\frac{1}{4}$ cent per mile; 40 cars \times 18 trips = 720 trips \times 16 miles = 11,520 miles per day; 11,520 miles per day \times 3,650 days = 42,000,000 miles, at $\frac{1}{4}$ cent.....	105,120
Extra fares collected by reason of greater advantages, etc., say, 2 cents per round trip \times 720 trips = \$14.40 per day \times 3,650 days.....	52,560
Saved in accidents, by reason of better service and equipment, say, \$1,000 per year.....	10,000
Total	\$177,680
Five per cent for 10 years.....	88,840
	\$266,520

Contra Single-Ended.

Cost of 600 feet of track, at \$7.00 per foot.....	\$ 4,200
Operating 720 trips per day, say, 80 miles \times 3,650 days 29,200 miles, at say, 10 cents per mile.....	29,200
	\$ 33,400
Five per cent for 10 years.....	16,700
	\$ 50,100

Saving in 10 years.....\$216,420
Or \$21,642 per year, with better service and passengers more comfortable and better taken care of. The above means a saving of \$540 per car per year, or about \$1.50 per day. This is more than one cent per car-mile and should be worth consideration.

WORK OF NEW YORK PUBLIC UTILITIES COMMISSIONS.

The New York public utilities commission for the first district met on July 2 in the offices of the old rapid transit commission, which will be used as headquarters for the present, and elected Travis H. Whitney secretary. The announcement was made that the offices would be open every day in the year from 8 a. m. to 11 p. m. Chief Engineer George S. Rice and the working force of the rapid transit commission have been retained by the new board, for the present at least. The board was notified that \$400,000 remaining to the credit of the old commission was available for the use of the new commission.

The commission has adopted rules of procedure. Sessions will be held daily at 10:30 a. m. and at 2 p. m. for the purpose of receiving and acting upon applications and other communications. For matters that require testimony and for the purpose of inquiring into accidents special sessions will be held. Companies are asked to telegraph or telephone news of accidents immediately and to send a fuller report in writing afterward. Inspectors will be on duty during office hours, ready to go to the scene of accident at once. The secretary has been directed to furnish all information upon the technical points involved in the preparation of a petition or an answer, and any information contained in the records of the commission bearing upon a particular case. When any complaint has been received by the commission it will expect a definite answer from the corporation affected within 10 days.

After spending a week in perfecting its organization the commission held its first public session on the morning of July 8 and took action on several matters. A resolution was adopted that all complaints as to fares between points outside of the district and points within the district over railroads other than street railroads should be referred to the commission of the second district. It was then resolved that a committee of three be appointed to report as early as possible regarding the conditions of travel over the Brooklyn bridge and connecting railroads, and to recommend what may be done to improve most speedily the service.

Next came several very important actions concerning common carriers over which the commission has control. All the resolutions on this subject were introduced by Commissioner Maltbie. The first provides that preliminary to the preparation of a uniform system of accounts, records and memoranda to be prescribed for the railroads and street railroad corporations and other common carriers the commission request all common carriers to submit before July 22 accounts, records and memoranda that are now in use by them. Another resolution requested the same data from the gas and electric light corporations. The most important of these resolutions provides that common carriers subject to jurisdiction of this commission be requested to submit to the commission on or before July 22, 1907, copies of such accounts, records and memoranda as are now kept by them relating to the movement of traffic, and that such corporations and common carriers be requested to submit by such time a com-

plete statement showing as of July 1, 1907, schedules of cars or trains operated by them, which shall include a statement showing the exact time when each car or train is scheduled to leave the starting point to reach its destination, the seating capacity, the routes operated, the number, character and seating capacity of passenger cars that will be available for use on September 1, 1907, and the number, character and capacity of passenger cars that were available for use on September 1, 1906, and September 1, 1905. Both of these resolutions were passed.

Chairman Willcox then laid before the board the report of Chief Engineer Rice as to the work under construction and bequeathed under the law to the new commission by the old board. According to Engineer Rice there is about \$15,000,000 worth of work to be finished on uncompleted contracts. The report goes into detail as to the present condition of the Brooklyn subway contract and states that the Brooklyn tunnel work should be completed late in the spring of 1908. Mr. Rice also points out that five contracts have been let for the Brooklyn loop lines which will require an expenditure of about \$10,000,000. He also calls attention to the Eleventh avenue situation and relief of the present congestion in the subway at Ninety-sixth street.

The commission held its second public meeting on July 9. Chairman Willcox announced the appointment of Commissioners Bassett, McCarroll and Eustis as members of a committee to investigate the traffic conditions at the Brooklyn bridge, and Commissioners McCarroll, Bassett and Maltbie to report on the Fourth avenue (Brooklyn) subway.

The most important matter to come before the commission was a supplemental report from Chief Engineer Rice, in which he advocated the third-tracking of the Second and Third avenue elevated railroads, so that something like immediate relief might be provided for the congested traffic of the Bronx from the Harlem river to the Battery. The matter of granting this privilege to the Interborough-Metropolitan Company had been up many times before the old rapid transit commission, and there seemed to be an overwhelming sentiment in favor of it on the part of the residents of the Bronx. It was pointed out that it would take years to build new subways, even under the most favorable circumstances, and that the population of the Bronx was increasing so rapidly that something must be done immediately to relieve the congestion. The rapid transit commission and the officials of the railroad company could not agree on terms and the matter has been held up ever since. A commission also received a request from the Taxpayers' Alliance of the Bronx, requesting a hearing on the third-track question.

It is stated that as a result of the decision of Judge Holt of the United States district court in the suit brought by Daniel W. Burrows against the Interborough-Metropolitan merger, the commission will soon take action to investigate the merger on its own account.

The commission of the second district has decided to retain the following employees of the old state railroad commission: J. D. Shultz, steam railroad inspector; C. R. Barnes, inspector of electrical roads; E. F. Van Holsen, inspector of accidents; G. P. Robinson, locomotive and boiler inspector; H. A. Suitermeister, superintendent of grade crossing bureau; and J. E. Brazee, inspector of grade crossings.

Governor Hughes on July 8 sent to the senate for confirmation the names of the men he appointed on the two commissions. In his message he announced for the first time the terms they were to serve, as follows:

First district, Chairman W. R. Willcox, until 1913; William McCarroll, 1912; Edward Bassett, 1911; Milo Roy Maltbie, 1910; John E. Eustis, 1909.

Second district, Chairman Frank W. Stevens, until 1913; Charles Hallan Keep, 1912; Thomas Mott Osborne, 1911; Martin S. Decker, 1910; Frank E. Sague, 1909.

Ft. Wayne & Wabash Valley Timetable.

An official copy of timetable No. 6 of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., has been received from John B. Crawford, superintendent of transportation. The timetable took effect on July 11. Besides the time of trains complete rules for the government and information of employes are given, and also some general instructions. Among the latter are the following:

"In case of doubt always take the side of safety.

"Ignorance of the rules excuses no one.

"Employees are required to be polite and considerate in their intercourse with the public and with one another, remembering that the reputation and prosperity of the company depend not only upon the promptness with which its business is conducted, but also upon the manner in which its patrons are treated by its employes.

"To obtain promotion, capacity must be shown for greater responsibility.

"Employees in accepting employment assume its risks."

PIPING AND POWER STATION SYSTEMS—XLV.

BY W. L. MORRIS, M. E.

Pump suction lines are essential for continuous operation and the plant in no case should be made wholly dependent upon any one pipe connection for its continuous operation. The underground pipes should be of cast iron the same as that used for city water pipes. A telltale pipe can be run from the storage reservoir to the power station, as shown in Figure 292, and also in Figure 287, the pipe being laid in the same trench as the supply pipe instead of independently, as shown.

Artesian Water to Other Buildings—Class L4.

Ordinarily the buildings located near the power plant are supplied with water from the low-pressure general service main or the fire main if the latter is intended to serve for both the general and the fire service. The water for the plumbing fixtures in the power house and other buildings when taken from the general low-pressure main should not be considered to be in any particular class of water supply if there is more than one. For instance, the low-pressure system may be supplied with deep well water today, storage cistern water tomorrow and perhaps with city water the next day.

The distribution of water from its original source should be considered only with respect to the systems served and not by the apparatus itself. For example, Figure 292 shows a system of supplying artesian water to the storage tanks, the pumps and the low-pressure main. The services supplied from these sources do not belong to the artesian water system, but solely to the system which takes artesian water when it can get it and other water when artesian water is not obtainable.

If water for general service is taken from a canal or creek it may be necessary to run a line from the artesian well to the different buildings, especially for drinking water. The drinking water system is then a part of the deep well system. If an abundant supply of creek water is available there may be no need for artesian water except for drinking purposes. The requirements for drinking water make its supply very difficult if deep well water is not required for any other service. But little water is required for drinking and that must be cool and "just out of the well."

About the simplest method of supplying a small amount of deep well water for drinking purposes is to place a pulley at the outer end of the large motor shaft and use a small slow-speed motor to drive the motor shaft, placing, say a 36-inch pulley or square-rimmed balance wheel, on the large motor shaft and a 3-inch pulley on the small motor, reducing the output of the well to about one-twelfth of its regular capacity. Ordinarily the small motor would not have to be one-twelfth the power of the large motor because the water level would be much higher when the well was being pumped slowly than when it was being pumped to its full capacity. The large motor armature would revolve with the small motor, but the loss of power from this cause would not be serious. When the full capacity of the pump is needed it only would be necessary to throw off the belt. If the small motor should be run at half the speed of the large motor it would discharge but one twenty-fourth the amount of water or about two and one-half gallons a minute from an artesian well sufficiently large to supply 1,000 boiler horsepower. Pipes supplying drinking water should not be placed less than five feet under ground, to prevent freezing in winter and to keep them cool in summer. These pipes and fittings should be galvanized inside and outside and the least possible amount of this piping should be exposed to the heat of the boiler room. A small discharge at the extreme end of the drinking water line should be left open at all times to prevent the water from standing in the pipes.

Artesian Water to Fire Mains—Class L5.

If a plant is wholly dependent upon artesian water for its

water supply, or if there is a possibility of too small a supply of water being obtained from a stream, it will be found necessary to hold water in storage for use in case of a fire. An artesian well may have a capacity of but 60 gallons a minute and take 16 hours to fill a storage pond or cistern, yet together they may make a reliable water supply for fire protection. There are cases where large pumps are not available for fire service, and it is safer to elevate water to a high tank, say 125 feet from the ground, using a deep well pump for this service. For power stations a better arrangement is to provide a storage tank on the ground, of much greater capacity, not less than 100,000 gallons, and use a fire pump of large capacity. This storage tank may be arranged, as shown in Figure 292, and in case of fire both feed pumps could be used for fire service.

In this arrangement the pumps installed should be such that one is especially suited for fire service, but applicable for boiler feeding and the other designed for boiler feeding, but suitable for fire service as well.

Artesian Water to Condensers—Class L6.

There are difficulties encountered in the use of most artesian well water which appear conspicuously in the boiler. The use of such water in the condensers tends to diminish these difficulties because the temperature of the water is increased and it is delivered to a large pond where the solid matter contained in it can settle. If the jet type of condenser is to be used, the piping system can be simplified by placing the water storage tank, shown in Figure 292, so that its extreme high water level will be 12 or 18 inches below the top of the hot well, this ordinarily being the basement floor line. If an elevated pond were employed to supply the low-pressure service, the hot well would likewise have to be elevated, which would thus necessitate the use of an unsatisfactory construction.

Ordinarily the reserve feed pump will likewise serve as a fire pump, and if the low-pressure service is taken from the fire mains the pumps will always be ready for fire service. In this installation a double system of suction lines to the feed

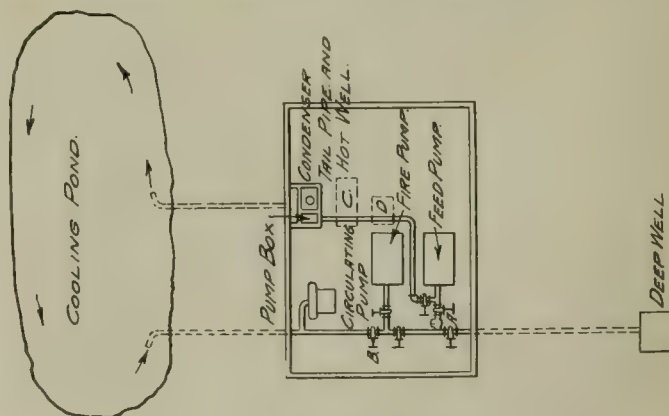


Figure 293 (L6-1).

pumps must be provided, and also means must be afforded for the feed pumps to take water from the hot well and the fire pump to take its water from the pond, or, better still, from the deep well discharge, the latter arrangement being shown in Figure 293 (L6-1). In regular operation all the valves shown in Figure 293 will be left open and the check valve, a, will be closed. This is because the overflow of the hot well will be higher than the surface of the pond (say 12 inches) and, besides, the weight of the valve will also tend to close it.

The pump box from which the suction is taken should not be less than four feet deep, making a distance of three feet from the pond level to this suction, thus insuring water in the suction line and feed pumps at all times. If water does not flow to the feed pump from the condenser it will flow to it through the check valve, a. The deep well water will not

regularly flow to the feed pump, but will pass by it, part being taken by the fire pump working on the low-pressure service, the remainder going to the circulating pump. This will be seen by examining Figure 293. By closing the valve, b, either half of the suction system may be shut off. If the deep well pump is operated together with the feed pump, the excess water will overflow at the pump box. In the latter case the condenser would not be in operation. It would be possible to connect the hot well to the fire pump, but this would not be used enough to justify the expense and increased complication resulting from these connections.

Emergency connections should insure reliability, and not necessarily the highest economy. The system shown in Figure 293 will operate more satisfactorily if some form of variable speed drive is provided which will permit running the pump at different speeds, not necessarily a great number of different speeds, but say two speeds, one corresponding to the full capacity of the deep well and the other just sufficient to supply the low-pressure service with cool water. This arrangement will permit more constant operation, and if there is an intermediate speed, at which the deep well pump can be operated, it will be possible to run on it for long periods, saving time, wear on the pump and giving more satisfactory service. A constant speed motor is invariably a very unsatisfactory source of power for driving pumping machinery, not only in cases similar to that cited, but any other pertaining to power station work. When a deep well pump is driven by a belt the motor and pump can be fitted with cone pulleys, thus permitting the operation of the pump at a number of different speeds.

A suggested mechanical arrangement for obtaining two speeds is to put one gear on each end of the crank shaft and on each end of the pump motor shaft. These should be so arranged that one pair of gears will be out of mesh when the others are in mesh. If the gears and pinions are of different ratios two speeds will then be available. Two speeds can also be obtained by means of alternating-current "full-speed and half-speed" motors.

To obtain drinking water a small centrifugal pump can be placed either on the end of the motor shaft or belted from it. This is more advisable than to take the drinking water from the low-pressure system shown in Figure 293, as a low-pressure line would be constructed of black pipe large in size and the water would be warm and there would also be danger of pond water getting into the low-pressure service. This pump would take water from the deep-well pump-discharge and would maintain a pressure of 5 or 10 pounds. Centrifugal pumps have the advantage that they do not require relief valves. The capacity of such a pump need not be over 10 gallons per minute and will require less than one-fourth horsepower to drive it.

If the artesian water is to be used for cooling a surface condenser the piping system would be similar to that shown for the elevated jet type of condenser illustrated in Figure 293. The condensation then will flow from the hot well or base of the condenser to the vacuum feed pump, as in Figure 293, but the check valve, a, will be omitted. If an open heater is to be installed there must be another pump to take water from the hot well and deliver it to the heater; in Figure 293 the latter is indicated by d and the pump by c. This statement applies equally to surface and elevated jet condensers.

(To be continued.)

According to advance statistics of the 1907 edition of Moody's Manual, 541 operating electric traction companies in the United States report 13,650 miles of track, with outstanding capital stock of \$737,522,000, and \$650,373,000 of bonds, a total capitalization of \$1,387,895,000, par value. In addition 106 parent or holding companies report 17,174 miles of track, with outstanding stock of \$1,457,650,000, and outstanding bonds of \$1,577,220,000, a total of \$3,034,870,000, par value. These 106 parent companies operate or control 483 subsidiary companies.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Bridge Toll Payments Deductible from Franchise Tax.

People on the relation of the Nassau Electric Railroad Company v. Grout, Comptroller, 103 New York Supplement, 975.—The supreme court of New York, appellate division, second department, says that the scheme of the statute for the taxation of special franchises (incorporated in the tax law) is that they are assessed at their value without any diminution for any local public charges thereon, and that such charges are to be deducted from the tax when levied. Section 46 requires that if there has been paid to the city, town or village for the tax year, "under any agreement therefor, or under any statute requiring the same, any sum based on a percentage of gross earnings, or any other income, or any license fee, or any sum of money on account of such special franchise, granted to or possessed by such person, copartnership, association or corporation, which payment was in the nature of a tax," all amounts so paid shall be deducted from the tax. It cannot be said that only sums paid as taxes may be deducted, for the statute classifies sums paid under agreement as taxes—which they may be in a loose sense—and directs them to be deducted. The company runs its cars across the Brooklyn bridge under an agreement with the city requiring it to pay a toll of five cents the round trip for each bridge is a special franchise. Inasmuch as the state has car. This payment is within the meaning of the statute, provided the company's contract right to such use of the treated it as such and assessed it, it is not open to the city comptroller to refuse to make the deduction on the ground that it is not. If the tax is to be imposed and collected the deduction must be allowed.

Liability to Steam Railroad Company for Proportion of Repairs on Bridges as Parts of Streets.

Northern Central Railway Company v. United Railways & Electric Company, 66 Atlantic Reporter, 444.—The court of appeals of Maryland says that this action was brought to recover a sum claimed to be the defendant's proportion of the cost of repairs to two bridges forming continuations of streets in Baltimore city, which bridges crossed a valley in which flowed a stream, on the banks of which, beneath said bridges, were located the tracks of the plaintiff railroad company. It was sought, primarily, to recover this sum upon the strength of the obligation alleged to be imposed, by the condition in the grant of the city, upon the defendant as successor to the rights and obligations of the Baltimore City Passenger Railway Company, and of the Baltimore Traction Company, of the cost of repairs between the tracks on these two bridges, and two feet upon either side thereof, upon the legal theory that these bridges were parts of the respective streets.

The court, which reverses a judgment rendered in favor of the defendant and orders a new trial, says that it was to be observed at the outset that, under a grant from the city to the defendant company of the right to lay its tracks in the streets of the city, the defendant company had laid its tracks on these bridges connecting portions of said streets, and that neither the city nor the plaintiff railroad company had ever denied or questioned their right to do so under that grant. The grant would have been of no practical value to the grantee if it had been obliged to terminate its tracks at each end of these bridges, and the railway would have been of no practical value to the traveling public as a means of conveyance nor to the city as a source of revenue for the Park tax imposed upon the street railways. To exclude, therefore, the right to use these bridges, would be to nullify the practical advantages to the public and to both of the direct parties to the contract. Every beneficial interest of the municipality required the words "streets" to include these

"bridges," and the beneficial interest of the defendant company demanded the same construction.

The right of the defendant company to maintain its tracks upon these two bridges, under ordinances of 1859 and 1880, was vested, and its liability to the city to keep in repair the space occupied by its tracks and two feet on either side thereof was fixed, when, under ordinances of 1868 and 1890, respectively, the plaintiff railroad company became liable to the city for the construction and maintenance of the bridges then erected. The trackage rights of the defendant company on these bridges as parts of the streets were not thereby divested, nor was its liability to the city for repair of its tracks thereon thereby released or extinguished. It continued unimpaired, though the city could thereafter, at its pleasure, call upon the railroad company to make all the needed repairs, or upon the defendant company for the limited repairs for which it was liable, and upon the railroad company for all other needful repairs, and, upon performance by the railroad company of the primary and continuing duty of the defendant company to make its limited repairs, the contract of the defendant company with the city ought to inure to the benefit of the railroad company.

Liabilities to Pass Users, Members of Police Force.

Marshall v. Nashville Railway & Light Company, 101 *Southwestern Reporter*, 419.—The supreme court of Tennessee says that the passenger fatally injured in this case was riding on what was designated as a "coupon pass," or "complimentary coupon pass," "good only if detached when used and when presented by the person named on cover," and that, "in consideration of the courtesy of this pass book," he had agreed to use it subject to certain conditions, one of which was, "I understand that I ride upon the cars of the company entirely at my own risk of injury or damage."

The question was raised whether a common carrier may absolve itself from liability to a person whom it carries free of charge, when the party agrees to such conditions, in consideration of, or as an incident to, such free carriage; and, if it may not absolve itself entirely, to what extent it may lawfully relieve itself, and from what degree of negligence. The general result of the cases is that a railroad or street car company is not liable for ordinary negligence to a party who is a passenger upon the road, riding upon a free pass, or coupon, such as was used in the present case. It is said; however, that a contract undertaking to exempt a common carrier from injuries caused by his gross or wilful negligence is null and void.

This court is of opinion that, in order to render the company liable to an individual using and riding on such a pass, there must be on the part of the company such negligence as may be denominated wilful, reckless or wanton, or negligence so gross as to amount to wilfulness, recklessness or wantonness, and for negligence short of this the company is protected by the terms of the pass, which constitute the contract of carriage. In such case the company, as to such individual, occupies the position of a mandatory, and not that of a common carrier, so far as its liability for negligence is concerned.

Again, the court says that a party may use a pass for which he does not pay in money, but for which some valuable consideration is given. In such case, he is a passenger for hire. In this case the party was a member of the police force of Nashville, being chief of detectives, and it was said that to this class of persons the company, as a rule, issued passes, which were based upon a valuable consideration. In other words, this pass was given, like others of its class, to encourage and to induce members of the police force to ride upon the cars, to be frequently about them, because their presence tended to preserve peace and good order for the passengers and to protect the interest and operation of the road. The court is of opinion that such a motive on the part of the road cannot be considered a valuable consideration.

because the expected benefits are too remote, contingent, and uncertain to be so classed; and the pass must, therefore, be considered and treated, as it purported to be, a mere gratuity or compliment.

Constructing Switch Tower in Street—Rights.

Williams v. Los Angeles Railway Company, 89 *Pacific Reporter*, 330.—The supreme court of California says that the plaintiff was the owner of a lot and the building thereon situated on the corner of streets at about the business center of the city. The company, operating a system of electric street railways passing along both of the streets and turning each corner of the intersection, erected an iron post or pedestal 12 inches in diameter and about 10 feet high, and placed thereon a switch tower 4 feet 2 inches wide and over 9 feet high above the top of the post. The post was situated on the sidewalk of one street some two or three feet north of the north line of the other street and about nine feet from the walls and windows of the plaintiff's building. This tower was to be used as a signal station, and in it was to be stationed a man who, by means of electric wires extending from the tower to the switches, was to turn the switches and by semaphore signals was to direct the running of the cars, as was formerly done by a switchman on the street.

Whether the damage and obstruction to the plaintiff's easements or rights was so slight as to come within the *de minimis* rule ("the law does not care for or take notice of trifles"), or was sufficient to justify an injunction *pendente lite* (during the litigation), was a matter for the determination of the court below.

The granting of the franchise to lay tracks in streets and run cars thereon by electricity did not carry the right to erect such a structure as this tower in the street, at any rate, not unless it was shown that it could not be made of practical use if located on private property. The court does not mean to say that, even if that were shown, the right would be included in the franchise. What it decides is that, if it can be placed on either of the four corners, on private property, and not in the space dedicated as a street and sidewalk and can there be used substantially in the same manner, then the city authorities cannot give the right to put it in the street, to the detriment of the private rights of the plaintiff. The fact that it may cost a large sum to obtain the necessary private property at that point is immaterial.

Nevertheless, upon this appeal, this court cannot say that the refusal of a temporary injunction until the trial of the cause was erroneous. It might be that the court below considered it doubtful that there would be any appreciable damage, or, at all events, as it was not claimed that the defendant was insolvent, that the full damages could be recovered in an action. The court could allow it in this action, under the prayer for general relief, and could, in the final judgment, restrain the use of the tower or command its removal, unless the damage was paid within a time fixed. The defendant would have the right to bring a condemnation suit, pay the damages assessed, and thereupon resume the use of the tower. This court cannot say that it would have been unreasonable in the court below, in view of the circumstances, to have considered that the rights of the parties could be substantially preserved by reserving the matter of an injunction until the trial, in the meantime suffering the tower to remain, and allowing the defendant to operate its cars therewith.

The Indianapolis & Louisville Traction Company and the Indianapolis Columbus & Southern Traction Company have each received two new cars to be put in operation for through service on their lines between Indianapolis and Louisville as soon as the Seymour division is completed. The Indianapolis Columbus & Southern has six more new cars almost completed by the Niles Car & Manufacturing Company, which will be shipped within a short time.

News of the Week

Increases of Wages.

The Cincinnati Newport & Covington Light & Traction Company of Covington, Ky., has announced an increase of wages for its conductors and motormen, effective on August 4. The men will receive 20 cents per hour for the first year of service, 21 cents for the next five years, and 23 cents thereafter.

The Chicago Union Traction Company has granted its employes an increase of wages similar to that recently put into effect by the Chicago City Railway. The motormen and conductors will receive 23 cents an hour for the first three months, 25 cents for the next nine months, and 27 cents thereafter. Barn men and other employes receive about a 10 per cent increase.

American Street Railway Investments, 1907 Edition.

The fourteenth annual edition of American Street Railway Investments, published by the McGraw Publishing Company, New York City, has just been issued. The preliminary general statistics of this 1907 edition show a total of 63 companies with gross revenue in 1906 of over \$1,000,000 each; of 44 companies with \$500,000 to \$1,000,000 each; of 184 companies with \$100,000 to \$500,000 each; of 100 companies with \$50,000 to \$100,000 each; and of 90 companies with a total of \$25,000 to \$50,000 each. The total number of companies, the gross revenues of which are given in these tables, is 481, as compared with 437, of which similar figures were published in the tables in the previous volume. The book contains 453 pages, with statistics relating to more than 1,400 operating and controlled companies. There are 21 more pages than in the edition of 1906, and 44 maps are published, showing routes of the systems of 47 separate companies.

Trolley Lines in Steam Railway Accounting.

In the system of accounting prescribed by the interstate commerce commission from July 1 for steam railways the classification of "Outside Operations" provides for the account "Trolley Lines." This account covers the "operations of electric trolley and other surface roads other than electrically operated portions of the line of the carrier reporting, for the use of the facilities of which direct charges are made or allowances included in through rates." The revenue under this account covers "the proceeds of operations of trolley lines from freight, passengers, baggage, advertising and miscellaneous sources, whether derived from direct charges or allowances made in through rates." The expense includes "the cost of operating and maintaining trolley roads and their equipments, etc., including supervision, cost of company's electric current used, rents, taxes, etc. In case a station, building or terminal be used for the purposes of both the carrier and the surface road, the maintenance of any portion thereof not devoted exclusively to the uses of the surface road is to be omitted from this account."

Chicago Settlement Plan Nearly Ready.

After a conference yesterday between Judge Grosscup of the United States circuit court and W. W. Gurley, attorney for the Chicago Union Traction Company, the plan for distribution of the Chicago Railways Company stocks to holders of underlying securities, with a slight change, was sent to New York. It is expected that it will be returned to Chicago on Monday with the approval of the banking interests which are to finance the transaction, and that the arrangement can then be made public.

There was sent to the Chicago Title & Trust Company yesterday the certificate of Judge Grosscup and Prof. John C. Gray, the arbitrators, stating that the plan of reorganization has been filed with them and that it provides for the execution of the plan for the distribution of securities. This action makes the deposit of stocks of the underlying companies with the trust company binding, and notice to that effect has therefore been given to the depositors. The amount of stock held by the trust company is in excess of the requirement for each of the various roads.

A hearing on the plan will be held by Judge Grosscup on July 24.

At Judge Grosscup's request the city council on July 8 passed an ordinance extending the date for acceptance of the Chicago Railways Company ordinance from July 26 to September 14. In his letter to Mayor Busse urging the extension of time, Judge Grosscup stated that the stocks necessary to acceptance of the ordinance had been deposited with the Chicago Title & Trust Company, but that it was still necessary, before the acceptance and the transfer of properties are made, that the court shall hear a petition asking that the properties in

its hands be turned over to the Chicago Railways Company and that such petition be considered and passed upon. Judge Grosscup added:

"In the meantime, realizing that the work of rehabilitation should go on as rapidly as possible according to the requirements of the city, the court, through its receivers, will do that work as rapidly as it can, and in accordance with the requirements of the city."

Accompanying the communication was a letter from J. M. Roach, general manager of the Union Traction company, saying that should the time for accepting the ordinance be extended, rehabilitation of the street railway properties would be begun immediately "and proceed upon such streets as would be selected by the city or its representatives and done in such manner as would be approved by the city."

New York reports say that the Union Traction interests contemplate raising the funds required for reconstruction by issuing \$15,000,000 or \$20,000,000 "rehabilitation and betterment" 5 per cent bonds.

Interborough-Metropolitan Demurrer Overruled.

Judge George C. Holt of the United States circuit court, New York, has overruled the demurrer of the Interborough-Metropolitan Company to the suit of Daniel W. Burrows of Chicago, who declared that the transfer of certain stock of the Metropolitan Securities Company to the Interborough-Metropolitan Company was illegal and in restraint of trade, and asked to have it set aside.

The defendants say there was no creation of a monopoly, because by monopoly is meant the exclusion of all others from the field. Judge Holt says that while that is the strict legal meaning of the term, it has a more common meaning to the effect that a monopoly thus formed may effectually, if not legally, prevent all competition, and that the latter is the kind of monopoly meant in Section 7 of the stock corporation law. The decision says that "on the facts alleged in the bill, which the demurrer admits, it is difficult to see how the monopoly could be more complete."

Theodore P. Shonts, president of the Interborough-Metropolitan Company, has issued the following statement:

"Judge Holt's decision is only upon the formal questions presented by the company's demurrer. Our counsel are unanimously of the opinion that the validity of the organization of this company will be sustained by the appellate courts."

Plans Approved for Illinois Traction Company's Mississippi River Bridge.

The plans, specifications and location of the new bridge across the Mississippi river at St. Louis to be erected within the next two years by the St. Louis Electric Bridge Company for the Illinois Traction System have been approved by the war department. The letting of the contract for the structure is all that now remains before actual construction work can be begun. The plans were prepared by Ralph Modjeska, consulting engineer, of Chicago, who designed the company's Peoria bridge over the Illinois river.

The new bridge will be erected about a quarter of a mile south of the Merchants' bridge, which it will resemble. It will be 2,365 feet long from shore to shore, with three central spans, 521, 523 and 521 feet in length, respectively, and two smaller spans, each 300 feet in length. The height of the bridge, above low water, will be 75 feet. The bridge will cost about \$2,500,000.

As soon as contracts are let for building the bridge awards will be made for laying tracks in St. Louis. All the improvements, including the bridge and land bought, will cost about \$5,000,000. The company has acquired the land bounded by Twelfth, Thirteenth, Gay and Linden streets, and will erect there a passenger station, three stories high, at a cost of about \$200,000. Another passenger depot will be constructed on the system's land at Ninth, Eleventh, Palm and Branch streets. Freight depots, yards and passenger depots will be built on the 24 acres of land at the foot of Salisbury street.

Appeal from Des Moines Perpetual Franchise Decision.

City Solicitor Bremner of Des Moines, Ia., has filed an appeal to the United States supreme court from the decision of Judge McPherson, rendered on February 19, as reported in the Electric Railway Review of March 2, that the franchise of the Des Moines City Railway is perpetual. The city takes exception to the decision in 50 points, including the following:

In holding that the ordinance of December 10, 1866, was a valid and subsisting contract between the street railway company and the city.

In holding that the ordinance of December 10, 1866, was construed by the city for years as being a perpetual franchise.

In restraining the city from interfering with the company in the free use and enjoyment of any privileges and franchises to which it had acquired rights.

In restraining the city from bringing action in court to

determine the respective rights of the city and the company. In enjoining the city from ousting the company from the streets.

In enjoining the city from bringing suit to test the right of the company to operate its street railway in the streets of the city.

In holding that the city had power vested in it to grant a perpetual franchise to the street railway company.

In holding that all the company's street railways were operated under the authority of the ordinance of December 10, 1866.

Fare Boxes.—At a recent meeting of the St. Thomas (Ont.) street railway commissioners the question of providing new fare boxes was taken up and favorably discussed.

Indianapolis & Cincinnati Withdraws from Ticket Agreement.—The Indianapolis & Cincinnati Traction Company of Indianapolis, Ind., has withdrawn from the interchangeable coupon ticket agreement, effective on September 1.

Power House Struck by Lightning.—During an electric storm on July 6 the power house of the Toledo & Chicago Interurban Railway Company at Kendallville, Ind., was struck by lightning, putting the turbine out of commission and delaying traffic for several hours.

No Round Trip for One Fare.—Judge Wheeler of the New York supreme court has handed down a decision in the case of Hilton versus International Railway Company of Buffalo, that the defendant is not obliged to give a passenger a round trip for one fare over a loop line where a distinction is made between the in and out trips.

Car Barn Office Robbed.—Two masked robbers entered the office of the Chicago General Railway Company in the Kedzie avenue car barns, Thirty-first street and Kedzie avenue, shortly after 1 o'clock on July 5 and compelled the night receiver, James Driscoll, to stand against a wall while they took \$450 which lay on the desk.

To Arbitrate Traction Wages.—Lewis E. Carr of Albany, N. Y., counsel for the Delaware & Hudson Company, and James D. Landrigan of Troy have been named as the arbitrators to settle to dispute over the question of wages to be paid the employes on the Albany and Troy divisions of the United Traction Company. The decision of the arbitrators is to be final.

Rights of North Jersey Street Railway Upheld.—The New Jersey court of errors and appeals has sustained the right of the North Jersey Street Railway to operate in the streets of Jersey City. The suit was brought by Mayor Fagan on the ground that the company was operating without authority and that the act continuing the existence of corporations was unconstitutional.

Case Against Steam Road.—The Chicago & Milwaukee Electric Railroad has filed with the interstate commerce commission its brief and argument in the case against the Illinois Central Railroad for through rates. The document reviews the evidence and gives a summary of the points which were made by the Chicago & Milwaukee company in the hearing before the commission.

Moline Mayor Stops Cars.—Because the city and the company have failed to reach terms on a franchise ordinance, Mayor Johnson of East Moline, Ill., on July 9 stopped the cars of the Moline Rock Island & Eastern Interurban Railway. The company offered a bonus of \$10,000 and an agreement to build 25 miles within five years. The city insisted on street lighting along the line and forfeiture of franchise for failure to build an extension.

Ballston-Saratoga Line Opened.—The Delaware & Hudson Company's electrified division between Ballston and Saratoga, N. Y., which will be operated by the Schenectady Railway as a part of a through line from Schenectady, was formerly opened for traffic on July 3. A 20-minute summer schedule will be maintained between Schenectady and Saratoga, and with the limited service to be established later the trip of 22 miles may be made, including one stop at Ballston Spa, in 55 minutes.

Refuses to Remove T-Rails in Columbus.—The Indiana Columbus & Eastern Traction Company, through its division managers, W. A. Gibbs and J. L. Adams, on July 9 replied by letter to the formal demand of the Columbus board of public service that grooved rails be laid in the improvements of McDowell street, from Town to Mound streets, and of Mound, from Parsons to Kelton avenues. The gist of the reply was that the company had been advised by its counsel that under the franchises granted it by Columbus, it is not confined to the use of the grooved rail in those streets, neither is it bound by the ordinance of council. It claims there is no

grooved rail rolled which is as safe as a T-rail. The company offers to replace the present T-rail with a deeper and heavier T-rail, but in view of the advice given by its counsel, it insists on the use of the T-rail. The council recently passed an ordinance requiring the use of grooved rails in improved streets, which will now probably be tested in the courts.

Detroit United Railway Reorganizing Its Service.—Approximately 75 new crews will be added to the car service of the Detroit United Railway in carrying out the terms of the recent agreement reached between the company and the employes' association. This is necessitated by the regulation of the "tripper" service as agreed upon in the eight conferences held between the association's committee and General Manager Brooks. It means the complete revision of the schedule of every line in the city. The entire new system is not yet completed, but as fast as the system is formulated for a line it is put into operation.

Wisconsin Franchise Bill Passed.—The so-called Kelly bill, which provides for indeterminate franchises in place of limited franchises for street railways has been passed by the Wisconsin legislature and sent to the governor. According to the provisions of the bill every new street railway franchise to be granted shall be indeterminate and the city shall be given the right to purchase the property at a valuation to be determined by the state railroad commission. A company operating under a limited franchise may exchange it for an indeterminate franchise. The Milwaukee city council has asked the governor to veto the bill.

Chicago Street Railway Assessments Increased.—The completed list of the personal property valuations of the public service corporations of Chicago, as compiled by the board of assessors, shows increases in the assessments of the street railway companies. The valuation of the Chicago Union Traction Company is placed at \$11,550,000. Last year the assessor's figures were \$10,925,000, but these were cut to \$8,384,805 by the board of review. The Chicago City Railway Company's assessment is \$9,850,000, as compared with \$9,425,000 for last year. The valuation for the Chicago Consolidated Traction Company is the same as last year, \$2,505,000.

City Officials Order Company to Stop Running Cars.—In a franchise controversy between the city of Peru, Ill., and the Illinois Valley Railway, City Attorney Scanlan on July 9 ordered the railway company to cease operating its cars through Peru. The city attorney issued these orders under instructions from the city council. The trouble grows out of a recent decision of the Illinois supreme court which makes franchises granted to street railway companies nonassignable to railroad corporations. The Illinois Valley Railway entered Peru under such conditions and now the city demands that the railway company apply for a new franchise, which the latter has thus far failed to do.

Through Cars from Springfield to Worcester.—The first cars to run from Springfield to Worcester, Mass., over the new 14-mile extension of the Springfield Street Railway from Palmer to Fiskdale, made the run on July 1. From Fiskdale to Worcester the cars use the tracks of the Worcester Consolidated Street Railway. An hourly service will be maintained and the fare will be 80 cents, 30 cents less than the fare on the Boston & Albany. Passengers may ride from Springfield to Boston with but one change of cars at Worcester for \$1.25, 75 cents less than the steam railroad rate. The track on the new extension is laid with 80-pound rails, and has a maximum grade of 3½ per cent, although it rarely rises over 1½ per cent. There are 28 bridges on the line. Ten miles of the new line are on private right of way.

Would Amend Brooklyn Bridge Contract.—The contract under which the Brooklyn Rapid Transit Company operates its cars over the Brooklyn bridge will expire on August 23, when the board of estimate will fix the terms of a new agreement. The original contract for the operation of cars over the bridge was made in 1897 and renewed in 1898. Under the contract about to expire the Brooklyn Rapid Transit pays an annual rental to the city of \$20,306, and in addition 10 cents for every elevated car and a percentage of the net receipts, running on a sliding scale from 5 per cent on profits of from \$10,000 to \$20,000, up to 25 per cent on \$150,000 or over. In a letter just sent to the mayor by the City Club the suggestion is made that in making a new contract these rates of payment be readjusted and that in future no guarantee of the exclusive use of the bridge be given to the Brooklyn Rapid Transit. It is pointed out in this communication that the bridge, including tracks and termini, is city property and that the city has not only relinquished the returns it used to get from the operation of its own cars, but probably loses some of the receipts it might derive from vehicle traffic were the roadways less crowded.

Construction News

FRANCHISES.

Annapolis, Md.—The city council last week granted an amended franchise to the Washington Baltimore & Annapolis Electric Railway. The company is given the exclusive use of its tracks in the city for three years.

Arkansas City, Ark.—Representatives of an eastern syndicate are said to have applied for a franchise for an electric railway from Arkansas City to Winfield, Ark.

Columbus, Ind.—The Indianapolis Columbus & Southern Traction Company has been granted a franchise on Second street.

Evanston, Ill.—A franchise has been granted to the Chicago Consolidated Traction Company to extend its tracks from the present terminus at Bennett and Central streets to Reese street, two blocks west, from there connecting with the North Shore & Western Railroad, now being built.

Gary, Ind.—Frank Gavitt last week secured a 50-year franchise for street railway lines on Broadway, Fifth avenue and Eleventh avenue. The franchise provides that cars shall be in operation inside of two years, tickets to be sold at the rate of eight for 25 cents, and 5 per cent of the gross earnings are to be paid to the city.

Greeley, Colo.—E. A. Reacer of the Interurban Construction Company of Denver, Colo., has applied for a franchise for an electric railway from Denver to Greeley.

Long Island City, N. Y.—The board of estimate and apportionment has granted the Long Island Railroad Company a franchise to build two extensions in Queens county. One will be known as the Montauk cut-off. It will be a short two-track line entirely within Long Island City and after the completion of the Pennsylvania tunnel will be used almost entirely as a freight line. The other extension will be known as the Glendale cut-off and will be from two to three miles long, connecting the Montauk division and the New York Woodhaven & Rockaway Beach lines with the main line at Elmhurst, which will be four-track, thus affording a direct route for those divisions to the tunnel.

New York, N. Y.—The first application to the new public utilities commission for a franchise was that of F. B. Behr for a monorail system from the Atlantic avenue ferry, Brooklyn, to Coney Island.

St. Louis, Mo.—Six months' additional time has been granted to the North St. Louis & Suburban Railway for the completion of its line. The route is now surveyed from North St. Louis to Jennings.

Sherman, Tex.—The city council has granted a new franchise to the Gainesville Whitesboro & Sherman Railway, which agrees to have its line in operation between Sherman and Gainesville in one year.

Southport, N. Y.—A franchise has been granted to the Elmira Corning & Waverly Railroad.

Strathcona, Alberta.—The Strathcona Radial Railroad has applied for a 30-year franchise for a street railway system in this city, agreeing to have cars in operation by November 1, 1908.

Terre Haute, Ind.—The city council last week voted to postpone action on the new franchise applied for by the Terre Haute Indianapolis & Eastern Traction Company until the return of President Hugh J. McGowan of Indianapolis from Europe. The company already holds a franchise in the name of the Terre Haute Traction & Light Company, but desires a new independent franchise, with several additional privileges.

Tifton, Ga.—A franchise for a street railway has been granted to L. P. Thurman, I. W. Myers, W. W. Banks, O. Daniel, J. E. Cochran, E. F. Bussey and J. J. L. Phillips.

RECENT INCORPORATIONS.

Canyon City Pueblo & La Junta Railway & Power Company, Pueblo, Colo.—Incorporated in Colorado to build a standard-gauge electric railway between the points named in the title. Capital stock, \$200,000. Incorporators: Charles R. Buckey, Thomas J. Stanley, Andrew J. Behymer, Daniel W. Sheldon, Perry Behymer, George D. Kendall and Francis James, Pueblo.

Charleston Westfield Marshall & Terre Haute Interurban Railroad, Marshall, Ill.—Incorporated in Illinois to build an electric railway from Charleston, via Westfield, Ill., to a point where the Indiana state line crosses the national road. Cap-

ital stock, \$5,000. Incorporators: James Dawson, William B. Scholfield, Seymour Hurst, Norman Bennett, W. L. Biggs, M. L. Briscoe, W. R. Patten, T. M. Berkley and E. T. Pinnell.

Defiance Hicksville & Ft. Wayne, Railroad.—Incorporated in Ohio to build an interurban electric line between Defiance, O., and Ft. Wayne, Ind. This is a subsidiary company of the Toledo Wabash & St. Louis Railroad, which is to build an interurban system in three sections from Toledo, O., to St. Louis, Mo., the incorporation of the Defiance Hicksville & Ft. Wayne being for the purpose of building the Defiance-Ft. Wayne section. Capital stock, \$10,000. Incorporators: Clarence D. Whitney, president; George G. Metzger, J. P. McAfee and S. L. McAfee, all of Toledo, O.

Enid Blackwell & Osage Interurban Traction Company, Enid, Okla.—Incorporated in Oklahoma to build an electric railway 85 miles long, from Enid to Pawhuska, through the counties of Garfield, Kay, Noble and Osage. Capital stock, \$1,000,000. Incorporators: George W. Bear, Frank Bradfield, S. I. Hudkins, John R. Clover and Guy S. Manatt.

Enid Waukomis & Oklahoma City Interurban Railway, Waukomis, Okla.—Incorporated in Oklahoma to build an electric railway from Enid, via Waukomis, to Oklahoma City, 100 miles. Capital stock, \$200,000. Incorporators: R. N. Brittan, president; J. A. Butler, treasurer; Charles Moore, secretary; S. F. Scott, A. R. Drew and A. B. Campbell, all of Waukomis; and Valentine Johnson of Enid.

Northern Construction Company, Hartford, Conn.—Incorporated in Connecticut to build electric railways; also dams, sluices and other forms of construction work, together with engines, boilers and other appliances for use in the generation of power. Capital stock, \$75,000. Incorporators: G. Richard Nichols, W. Evans Smith, Philadelphia, Pa., and Arthur Perkins, Hartford, Conn.

Ohio Brass Company, Mansfield, O. has been incorporated at Jersey City, N. J., with a capital stock of \$1,000,000. This company has also been incorporated in Illinois with a capital of \$10,000.

St. Louis Mountain Grove & Southern Railway, Mountain Grove, Mo.—Incorporated in Missouri to build a 30-mile electric interurban line from Mountain Grove, Wright county, to Bryant Creek, Ozark county. Capital stock, \$300,000. Incorporators: J. J. Hedges, J. H. Jarrett, E. L. Richardson, Springfield, Mo.; J. Allhands, St. Louis; and P. M. Johnston, Elmo, Ill.

TRACK AND ROADWAY.

Anderson (S. C.) Traction Company.—The first passenger car was operated over the newly completed line from Anderson to Belton, S. C., a distance of 10 miles, on July 1. The power is furnished by the Savannah River Power Company's plant at Gregg Shoals.

Atlantic Northern & Southern Railway, Atlantic, Ia.—The directors last week let a contract for grading on this road from Manning to Villisca, Ia., to Tompkins, Fitzgerald & Peterson of Omaha, Neb., specifying that work should begin on July 10. J. W. Cuykendall of Atlantic, president.

Atlanta Macon & Griffin Electric Railway, Atlanta, Ga.—At a recent meeting of the directors it was announced that the work of construction on the line from Atlanta to Macon, Ga., would probably begin in the fall. Engineer Fitzgerald has completed his surveys and profiles. W. J. Kincaid of Atlanta is president.

Berkshire Street Railway, Pittsfield, Mass.—This company expects to ask for bids this week for the construction of its proposed lines from Great Barrington to Egremont and Canaan. Surveys and specifications have been completed. Henry Gough, chief engineer.

Boise (Idaho) & Interurban Railway.—This company's line from Boise to Caldwell, Idaho, was completed last week, and operation is to begin as soon as the plant of the Swan's Falls Power Company, from which power will be purchased, is completed. There are two substations, one at Park and the other at Middletown. W. E. Pierce, president; F. H. Knox, chief engineer.

Canyon City Pueblo & La Junta Railway & Power Company, Pueblo, Colo.—This company, incorporated last week to build an electric railway from Canyon City, Colo., to the Kansas state line, has organized by electing the following officers: Alfred E. Bent of Lamar, president; Andrew J. Behymer of Elwood, Ind., general manager; George D. Kendall of Pueblo, secretary; Charles R. Buckey of La Junta, assistant secretary; F. E. Pastorius of Colorado Springs, treasurer.

Central California Traction Company, Stockton, Cal.—Work on the line from Stockton to Lodi, Cal., 14 miles, is being delayed pending the arrival of the third-rail insulators, but it is announced that the road should be ready for operation by August 1. The line is to be extended ultimately to Sacramento. S. B. McLenegan, general manager.

Chautauqua Traction Company, Jamestown, N. Y.—President A. N. Broadhead is quoted as saying that it is the intention of the company to double-track its line between Celoron and Westfield, N. Y. Work is to be started this summer at points near Celoron and Lakewood, although it will not be completed until next year.

Chicago & Joliet Electric Railway, Joliet, Ill.—Work has been started on laying the track from the foot of Bluff street up the Western avenue hill.

Chicago & Southern Traction Company, Chicago, Ill.—It is stated that the line between Chicago and Kankakee, Ill., will be in complete operation by September 1. Ballasting has progressed to a point one mile north of Peotone and is proceeding at the rate of a mile a day, while grading is in progress between Monee and Crete. The overhead trolley wire is being strung and the machinery at the substation at Bradley is being installed. Matthew Slush of Detroit is president.

Columbia (S. C.) Electric Street Railway Light & Power Company.—Work has been started on the construction of an extension connecting with the city system at Bull and Laurel streets, and running to Colonial Heights, a new suburban residence district north of the city. A shuttle car service will be operated when the line is completed.

Columbus Marion & Bucyrus Railway, Delaware, O.—Work has been resumed on the grading of this extension of the Columbus Delaware & Marion Railway, from Marion to Bucyrus, O., 18 miles. George Whysall, general manager.

Columbus (Ga.) Railroad.—It is reported that this company will build an extension out Twelfth avenue, through East Highlands, to Jordan City.

Consolidated Railway, New Haven, Conn.—It is reported that this company has completed its line from Seymour to Naugatuck, Conn., which completes the through line from Waterbury to New Haven. I. K. Punderford, general manager.

Denton (Tex.) Interurban Railway & Power Plant Company.—It is reported that this company has let a contract for building four miles of line to Z. Wiggs.

Fairmont & Mannington Railroad, Fairmont, W. Va.—This company has awarded the contract for the construction of its 15-mile line between the points named, by way of Barrackville, Farmington and Downs, to the Blodgett Construction Company of Wheeling, W. Va. F. H. Bailey, general manager, Fairmont, W. Va.

General Electric Power Company of California, Rochester, N. Y.—This company will construct an electric railway from San Francisco to Lakeport, Cal., a distance of 130 miles. Power is to be developed on the Mokelumne river. Surveys have been completed and right of way has been obtained. The general contract for construction has been let to Walston H. Brown & Bros., 45 Wall street, New York, N. Y. William H. Underwood, Rochester, is president; John Bogart, 16 Exchange place, New York, is engineer.

Grand Rapids & Kalamazoo Valley Traction Company.—It is reported that this company has completed grading from Kalamazoo north to Otsego, Mich. W. H. T. Patterson of Kalamazoo is president.

Hot Springs Railway.—The Hot Springs Street Railroad Company has filed amendments to its charter, changing its name to the Hot Springs Railway Company, also giving it the right to use additional streets in Hot Springs and Garland county. H. E. Martin is general manager.

Illinois Traction Company, Champaign, Ill.—It is reported that this company is considering plans for the construction of a line from East St. Louis east through Effingham and Vandalia, Ill., provided the right of way can be secured.

Indiana Columbus & Eastern Traction Company, Columbus, O.—The contract for tracklaying and ballasting on the Lima-Bellefontaine extension has been awarded to Howard Graham of Dayton, O., and J. T. Adams of Hamilton, O. It is planned to complete the road by fall.

Indianapolis Transportation & Transit Development Company.—It is reported that this company has been organized to build a third-rail electric railroad from Lagrange, Ind., to Battle Creek, Mich., via Angola, Fremont, Coldwater, Union City and Tekonsha, and to develop resorts along the line.

Long Hollow Street Railway, Huntington, Pa.—Application

for a charter will be made by this company to build an electric freight and passenger line from Mt. Union to McVeytown, Pa., about 12 miles. It is stated that this will be an extension of the Juniata Valley Railway, which will build from Huntington to Mt. Union. Incorporators: H. E. Steel, F. Blair Isenberg, J. M. Starr, R. W. Jacobs and James S. Woods, all of Huntington, Pa.

Madison & Fond du Lac Electric Railroad, Madison, Wis.—David Howard, president, Oak Park, Ill., writes that this company expects to begin grading on September 1 on its electric line from Madison to Fond du Lac, Wis., 68 miles, and a branch from Watertown to Fox Lake, Wis., crossing the main line at Beaver Dam, where the main power plant will be located. The route includes Columbus, Beaver Dam, Lowell, Waupun and Juneau. The protected third-rail system will be used.

Mankato (Minn.) Electric Traction Company.—This company has been organized for the purpose of building a street railway in Mankato. It is stated that 300 tons of 60-pound steel rails will be available for delivery within a month and that work will be commenced as soon as possible after another meeting has been held to decide upon other details. The following officers have been elected: W. L. Hixon, president; Fred Kron, vice-president; W. D. Willard, secretary and treasurer; H. E. Hance, superintendent, Mankato, Minn.

Marietta, O.—Surveys are being made for an electric railway from Marietta to Bellaire, O.

Monterey (Mex.) Railway Light & Power Company.—This company is rebuilding the two street railway systems which it bought a year ago, and is converting them for electric operation. A number of new lines and extensions will be built and about \$2,000,000 will be expended in improvements. George S. Binckley, general manager.

New York City Railway.—The company has announced its intention of beginning this week the work of electrifying the old Belt Line system in First avenue.

Northern Electric Railway, Chico, Cal.—It is now stated that the line from Marysville south to Sacramento, Cal., will probably be in operation by the middle of September. Nine miles of track has been laid south of Marysville, and tracklaying is progressing at the rate of a mile a day.

Olympian Springs, Ky.—A meeting was held in this town recently to consider plans and raise subscriptions for an electric railway to connect Olympian Springs, Sharpsburg, Owingsville and West Liberty, Ky., a distance of about 26 miles. Judge C. W. Goodpaster of Owingsville and Judge J. W. Lane of Bath are interested.

Pacific Traction Company, Tacoma, Wash.—The new line from Tacoma to American Lake, Wash., has been completed and cars were operated over the line last week. B. J. Felt, vice-president.

Peninsula Railway, Barstow, Fla.—The contractors began grading last week on the company's proposed line from Barstow to Tampa, Fla., 50 miles. A large quantity of rails and ties have been delivered and construction is to be rushed. The Evers Engineering Company of Cleveland, O., has charge of the engineering work. Sixty-pound rails will be laid.

Peoria Streator & Ottawa Railway.—This company, controlled by the Illinois Traction System, has made an agreement with the city of Streator, Ill., to build a bridge across the Illinois river at that point, costing about \$100,000, of which the city will pay \$35,000. The plans will be made by Ralph Modjeska of Chicago.

Rome, N. Y.—It is announced that plans for the construction of an electric line from this city to Oneida, N. Y., to be built by the Andrews-Vanderbilt syndicate, which controls the Utica & Mohawk Valley and the other electric lines in central New York, are under consideration and that franchises already have been secured. It is stated that the line if built will follow the route laid out for a former proposed road known as the Rome & Oneida Railway. C. Loomis Allen, general manager of the Utica & Mohawk Valley Railway, is quoted as saying that work on the construction of the line will be started as soon as the money market will permit.

Sangamon Valley Railway, Springfield, Ill.—L. V. Hall has been elected manager of this company, which proposes to build an electric railway north from Hillsboro to Rochester, Ill., to connect with the Springfield Clear Lake & Rochester Electric Railway.

Seashore Municipal Railway, Hempstead, N. Y.—This company has received permission from the railroad commissioners to build and operate an electric railway from Hempstead to East Rockville by way of Rockville Center, Nassau county, a distance of five miles. Capital stock, \$150,000.

Southern Wisconsin Light & Traction Company.—This company, which recently acquired the Madison & Interurban Traction Company, has filed a mortgage with the Merchants' Loan & Trust Company to secure an issue of \$2,000,000 5 per cent bonds for the purpose of building additional lines in Dane and Rock counties. F. W. Montgomery of New York is president.

Spokane Wallace & Interstate Electric Railway, Coeur d'Alene, Idaho.—Grading on this road, which will connect Coeur d'Alene and Wallace, Idaho, by a 51-mile electric line, will be started on August 15 next. For several months past surveyors have been at work locating the route, which will skirt the east side of Lake Coeur d'Alene to Wolf Lodge Bay and from there east to the Coeur d'Alene river, which it will follow to Wallace. A 4,000-foot tunnel is to be built, which, for two miles on each side, will require a grade of 20 per cent. Ten per cent or less will be required for the remainder of the distance.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.—The first regular car was operated over the new line from Indianapolis to Greencastle on July 3. The ballasting between Plainfield and Greencastle is not entirely completed. Work is being pushed on the line from Greencastle to Brazil, and it is believed that through cars may be operated this year.

Toledo Fostoria & Findlay Railway, Findlay, O.—Work on the extension from Pemberville to Toledo, 17 miles, is being pushed steadily and grading has been completed to within two miles of Pemberville. F. W. Adams, general manager.

Union Traction Company of Kansas, Independence, Kan.—This company's new line from Independence to Coffeyville, Kan., 18 miles, has been completed and the first car was operated over the line on July 4. It is expected that regular service will be installed by July 15. The company has also just completed a small city system in Coffeyville, and is building a line from Independence to Cherryvale. D. H. Siggins is president.

Washington Alexandria & Mt. Vernon Railway, Washington, D. C.—This company has been granted an extension of time in which to complete the installation of a standard underground electric system, in place of the overhead trolley now in use. The change was ordered by the war department some time ago, the company being required to have the installation made by June 30. It now has until December 1, 1907, in which to do the work and must give bond for \$70,000 for its completion by that time. J. Colvin, superintendent, Washington, D. C.

West Point, Ga.—Stone & Webster of Boston, Mass., are said to have closed options on the river lands near this town for a 30,000-horsepower water power development, to provide power for an electric line from Columbus to West Point, for which surveys are now being made.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—A contract for the construction of the new line between Bradford and Carrollton has been let to James A. Hart & Co. of New York.

Whatcom County Railway & Light Company, Bellingham, Wash.—President C. D. Wyman of Boston has announced the route for the line which Stone & Webster of Boston, Mass., are to build from Bellingham south into Skagit county, by way of Mt. Vernon, Sedro-Woolley, Burlington, La Conner, Bow and Edison. The right of way has not yet been secured nor have the plans been completed, but it is announced that construction work will begin within a short time, and that surveys will be started immediately, under the direction of Engineer S. L. Shuffleton.

POWER HOUSES AND SUBSTATIONS

Indianapolis Columbus & Southern Traction Company, Columbus, Ind.—It is announced that this company has just completed a portable substation.

Kittaning & Leechburg Railways Company, Kittaning, Pa.—It is announced that this company will dismantle its present plant as soon as the new unit which was recently ordered, consisting of a 600-horsepower gas engine and a 350-kilowatt generator, is installed in its plant at Garrett's Run.

Rhode Island Company, Providence, R. I.—It is announced that this company will be in the market for two 3,000-kilowatt steam turbines in the near future.

Utah Light & Railway Company, Salt Lake City, Utah.—No definite information has thus far been received as to the date of commencement of work on the new power plant, which it has been announced that this company will build on the banks of the Jordan river.

Personal Mention

Mr. W. O. Wood, assistant superintendent of the Brooklyn Rapid Transit Company, has resigned to accept service with the New York City Railway Company.

Mr. C. E. Swan, district claim agent of the Northern Pacific Railway at Spokane, Wash., has been appointed to a similar position with the Spokane & Inland Empire Railroad at Spokane; effective on July 1.

Mr. Dow S. Smith, for the past five years general superintendent of the Brooklyn Rapid Transit Company, has resigned and will be succeeded by Mr. W. S. Menden, at present chief engineer of the company.

Mr. A. J. Sampson, for the past two years auditor of the Saginaw Valley Traction Company, Saginaw, Mich., has been elected secretary and treasurer, succeeding Mr. Charles E. Mershon, resigned to engage in business at Duluth, Minn.

Mr. Fred Rogers, formerly freight and passenger agent of the Willmar & Sioux Falls division of the Great Northern Railway at Sioux Falls, S. D., has been appointed traffic manager of the Walla Walla Valley Traction Company, Walla Walla, Wash.

The following appointments have been announced by the Indianapolis Crawfordsville & Western Traction Company: Auditor, W. W. Goltra; master mechanic, H. Applegate; chief engineer power station, J. C. Muse. A. E. Reynolds of Crawfordsville is president.

Mr. H. A. Hildebrandt, who for the past three years has been connected with the mechanical and electrical testing departments of the Brooklyn Rapid Transit Company, has resigned to become superintendent and chief engineer of the electric lighting and waterworks at St. Peter, Minn.

Mr. Charles E. Hubbell, vice-president and general manager of the Syracuse & Suburban Railroad, Syracuse, N. Y., has been elected president of that company, succeeding John L. King, deceased. Mr. Chester H. King, son of the late John L. King, has been elected vice-president to succeed Mr. Hubbell.

Mr. F. J. J. Sloat, general manager of the Cincinnati Northern Traction Company at Hamilton, O., has been appointed division manager of the Indiana Columbus & Eastern Traction Company, with headquarters at Dayton, O. He will retain the management of the Cincinnati Northern Traction Company.

Mr. Leverett M. Clark, heretofore master mechanic of the Indianapolis & Northwestern Traction Company at Lebanon, Ind., has been appointed master mechanic of the Indianapolis Traction & Terminal Company, succeeding Mr. W. H. Evans, who resigned some time ago to accept a similar position with the International Railway, Buffalo, N. Y.

Mr. Charles M. Preble of Ft. Wayne, Ind., has been appointed the third inspector of tracks, bridges, trestles, culverts, tunnels, overhead and underhead structures, engines, motor cars, equipments, depot stations, platforms, etc., of the Indiana steam and electric railroads by the state railroad commissioners. These inspectors are required to report the result of their investigations every day to the commission.

Mr. Harlan A. Wellsman has resigned as superintendent of motive power of the Camden Interstate Railway of Huntington, W. Va., in order to devote his time to the H. Wellsman Electrical Company of Ashland, Ky., in which he has been interested for several years. Mr. Wellsman has been connected with the Camden Interstate Railway for several years. Mr. Scott Coalgrove, his assistant, has been appointed to succeed him.

Mr. J. E. Lyons, heretofore chief engineer of the Cleveland Painesville & Eastern Railroad power plant at Wiloughby, O., has been promoted to the position of superintendent of power and cars, effective on July 1. Mr. Lyons has been with the Cleveland Painesville & Eastern for 11 years, and was for five years master mechanic of the East Cleveland Railway. He was also for one year with the Cleveland City Railway in the same capacity.

Mr. W. H. Evans, master mechanic International Railway Company, Buffalo, N. Y., has been appointed chairman of the standardization committee of the American Street and Interurban Railway Engineering Association, in place of Mr. H. Wallerstedt, resigned. Mr. Evans has called a meeting of the committee to be held in Cleveland, July 26, 27 and 28, at which time the committee will probably draft the preliminary

outline of its report to be presented at the Atlantic City convention in the fall.

Mr. Guy W. Talbot of Portland, Ore., has resigned as vice-president and treasurer of the Corvallis & Eastern Railroad to become vice-president and general manager of the Oregon Electric Railway of Portland, which is building an electric railway from Portland to Salem. Mr. Talbot became general manager of the Corvallis & Eastern and the Astoria & Columbia River railroads in April, 1906, and later resigned from the Astoria & Columbia River and became vice-president of the Corvallis & Eastern. He is 34 years old and has been connected in various capacities with the Chicago Burlington & Quincy Railroad, the Des Moines Northern & Western Railway, the Des Moines Union & Terminal Company, the Chicago Milwaukee & St. Paul Railway, the Iowa Central Railway and the Peoria & Pekin Terminal Railway. He resigned as vice-president and general manager of the latter company to go to Portland last year.

It is officially announced that Mr. Robert Jemison has resigned as president of the Birmingham (Ala.) Railway Light & Power Company, effective on September 1 or 15. Mr. A. H. Ford, formerly superintendent of the New Orleans & Carrollton Railway, and now president of the American Cities Railway & Light Company, has been elected to succeed Mr. Jemison. Mr. Jemison has had a long experience in electric railway work. In 1887 he built the East Lake dummy line from Birmingham to East Lake, Ala., and in 1889 was elected vice-president and general manager of the Birmingham Railway & Electric Company, operating most of the street railways and dummy lines around Birmingham at that time. Upon the organization of the Birmingham Railway Light & Power Company, which now operates the street railways, electric lights and a gas and steam plant in Birmingham, and has held that position continuously until the present time. He resigns after 20 years of service with the Birmingham street railways, feeling that younger men should handle the business. He has been requested to become chairman of the board of directors.

Mr. R. P. Stevens, for the past two years general superintendent of the Auburn & Syracuse Electric Railroad, has been elected president of the Lehigh Valley Transit Company,



R. P. Stevens.

Allentown, Pa., which operates about 150 miles of electric railway from Philadelphia to Allentown, Bethlehem, Nazareth, Slatington and points in the Lehigh Valley, also three electric light plants, the company being a consolidation, effected in 1905, of nine companies located in the Lehigh Valley. Mr. Stevens was born in 1876, in Eastport, Me., where he attended school, and later he attended East Maine Seminary, Bucksport, Me. He graduated from the University of Maine with the degrees of B. M. E. and E. E., and took a post-graduate course in the Massachusetts Institute of Technology. He was employed for a time by the Electrical Wiring & Supply Company, Boston, Mass., and later by the American Bell Telephone Company in Boston, on the student's course. He left this company to enter the General Electric Company's works to prepare for construction work, and afterward built an electric light plant for that company in Clifton Forge, Va. While with the Automatic Fire Alarm Company of Boston he invented an automatic fire alarm apparatus and was appointed superintendent of the western department, with headquarters at Chicago. He went to Everett, Wash., in February, 1900, to rehabilitate the system of the Everett Railway & Electric Company, and was later appointed general superintendent. While there he built a new power house and an entire new system, built an interurban line and electrified the tracks of the Northern Pacific Railway from Everett to Snohomish under an agreement with the Northern Pacific Railway, the steam road operating the freight and the electric company the passenger and express service. This is said to have been the first successful electrification of a steam line where steam freight trains were continued in operation in connection with the electric service. He left Everett to accept the position of general superintendent of the Auburn & Syracuse Electric

Railroad at Auburn, N. Y.; was later appointed general superintendent of the Auburn & Northern Electric Railroad and general manager of the Skaneateles Lake Transportation Company, which positions he now holds. Mr. Warren S. Hall will continue as vice-president and general manager, and Mr. H. C. Barron superintendent of the Lehigh Valley Transit Company.

Mr. John F. Keys, whose portrait is presented herewith, has been appointed general passenger agent of the Detroit United Railway, effective on July 1, succeeding Mr. John H. Fry, resigned. Mr. Keys is 28 years of age and is probably the youngest man holding a similar electric railway position in the United States. He has been connected with the Detroit United for the past 12 years, beginning his service with the company as an office boy, and during the first five years of this period serving consecutively in the auditing, purchasing and stationery departments of the road. Seven years ago, desiring to familiarize himself with the operating end of the business, he entered this department, serving for one year as night car house foreman, for two years as day car house foreman and for two years as assistant division superintendent. The past two years have been spent at the main office of the company as special car agent. Mr. Keys' jurisdiction will extend over the entire system of the company, including its interurban properties extending into the interior of the state, among which is the Detroit Monroe Toledo & Short Line, as well as the city and suburban lines of Detroit.



John F. Keys.

Mr. William Darbee has resigned as general manager of the Albany & Hudson Railroad, Albany, N. Y., to become assistant general manager of the Consolidated Gas Electric Light & Power Company of Baltimore, Md.; effective on September 1. Mr. Darbee was for several years assistant general superintendent of the Connecticut Railway & Lighting Company at Bridgeport, Conn., resigning that position about a year ago to become general manager of the Albany & Hudson to succeed Mr. George G. Blakeslee. Mr. R. H. Smith, at present general superintendent of the Connecticut Railway & Lighting Company at Bridgeport, has been appointed to succeed Mr. Darbee.

Mr. W. S. Menden, chief engineer of the various lines comprising the Brooklyn Rapid Transit system, has been appointed general superintendent of those lines in charge of the transportation department in addition to his present duties, effective on July 8, to succeed Mr. D. S. Smith, resigned. Mr. Menden was born at Evansville, Ill., 38 years ago. He studied at Rose Polytechnic Institute at Terre Haute, Ind., from which he graduated in 1891 and immediately entered the engineering service of the elevated railway system of Chicago. His rise in this work was rapid, and when he left Chicago in November, 1905, he was general superintendent of the Metropolitan West Side Elevated Railway Company of that city. He went to Brooklyn and assumed the post of chief engineer for the Brooklyn Rapid Transit system and has had entire charge of the rebuilding of its entire elevated structure, of the construction of the Brighton and Canarsie lines and of the structural work of the large new power houses and substations. In addition to this he has planned and built the model yards and car shops at East New York and at Thirty-sixth street, and the new surface car barns at Ninth avenue and Maspeth. He will remain chief engineer as well as general superintendent for the present.

Obituary.

Charles L. Rising, for the past two years traffic manager of the Illinois Tunnel Company, Chicago, died on July 10 at his residence, 1241 Judson avenue, Evanston, Ill., at the age of 66 years. He had been identified in various capacities with steam railroads for the past 42 years, entering railway service when 22 years old. He formerly was connected with the Chicago & Alton, the Wabash, Missouri Pacific and the Chicago & Milwaukee & St. Paul railroads.

Financial News

Citizens' Electric Company, Eureka Springs, Ark.—Application has been filed for a receiver. The company operates 3½ miles of track.

Cleveland Painesville & Eastern Railroad, Willoughby, O.—New debenture notes extending for one year, with the privilege of extension for another year, have been issued to provide for the \$500,000 debentures due on July 1.

Denver City Tramway Company.—It is now stated that the stock which was sold by D. H. Moffat comprises part of his holdings in the Denver & Northwestern Railway Company, which owns all of the stock of the Denver City Tramway Company. The purchasers comprise the eastern interests associated with Mr. Moffat, and include, besides Marsden J. Perry, Samuel M. Colt and Benjamin A. Jackson of Providence, R. I., and W. L. Bull and D. C. Clark of New York. Mr. Moffat retains a substantial interest in the company.

Havana (Cuba) Electric Railway.—The quarterly dividend of 1½ per cent increases the rate to a 6 per cent annual basis. Dividends have been paid at the rate of 4 per cent per annum since April, 1906.

Holyoke (Mass.) Street Railway.—Approval has been given by the Massachusetts railroad commission to the issue of \$60,000 capital stock for the acquisition of the stock of the Hampshire Street Railway by exchange, share for share. The Hampshire road has been controlled by lease since January 17, 1905.

New York New Haven & Hartford Railroad.—This company has absorbed the property of the Torrington & Winchester Street Railway, Winsted, Conn., and the Meriden Southington & Compounce Tramway Company, Meriden, Conn., subsidiary companies.—The Rhode Island company, a subsidiary company of the New Haven, has absorbed the Woonsocket (R. I.) Street Railway, the Columbian Street Railway of Pascoag, R. I., and the Providence & Burrillville Street Railway of Woonsocket. These companies have been controlled heretofore.

Troy & New England Railway Company, Troy, N. Y.—The Delaware & Hudson has acquired the property of this company, and the road will be operated as a connection of the United Traction Company of Albany. The Troy & New England road has been in the hands of a receiver since January 10, 1906, following a default in the interest due on August 1, 1905, on the \$160,000 first mortgage 5 per cent bonds. The authorized stock is \$350,000, of which \$180,000 is outstanding. The company owns 10 miles of track, extending from Troy to West Sand Lake and Averill Park.

United Railways Investment Company.—Stockholders will vote at Jersey City on July 23 on the issue of \$3,000,000 of 6 per cent 3-year notes, and on a plan to purchase 10-year notes of the United Railroads of San Francisco, a controlled property.

Winnebago Traction Company, Oshkosh, Wis.—R. H. Hackett was appointed receiver on July 6 on motion of the Trust Company of America, New York, trustee under the first mortgage 5 per cent bonds. The authorized bond issue is \$1,000,000, of which \$966,000 bonds are outstanding. The outstanding stock is \$650,000. Of the 38 miles of road owned, 15 miles are in Oshkosh, 15 miles extend to Neenah and Menasha, and 8 miles to Omro. The grounds on which the trustee petitioned for a receiver were the default in the interest due on April 1, 1907, and the inability of the company to raise money for needed improvements.

Dividends Declared.

Athens (Ga.) Electric Railway, common, 2½ per cent; preferred, 3 per cent.

Charleston (S. C.) Consolidated Railway Gas & Electric Company, 1½ per cent.

Columbus Railway & Light Company, 1 per cent.

Duluth-Superior Traction Company, Duluth, Minn., preferred, quarterly, 1 per cent.

Havana (Cuba) Electric Railway, preferred, quarterly, 1½ per cent.

Little Rock (Ark.) Railway & Electric Company, common, 2 per cent; preferred, 3 per cent.

Memphis Street Railway, preferred, quarterly, 1¼ per cent.

Peekskill (N. Y.) Lighting & Railroad Company, quarterly, 1 per cent.

Philadelphia City Passenger Railway, 7½ per cent.

Rockford & Interurban Railway, Rockford, Ill., common, 2 per cent; preferred, quarterly, 1½ per cent.

Manufactures and Supplies

ROLLING STOCK.

Bristol Belt Line Railway, Bristol, Tenn., is in the market for two cars.

Rhode Island Company, Providence, R. I., will purchase in the near future thirty 13 and 15 bench open cars.

Northwestern Elevated Railroad, Chicago, Ill., we are officially advised, is in the market for 40 trail cars.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind., it is reported, has ordered 10 double-truck cars.

Walla Walla Valley Traction Company, Walla Walla, Wash., will build a freight car of 60,000 pounds capacity at its own shops in Walla Walla.

Spokane & Inland Empire Railroad, Spokane, Wash., has placed an order with the Fitz-Hugh, Luther Company, Chicago, for fifty 80,000-pound standard box cars and thirty 80,000-pound 41-foot standard flats.

Utah Light & Railway Company, Salt Lake City, Utah, which was to have placed a contract for 62 cars on June 27, as reported in the Electric Railway Review of June 29, is reported to have given the order to the St. Louis Car Company.

Rochester Syracuse & Eastern Railway, Syracuse, N. Y., was erroneously reported in the Electric Railway Review of July 6 to have placed an order with the Niles Car & Manufacturing Company for 15 double-truck combination passenger and baggage cars and 2 double-truck express cars. This should have read the Buffalo Lockport & Rochester Ry.

SHOPS AND BUILDINGS.

Columbus (Ga.) Railroad.—This company has had plans prepared for another car house to be erected on its property on Second avenue. The building will be constructed of either brick or concrete blocks, two stories high and 48 by 110 feet. The second floor will be devoted to the comfort of the company's employees. It will contain a reading room, club room, shower baths, individual lockers and sleeping quarters. Copies of the plans have been placed in the hands of contractors and they have been invited to bid.

Hudson Companies, New York, N. Y.—Two commissions have been appointed to condemn the lands and buildings bounded by Railroad avenue, Warren street, Steuben street and Henderson street, required by this company as a site for repair shops and a yard for the cars which will run in tunnel bores under the Hudson river.

Illinois Traction Company, Champaign, Ill.—This company is making arrangements to build large car houses in Peoria, Ill.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company has secured options for the purchase or lease of property at the northeast corner of Illinois and Ohio streets, Indianapolis. This move places the company in complete control of the entire square and paves the way for a large addition to the Traction Terminal station.

Pacific Traction Company, Tacoma, Wash.—Work is progressing rapidly on this company's new car house at South Sixty-fourth street and Union avenue, South Tacoma, and it is expected to be completed in a few days. There will be eight tracks running through the building, which is of brick construction, 103 by 113 feet, with a car pit under each track, making room to inspect all the cars the company will use for some time.

Rhode Island Company, Providence, R. I.—This company, as reported in the Electric Railway Review of June 8, will build a new car house on Thurber avenue; also one on Academy avenue, and the present car house on Social street in Woonsocket will be rebuilt.

Union Traction Company of Kansas, Independence, Kan.—This company has leased the old postoffice building and will use it as an interurban station.

Utah Light & Railway Company, Salt Lake City, Utah.—The engineers of this company have approved the plans for the new car houses, which have been under consideration for some time, as reported in the Electric Railway Review of June 29. The plans call for one large building, containing

shops, store rooms, machine works and other shop facilities; storage tracks to accommodate 144 cars, 45 feet long, and inspection pits under each track. The office building and men's club, which is to cost \$75,000, will be located at the corner of Seventh East and Fifth South streets.

TRADE NOTES.

New York Air Brake Company, New York, has declared a quarterly dividend of 2 per cent, payable on July 22.

B. F. Sturtevant Company, Boston, Mass., has recently sold a large equipment of their electric propeller fans for export to Yokohama.

E. W. Bliss Company, Brooklyn, N. Y., has declared a quarterly dividend of $2\frac{1}{2}$ per cent on its common stock and 2 per cent on its preferred stock.

Transcontinental Car Company, Phoenix, Ariz., has been incorporated with a capital stock of \$5,000,000, and in the state of Illinois with a capital of \$2,500.

Bucyrus Company, South Milwaukee, Wis., has opened an office at 811 Singer building, Broadway and Liberty street, New York, in charge of James M. Reed.

McGee Switch & Signal Company, Dallas, Tex., has been incorporated with a capital stock of \$10,000,000 by R. M. McGee, M. M. Crestman and William M. Jones.

L. S. Thurston has left the construction department of the Cincinnati branch of the General Electric Company, to take up commercial engineering in its New York office.

Northern Engineering Works, Detroit, Mich., has supplied R. Hoe & Co., New York, with three 10-ton electric overhead traveling cranes, with a span of 55 feet, and a Newton cupola.

George L. Watson, formerly assistant chief engineer of the Fidelity Construction Company, Detroit, Mich., has opened an office in the Baxter building, Philadelphia, as consulting engineer.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has sold to Kuhn, Loeb & Co., New York, \$6,000,000 6 per cent collateral trust notes, dated August 1, 1907, and due August 1, 1910, denomination, \$1,000.

Railway Steel-Spring Company, 71 Broadway, New York, is receiving bids for the erection of a 2-story machine shop and store room at St. Louis, Mo. The building is to be 40 by 136 feet and will cost about \$12,000.

General Electric Company, Schenectady, N. Y., is reported to have awarded the contract for the erection of a shop building at Pittsfield, Mass., 65 by 100 feet, to Beckwith & Pike. It is to be of steel and brick construction.

M. W. Dunton Company, Providence, R. I., has been incorporated with a capital stock of \$50,000 to succeed to the business of M. W. Dunton & Co. The new firm will devote its entire attention to insulating materials. The management is unchanged.

Howell Car & Foundry Company, Trenton, N. J., has been incorporated with a capital stock of \$100,000, to manufacture steam, electric and cable cars, maintain electric lines, etc. Incorporators: E. L. Kern, J. K. Neaglery, N. F. Micking and others.

Universal Portland Cement Company, Chicago and Pittsburgh, has let the contract for a concrete office building at Universal, Pa., which is to cost \$15,000, to A. & S. Wilson Company, Pittsburgh. MacClure & Spahr, Keystone building, Pittsburgh, architects.

H. M. Beugler, who has been superintendent of railways for Ford, Bacon & Davis, operating the Newman properties in Houston, Tex., Memphis, Little Rock, Birmingham, Nashville and Knoxville, has become connected with Dodge & Day, Philadelphia and New York.

Reese Continuous Rail Company, Louisville, Ky., has been formed for the manufacture and sale of a patented device for making solid joints in railway tracks. The capital stock is \$40,000. The incorporators are: John E. Reese, George L. Martin, W. T. Blackford and William Neal.

F. L. McGillan, recently of the Valentine-Clark Company, Chicago, has become manager of the California Pole & Piling Company, 25 California street, San Francisco. Hicks-Hauptman Lumber Company and the Charles R. McCormick Company are associated with the California Pole & Piling Company.

General Fireproofing Company, Youngstown, O., has been awarded the contract by the secretary of the interior to fur-

nish and deliver about 350,000 pounds of steel for the reinforcement of concrete and for structural purposes in connection with the Belle Fourche irrigation project in South Dakota.

North Shore Electric Company, Beverly, Mass., capital stock \$25,000, has been incorporated by Alfred J. Paine, Malden; Maynard E. S. Clemson, Wakefield; and Nicholas J. Allen, Jr., Everett. The company will contract for the construction and repair of tunnels, electric railways, power plants, etc.

American Brake Shoe & Foundry Company has awarded the contract for a new plant at Chattanooga, Tenn. It will be constructed of brick, steel and frame, and will consist of main foundry building, core room, office building, sand sheds, storage bins and shipping platform. The machine shop will be 40 by 60 feet and the main foundry building 100 by 350 feet.

Cutler-Hammer Company, Milwaukee, has bought the Carpeles trunk factory, a 5-story building which adjoins its plant. The new acquisition has 70,000 square feet of floor space and is being rapidly fitted for use. The company now owns a square block of factory buildings in Milwaukee and has recently purchased another tract of 175 feet frontage of St. Paul avenue, which it will hold for future growth.

Owensboro Railway Chemical Spraying Company, Owensboro, Ky., has filed articles of incorporation. Capital stock is \$200,000, of which \$6,000 has been paid in. E. T. Franks, president; R. S. Hughes, first vice-president; W. Q. Adams, second vice-president; C. W. Wells, secretary and treasurer; J. V. Pearse, general manager. The company proposes to market a chemical for spraying railroad tracks that will kill all vegetation.

Westinghouse Electric & Manufacturing Company, in the fiscal year ended March 31, 1907, showed net earnings of \$5,486,712, a gain of \$2,106,981 over the figures of the previous year. After the payment of all interest charges, provision for depreciation, and other allowances, the balance applicable to dividends was \$2,532,200, or \$458,420 above the figures for the preceding 12 months. The company also submitted a statement for the two months ended May 31, 1907, showing net earnings of \$1,377,765, and, after charges, depreciation, etc., a balance of \$849,464, applicable to dividends accrued in the period. The figures for the year and for the ensuing two months are as follows:

	Fiscal year ended March 31, 1907.	Two months ended May 31, 1907.
Earnings	\$5,486,712	\$1,377,765
Monthly average income.....	457,266	688,882
Disposition of earnings:		
Interest on convertible sinking fund bonds and debenture certificates....	827,887	143,983
Interest and discount	815,266	185,121
Property and plant depreciated, accounts and bills receivable, and other assets written off	457,460	47,857
Adjustment of sundry old accounts not relating to current year's business, charges to depreciation, development, expenditures charged to operation and various adjustments for current year (net)	853,897	151,339
Deductions	\$2,954,512	\$ 528,301
Surplus	\$2,532,200	\$ 849,464
From this surplus there were paid 10 per cent dividends on preferred stock.....	\$ 399,870	
Ten per cent dividends on assenting stock	2,099,685	
	2,499,555	*416,592
Balance	\$ 32,644	\$ 432,871

*Divided between preferred, \$66,645, and assenting, \$349,947.

George Westinghouse, the president, said in his report: "Owing to the heavy floods in March, the last month in the fiscal year, the company lost considerable ground, as it was unable to make shipments except to a nominal extent. Except for this, the showing for the year would have been considerably better than was the case.

"The benefit of the March business was felt in April and May. Partly owing to this and partly owing to the general

increase in the volume of business, the earnings in April and May were record-breaking.

"The increase of nearly \$500,000 in the surplus available for dividends is considerably smaller than normally would have been the case, owing to the fact that, in view of the large earnings of the company, the management decided to write off sundry old accounts not pertaining to the current year's business and to allow more heavily than ever before for general depreciation and development work. To this extent, therefore, the surplus of \$2,532,000 does not measure the real surplus earnings of the Westinghouse company for the late year. Except for the abnormal charges for depreciation and sundry accounts it would have been probably \$500,000 greater.

"The results for the two months show a surplus of \$432,871 over all interest charges, depreciation, adjustments, 10 per cent dividends, etc. This is at the rate of nearly \$2,000,000 a year earned over everything. Heavier allowances were made for depreciation, etc., in these two months than ever.

"Of course, these two months should not be taken as a criterion of what will be done in the current fiscal year, because they were benefited by the bad weather conditions prevailing in March. However, June earnings continue to show heavy gains. The quarter just closed is the best the company ever had, and the indications are that the current fiscal year will be a record-breaker."

Electric Railway Improvement Company, 6005 Carnegie avenue, Cleveland, O., states that in Ohio and Indiana its cars used in installing bonds by copper welding and electric brazing may be seen in successful operation in the following cities: Cleveland, Dayton, Sandusky and Oberlin O.; Scottsburg, Sellersburg, Memphis, Rockport, Hatfield, Burrows and Lafayette, Ind. The company has recently obtained a contract at Rockford, Ill., to install a large number of bonds by the brazing process on the lines of the Rockford & Interurban Railway.

George F. Adams and James R. Downs have resigned from the Cleveland branch of the Westinghouse Electric & Manufacturing Company, and will open offices in the New England building, Cleveland, under the name of Adams & Downs. Both of these gentlemen have been connected with the Westinghouse company for the past 10 years. The new firm will act as selling representatives for the Burke Electric Company, handling that company's dynamos and motors.

W. R. Gaither, auditor of the South Chicago City Railway, has devised an attachment to the Burroughs adding machine, manufactured by the Burroughs Adding Machine Company, Detroit, Mich., which is designed for use in keeping the time of trainmen. The attachment holds a piece of paper on which the daily time of each employee is entered. The accrued time is brought forward from day to day by use of the machine in making the registration. Thus at the end of the period during which the time is kept, there is a printed record with a final total for each employee. Mr. Gaither has used his device very successfully.

J. H. Wagenhorst & Co., Youngstown, O., manufacturers of electric blue-printing machines, report the following partial list of sales, seven of which are repeat orders: Cleveland Crane & Car Company, Wickliffe, O.; Warren Steam Pump Company, Warren, Mass.; Vulcan Iron Works, Detroit, Mich.; A. O. Smith Company, Milwaukee, Wis.; Traylor Engineering Company, New York; John S. Cole, Charleston, W. Va.; Carnegie Steel Company, Youngstown, O.; District pumping station, Washington, D. C.; Cleveland Painesville & Eastern Railroad Company, Willoughby, O.; Eugene Dietzgen Company, Chicago, Ill.; Pardee Brothers & Co., Lattimer Mine, Pa.; Tennessee Coal Iron & Railroad Company, Bessemer, Ala.

George B. Dusenberre, manager of the Cleveland office of the Westinghouse Electric & Manufacturing Company, has resigned and will open offices in Cleveland as consulting engineer, specializing in power and electric railway work. Mr. Dusenberre has been with the Westinghouse company 20 years, starting in as wireman and holding various positions of trust, including that of assistant to the vice-president and manager of the railway and lighting department. Three years ago he took charge of the Cleveland district. Mr. Dusenberre holds a degree of mechanical engineer from Cornell University and is a member of the American Institute of Electrical Engineers and the Engineers' Society of Western Pennsylvania. He has done much consulting engineering work for the Westinghouse company and has had a prominent part in the development of the single-phase system. G. E. Miller, assistant to the manager of the railway and lighting department at the home office, succeeds Mr. Dusenberre at Cleveland.

ADVERTISING LITERATURE.

Highland Park College.—The annual announcements for 1907-1908 of Highland Park College, Des Moines, Ia., have been published in No. 3, Vol. III, of "The Exponent." This is a publication of 32 pages, 6 by 9 inches in size.

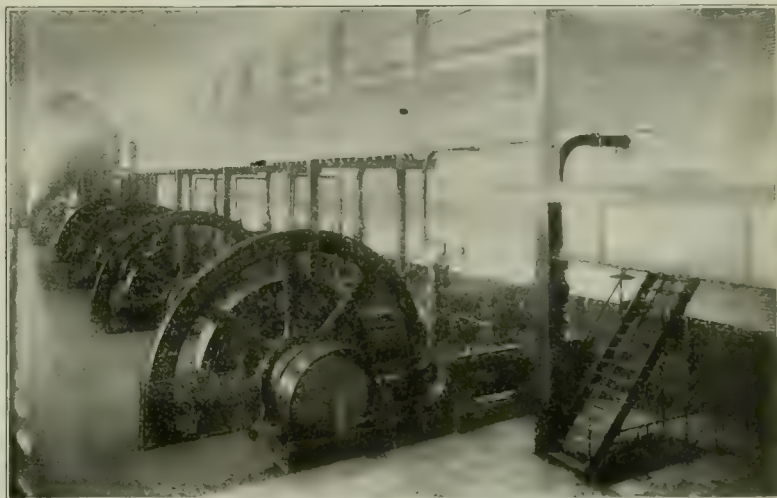
B. F. Sturtevant Company, Boston, Mass.—"Something Cooling for a Hot Day" is the title of an attractive 16-page folder designated as Bulletin No. 90, recently issued by this company. It describes various types of electric propeller fans and illustrates their application.

General Electric Company, Schenectady, N. Y.—Bulletin No. 4504 describes the G. E. Tungsten lamp for street series lighting; Bulletin No. 4506 describes the Edison gem filament 50-watt lamp; Bulletin No. 4516 describes MR circuit-breakers, and Bulletin No. 4517, which supersedes No. 4336, describes isolated plant switchboard panels with fuses. Supplement to Bulletin No. 4495 describes the company's new direct-current fan motors, type DL. All of the bulletins are copiously illustrated and contain much valuable data.

Lumen Bearing Company, Buffalo, N. Y.—The new catalogue of this company has just made its appearance, and presents a comprehensive statement regarding the standard bearing alloys produced by it, the conditions under which they work most advantageously, and their limitations as indicated by extended experience. The Ideal trolley wheel manufactured by the company is also described, as well as its aluminum and copper castings, manganese bronze, ingot metal, motor axle bearings, babbitt metals, both "Yankee Brand" and "Lotus Lining Metal," and the Lumen solder. The catalogue is handsomely illustrated and well printed.

REMARKABLE WEARING QUALITIES OF ALLIS-CHALMERS ENGINES.

After nine and a half years of service, running 20 hours a day and 80 revolutions per minute, Sundays included, a recent annual inspection of the engines installed at the powerhouse of the South Side Elevated Railway Company of Chicago, indicated that the amount of wear in the 54-inch low-



Allis-Chalmers Horizontal and Vertical Cross-Compound Engines Used for Traction Purposes.

pressure cylinders of the 26 and 54 by 48 inch Allis-Chalmers cross-compound engines constituting this equipment measured to the thickness of one paper sideways and two papers top and bottom, using paper from 0.010 to 0.011 inch thickness.

The measurements were taken on the No. 2 engine, which is one of the four units first installed in the power house. The cylinder was opened under the direction of Mr. Hadin, chief engineer, for the regular annual inspection. The same steel gauge was used which was made when the engines were first erected.

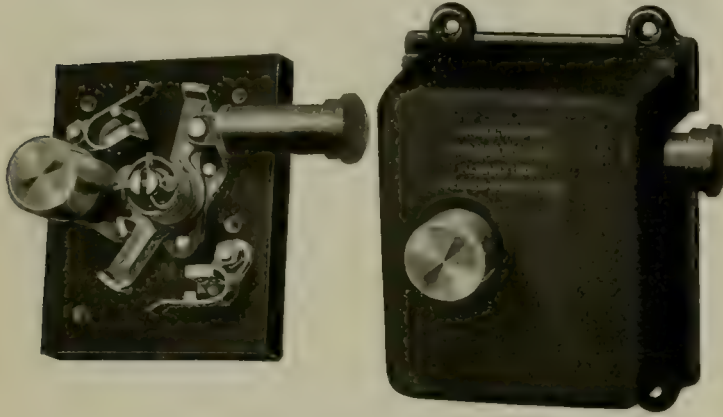
This record certainly speaks well for the wearing quality of the material used in the cylinder castings, and the excellent care which the apparatus has evidently received. Furthermore, attention is called to the fact that the original bull rings and packing rings are still in use in this cylinder.

It is interesting to note in this connection that current has never been put off the bus bars at this station since it was first put into operation. This station now contains four Allis-Chalmers 25 and 54 by 48 inch horizontal cross-compound direct-connected engines, two units of the same type, 34 and

70 by 54 inch, and two Allis-Chalmers vertical cross-compound engines, with cylinders 38 and 80 by 60 inch stroke.

A NEW TYPE OF CAB HEATER SWITCH.

The Consolidated Car Heating Company, 42 Broadway, New York, has recently designed a single-pole, double-break snap switch for controlling the heat in motormen's cabs, which is shown in the accompanying engravings. When heat is required the switch is closed by pushing in the lever at the side, and the blade is automatically locked in closed position. When heat is not required, the horizontal lever is



New Type of Cab Heater Switch.

pushed in, either by hand or by the cab door, disengaging the lock and opening the circuit. This lever is placed in the line of movement of the cab door and the closing of this door over the controller automatically cuts the heat from the cab in the event of the motorman neglecting to operate the switch.

THE HOLLAND TROLLEY BASE AND HARP.

Many of the difficulties experienced in maintaining the overhead work of trolley lines are due to the trolley wheel leaving the wire and striking the guy wires and hangers.



Holland Anti-Friction Double-Acting Trolley Base.

In order to permit the trolley pole to follow the contour of the wire it is necessary that the trolley base permit the pole to swing freely with little friction.

It is desirable that the trolley base shall be double-acting, so that it will turn over of its own accord in case, when backing into special work, the trolley wheel leaves the wire and strikes one of the guys. The trolley wheel is less liable to leave the wire on curves and in special work if the flanges of

the wheel are short and the harp is provided with flanges which keep the wheel on the wire, since the wheel does not then have a tendency to climb the wire when at an angle to it.

The accompanying illustrations show the trolley base, stand and harps manufactured by the H. Holland Trolley Supplies Manufacturing Company, 19 Michigan street, Cleveland, O. The trolley stand illustrated is mounted on an anti-friction turntable, consisting of four roller-bearing wheels revolving between chilled surfaces. The base is so constructed that it is weather-proof and self-oiling. The electrical contact is made within the outer casing, and the wire is brought out through the casing, thus protecting the contact between the moving and stationary parts from the weather. It is also so constructed that, should the pole be turned over in the opposite direction, the tension of the spring will not be changed. The spring and the fulcrum are so designed that the tension on the trolley wire remains constant from an angle of 60 degrees to the horizontal position.

The rugged construction of the base is easily seen by examining the illustration herewith presented. An important point to be noted in the construction is the small number of parts, all easily accessible for oiling and repairs. It is designed in such a manner that it presents a neat and symmetrical appearance, without any of the usual unsightly projections. The tension of the spring is easily adjusted by tightening or loosening the nuts on the upper end of the frame rods. These are fitted with lock nuts, to prevent them from being loosened by the vibration of the car.

The sleeve in which the pole is held is two feet long, which gives the trolley pole ample reinforcement at the point where it is most liable to be broken. The base is so constructed that it can be locked down, and an old pole removed and a new one inserted in a horizontal position, the evident advantages of this feature being that it prevents the pole from coming in contact with the overhead wire and permits the wheel to be lined up with the overhead work.

As the trolley base is double-acting, should the pole get foul of special work when backing without having turned the pole, it will reverse itself, thus preventing damage to the pole or overhead construction.

The advantages of this base, in addition to those mentioned, are that because of the small amount of frictional resistance in turning, the trolley wheel can freely follow the wire, thus preventing damage to the overhead work and materially increasing the life of the trolley wheel. One of the accompanying illustrations shows the type B Holland trolley harp and wheel, which has many advantages in turning the wheel, owing to the flanges being stationary and the wheel being protected by them. The groove in the wheel prevents



Holland Trolley Harps, Types B and C.

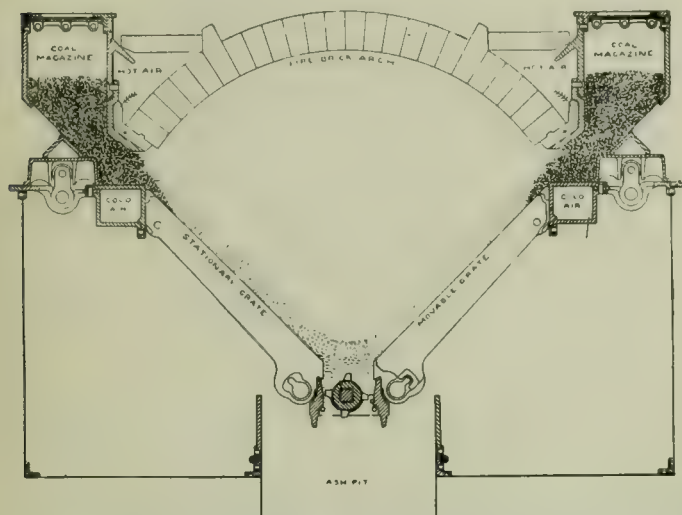
the wire from coming in contact with the harp when the car is running on a tangent. It is stated that by the use of this harp and wheel a considerable saving will obtain because of the smaller cost of the wheel and because the wheels average from 5,000 to 6,000 miles. If properly inspected the bearing will remain good until the wheel is worn out, no bushing being required.

The type C harp and wheel, designed for interurban lines,

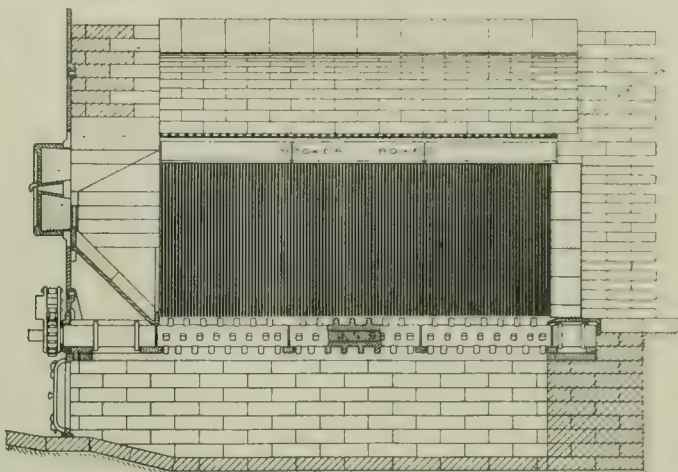
is also shown. The bearing consists of a 1-inch hollow pin, made from shallow shafting, with a screwed cap on one end, the opposite end having a passage to insert a lubricant, thus doing away with removing or replacing screws, and thus materially facilitating inspection and lubrication. The current collected by these wheels passes through spring contacts, pressing on the side of the wheels, thus preventing the current from passing through the bearing and causing sparking and the rapid destruction of the bearing.

THE MODEL AUTOMATIC SMOKELESS FURNACE.

As the art of steam boiler operation advanced, the need for some means of mechanically stoking the furnaces became



Model Stoker—Cross Section, Showing Construction and Method of Operation.

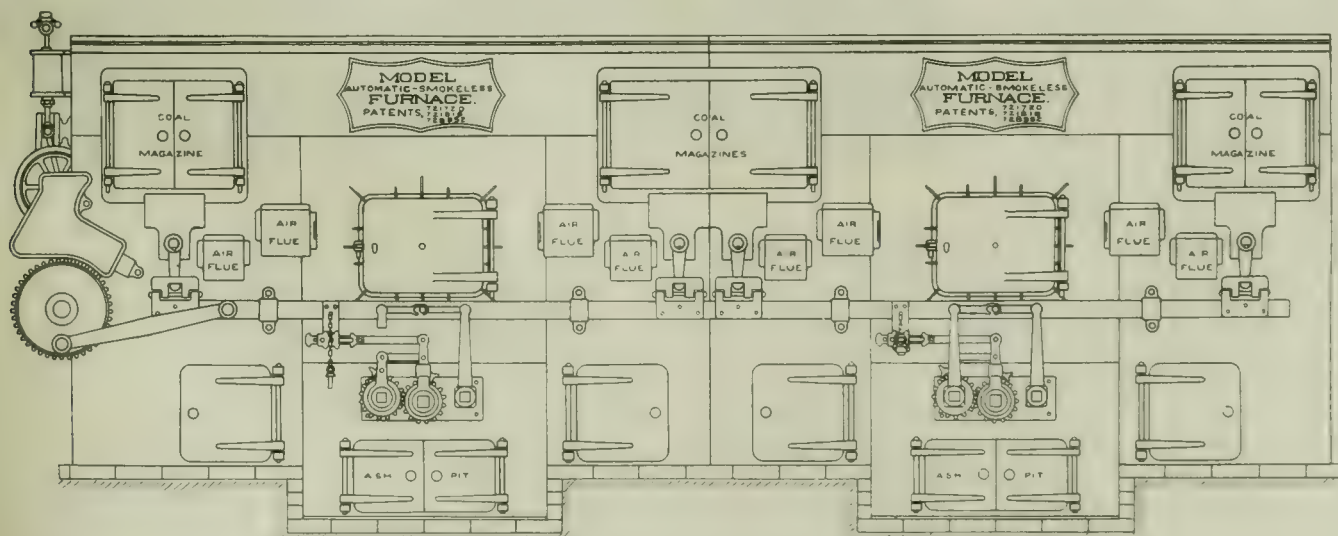


Model Stoker—Longitudinal Section, Showing Grate Bars and Clinker Crusher.

more desirable and more necessary, owing to the constantly increasing size of the boiler, and the increased cost of coal and labor. Many years ago the advantages of mechanical stoking were realized and many attempts were made to construct a device for automatically charging the coal into the furnace. Even then it was realized that mechanical stoking was one of the best methods of preventing smoke and the most successful and economical method of burning bituminous coal. There resulted from these attempts stokers of every

in contact with any cooling surfaces that might lower its temperature below the ignition point of the gases.

The requirements of the grate upon which the fuel is burned are, that the coal be gradually worked down the bars while exposed to the heat of the fire, so that the coal will be burned by the coking process in which the volatile gases are driven off by the heat and mixed with air. The coke resulting from the process of distillation must be worked down the grate and consumed with a proper air supply and finally the



Model Stoker—Front Elevation, Showing Engine and Operating Mechanism.

description, some of which were no more than mechanically operated shovels worked by steam engines.

The original idea of a mechanical stoker was simply a machine for automatically throwing the coal in the furnace. With this performance the ideas of those times were fulfilled. However, such is no longer the case. It is now well recognized by all engineers that the operations performed by a mechanical stoker must not only include getting the coal into the furnace, but properly burning the products of dis-

remaining clinkers and ashes should be delivered in the ash pit for removal by the ordinary method or by some mechanical device for removing them from the furnace. To maintain a uniform thickness of fire on the grate it is necessary that the grate be moved more at its lower than at its upper portion. This is because the green coal runs more easily than the coal which has been previously burned, and therefore contains a certain amount of slag and clinker.

To be commercially successful and economical the con-

struction throughout must be such that any of the individual parts of the stoker can easily be removed and renewed without dismantling any other parts of the stoker. The design must be such that no portion of the stoker will be exposed to the intense heat of the fire. The grate must also be so constructed that the grate bars will be self-cleaning and automatically prevent the slag and clinker from burning onto them. Finally, the concluding requirements of a perfect mechanical stoker are such that the coal feed, working of the grates, and clinker and ash removing devices can be regulated independently of each other and thereby adapt their movements to the requirements of all grades of coal.

Having carefully considered all the requirements of a perfect mechanical stoker and the chemical requirements which must be fulfilled to insure complete and smokeless combustion, the Model Stoker Company, 28 South Canal street Dayton, O., has perfected a stoker and furnace which, it has been stated, meets all the conditions that have been previously set forth. A cross section through the Model furnace and stoker is shown in one of the accompanying illustrations. A careful examination will show that the most minute details of its design have been executed with the essential requirements before the minds of its designers.

It will be noted that the stoker consists of two inclined grates composed of moveable and stationary grate bars, automatic feeders which charge the coal on the grates and a rotary crusher located at the apex of the triangle formed by the two grates for grinding up the clinkers and discharging them into the ash pit. The movable grate bars are pivoted to the stationary grate bars at their upper ends and are rocked back and forth by a bar at their lower end. It is thus evident that the lower ends of these grate bars are moved more than the upper ends. This shearing motion effectually prevents clinkers and slag from burning onto the bars. These grate bars are made of exceptional depth and expose such a large cooling surface to the entering air that their life is extremely long. The stationary grate bars are supported at their lower end by a bearing bar shown in the section.

The reciprocating motion is given to the coal feeder and grate rockers by a reciprocating bar extending across the front of the furnaces. The levers operating the coal feeders and grate rockers are, however, arranged so that they can independently be adjusted to suit the particular kind of coal being burned. The rotary motion of the clinker crusher is also derived from the reciprocating bar by means of a ratchet with an adjustable throw, thus making regulation of the crusher independent of the other motions. The reciprocating bar is driven by a crank and connecting rod, driven by a double set of worm gears, which is geared to a $3\frac{1}{2}$ by 5 inch steam engine, developing from $\frac{1}{2}$ to 2 horsepower, depending upon the size and number of the furnaces, kind of coal and the rate of feed. The power required to operate the furnace is very small and thus, besides requiring little steam to operate it, it possesses the advantage that, should it become necessary, it can readily be operated by hand. The exhaust steam from this small engine is discharged through special pipes below the crusher and plays an important part in preventing the formation of hard clinkers.

In the Model furnace, instead of one coal magazine extending across the front of the boiler, there are two magazines located along the sides. The value of this feature is the greatly increased coking capacity of the furnace, which especially adapts it to the burning of very rich gas coals, and makes it possible to obtain a far greater coking or smoke preventing capacity from a given sized furnace. The arrangement for supplying a liberal quantity of preheated air to the volatile gases distilled from the coal will be seen by examining the sectional view. The cold air enters the front of the furnace, passing through a passage under the coking plate, in which it is gradually warmed until it reaches the rear of the furnace. At this point it enters the hot air duct above the firebrick arch, in which it is heated to a high temperature by contact with the hot brick. The hot air is discharged into the furnace in finely divided streams at the exact point where it is most needed; i. e., at that point where the process of distillation is taking place.

Peep holes are provided in the front of the furnace so that the fireman can watch the process of combustion and

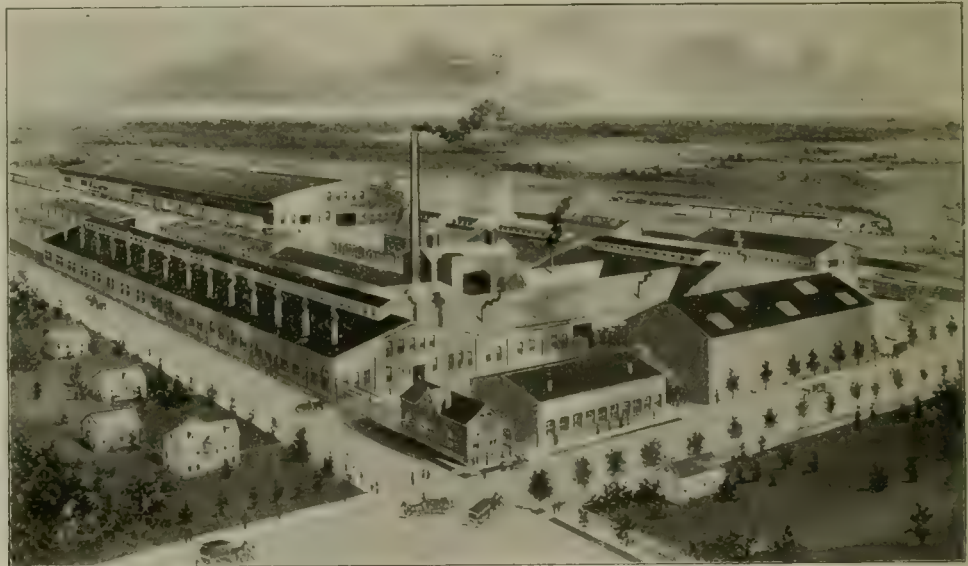
regulate his feeds to suit the demands. Large doors also are provided in the front of the furnace. These give ready access to the interior and all parts of the furnace should it become necessary to enter it for cleaning or repairs. The furnace is so arranged that oil or gas burners can readily be installed in it. The change from oil or gas to coal can be made in a few minutes without interrupting the service, or oil or gas may be used in combination with coal. These furnaces are adapted to all types and makes of boilers.

THE COOPER HEATER COMPANY.

The Cooper Heater Company of Dayton, O., has recently been incorporated with a capitalization of \$100,000. The company has just completed the purchase of a large plant in North Dayton, formerly occupied by the Craig-Reynolds Company, and the work of transformation is now under way. The plant acquired consists of two foundries, each 60 by 300 feet, a tin shop, one core room, an immense wareroom, pattern storeroom, office structure and other accessories, covering seven acres of ground. It has a railway frontage of 816 feet along the main line of the Cincinnati Hamilton & Dayton Railroad, and a spur track runs into the plant.

According to the terms of the purchase The Cooper Heater Company secures all the machinery, apparatus and equipment of the old works, and in a very short time the heater plant will be in full operation with a large force of workmen. The machinery and interior equipment were secured of Barney & Proctor, Cincinnati.

The company will manufacture exclusively house and car hot water and steam heaters, the invention of George D.



Plant of the Cooper Heater Company.

Cooper of St. Johns, Mich. For some months experiments were carried on with the heating apparatus with evident satisfaction, the result being that a number of large contracts were secured for the installation of the service. The apparatus is ingenious in that it occupies but a small space in either residence or car, and because of the economy effected in the consumption of fuel. On the demonstration that a street car can be heated at a cost of 10 to 12½ cents a day, the City Railway Company of Dayton recently placed an order with The Cooper Heater Company to install its system of hot water heating in all of its 81 winter cars. The company has also received orders from many of the leading traction lines in Ohio, Indiana and Illinois. A full description of the Cooper heater for car heating is contained on page 542 of the Electric Railway Review of April 20, 1907.

Besides the manufacture of various sized car heaters and residence heaters, the company will also manufacture complementary parts and do a repair business.

The officers of the Cooper Heater Company are: President, J. D. Hunter, New Orleans; first vice-president, George D. Cooper, St. Johns, Mich.; second vice-president, R. F. Martin, Crowley, La.; secretary-treasurer, Edward Martin, New Orleans; general manager, W. L. Blackwell, Dayton.

A long-distance electrical transmission plant has just been completed by which the city of Bellingham, Wash., is supplied with electricity generated at Nooksack Falls, 42 miles distant.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 3

CHICAGO, JULY 20, 1907

WHOLE No. 221

TABLE OF CONTENTS.

Editorial:

—San Francisco Strike is a Failure.....	61
—Underlying Securities in Chicago.....	61
—Investigation of New York Systems.....	61
—Care in Concrete Construction.....	62
—Pay-as-You-Enter Car in New York.....	62
—The Capacity of Future Generating Units.....	62
—The Milwaukee Cases.....	63
Benefit Association for Illinois Traction Employees.....	63
Pacific Electric Passenger Cars (Illustrated).....	64
Reducing Accident Risks and Costs.....	67
Decisions of Wisconsin Railroad Commission in Milwaukee Service Cases.....	68
Walton Clark and Others on Municipal Ownership.....	70
Trademark of Pittsburg & Butler Railway.....	70
Pittsburg Bridge Case.....	71
Plan for Distribution of Chicago Railways Company Securities..	71
Proposed High-Speed Lines for Boston and Vicinity.....	72
The Transmission Plant of the Niagara Lockport & Ontario Power Company. By Ralph D. Mershon (Illustrated)...	74
Settling Tanks for Boiler Feedwater (Illustrated).....	77
News of the Week:	
—Electrical Show at New York.....	78

—Central Electric Accounting Conference Meeting.....	78
—Low-Fare Road on Euclid Avenue, Cleveland.....	78
—Information Regarding Insurance.....	78
—Commission to Investigate Interborough-Metropolitan and Brooklyn Rapid Transit Companies.....	78
Construction News:	
—Franchises.....	80
—Incorporations.....	80
—Track and Roadway.....	80
—Power Houses and Substations.....	82
Personal Mention.....	83
Financial News.....	85
Manufactures and Supplies:	
—Rolling Stock.....	86
—Shops and Buildings.....	86
—Trade Notes.....	86
—Advertising Literature.....	87
Handling a Strike. By L. E. Drummond.....	87
Rooke Automatic Register and Fare Collector (Illustrated).....	88
Cypress Yards at Clay Rook, Mo.	89
Self-Propelled Motor Car for Interurbans. By E. J. Christie.....	89
Miller Guy Anchors (Illustrated).....	90
The Milloy Roller-Bearing Trolley Base (Illustrated).....	90

That the strike against the United Railroads of San Francisco has failed means that the company has maintained its organization and integrity against severe odds.

San Francisco Strike is a Failure.

The strike was declared on May 5 and has been waged with intense bitterness by the strong labor forces of the city. But the company has been able to operate an increasing number of cars and lines and now, more than 10 weeks from the declaration of the strike, all-night service has been resumed on one route, with the expectation that the service will be extended to other streets. More than the usual difficulties have beset the United Railroads of San Francisco from the beginning. Before the present signal failure the union employes have always been successful in their negotiations, and advances in wages have been conceded freely by the company. Everyone will admit that the system has been in no position lately to be lavish with its funds. Various increases in wages were followed by the destructive results of the earthquake, which necessitated the replacement of costly property. Wise men would have said that a strike which came so soon after developments of so grave a nature was foredoomed to disaster, and events have justified the refusal of the company to grant the demands of the employes who struck.

stock of \$100,000 is of especial interest. As formulated the plan gives these certificates a nominal par value of \$23,250,000. It is the presumption that the issue of such certificates, based on a percentage interest in earnings applicable to the stock instead of on a par value interest, would overcome the prevailing public sentiment against the existence of large amounts of junior securities. In distributing an interest in valuable ore lands to its shareholders the Great Northern Railroad adopted a similar method of participation certificates and the property is held by trustees for the benefit of the holders. The plan has many advantages, and the serious attention which it has received recently from those who are intimately concerned in questions of public relation may be accepted as an indication that this method of treating junior securities will receive a thorough trial.

Any other procedure than the early investigation of the Interborough-Metropolitan Company and the Brooklyn Rapid Transit Company by the public service commission of the first district, New York, could scarcely be expected. Public opinion is so strongly in favor of investigations, inquiries, regulation, etc., that the commission waited only until this week to reach a decision as to the course which it should follow regarding these two companies.

Investigation of New York Systems.

If the planning of labor were identical with its performance in an acceptable manner the commission could already point to great results; for besides announcing its intention of probing into these systems, it has set the date for a public hearing at which suggestions will be received for relieving the congestion at the Brooklyn bridge, has taken up the Fourth avenue (Brooklyn) subway question, and promises to investigate the Coney Island fare dispute. Any one of these important problems involves so many serious results to the public as well as to the railways that the commission should attack them with the earnest desire of rendering equal justice to all concerned. The public conception of the duty of the commission is founded on the fanatic anti-corporation radicalism of the day. The commission owes a duty

The scaling down of some of the securities is the feature of the plan for distribution of the Chicago Railways Company securities to holders of stocks and bonds of the Chicago Union Traction Company and underlying roads. The loss which this reorganization places upon underlying stockholders is large. Holders of the stock

Underlying Securities in Chicago.

of the original Chicago West Division Railway and the North Chicago City Railway, on which 35 and 30 per cent dividends, respectively, had previously been paid, will receive for each \$100 share \$200 in bonds, yielding 8 per cent annual income. This depreciation is due directly to the court decision declaring invalid the franchise rights of the companies. The suggestion of Judge Grosscup that no par value be given to the participation certificates which are to be based on the capital

to the corporations just as much as to the public. While the commission admits that it has no authority over the Brooklyn bridge, approaches and terminals, which are owned by the city, it takes the position that it has certain powers of regulation covering the movement of cars over the bridge. If there is to be any inquiry into Brooklyn bridge traffic conditions, it should be thorough and should embrace all of the causes of congestion. If the authority of the commission and of the city conflict, a division of such investigation should be arranged, or else the commission and the city should cooperate. The court of appeals decided that the 10-cent fare to Coney Island was legal under the old law, but did not pass upon the constitutional question as to whether a lower rate would be confiscatory, or the question as to the maximum rate that could properly be charged under the various charters and franchises. If the new commission should order a reduction these questions will remain to be determined, and there is every indication that if some other interest does not first raise the question of constitutionality of the public utilities law the subject will be brought up in the Coney Island fare case.

In view of the increasing use of concrete by electric railway companies for shops and other buildings the necessity for rigid inspection during construction by those in charge should be well understood. Concrete construction work should be in the hands of contractors or engineers who will give as careful attention to small jobs as to larger ones. It is improbable that any reputable engineer would use concrete, a "compressive" material, as if it had tensile strength, but some of the collapses of concrete structures are attributable to such defects in the engineering calculations. Failure to inspect carefully the work during construction also seems to be a growing cause for accidents. In buildings where carpenters may be at work forms for concrete columns offer a convenient resting place for timbers that require sawing or planing, and it has been observed that a carpenter will walk a considerable distance in order to take advantage of such a luxury, with the result that the forms become receptacles for shavings, sawdust and small blocks, which are likely to remain and become part of the columns. Concrete buildings have collapsed from the weakness of columns due to this carelessness. Another cause of failure results from the false economy of removing forms before the concrete is thoroughly set and employing them for another course above. This overloads the green concrete from which the forms have been taken and results disastrously. Failures due to poor quality of the concrete or improper mixing invite attention to another important phase of the matter, and further emphasize the necessity of placing all concrete work in thoroughly reliable hands.

The "pay as you enter" car is to have an opportunity for showing its worth in crowded Manhattan. It is stated that within a short time the Interborough-Metropolitan will place in operation on its Fourth and Madison avenue surface lines several of these cars with a view to ascertaining their value. The principle on which cars of this type depend for recognition in city use includes such an arrangement of the platforms and doors that a passenger may not enter the car body without first having passed directly in front of the conductor. The obvious and desired result is that no passenger can escape paying his fare. Cars of this type were first operated in Montreal, and those who, as a matter of technical investigation, have studied their operation, highly recommend their use. The rear platform of a 53-foot single-ended pay-as-you-enter car of the design recommended by the inventors, is 9 feet 5 inches long, with its floor depressed about 7 inches below that of the car body. This

platform, nearly 10 feet long, and affording standing room for 30 people, necessitates, with its long overhang, strong knees and underbracing. Modern car construction has so advanced that no doubt can exist as to the feasibility of using a 10-foot platform, but where cars are to be operated on city lines the overhang on curves of short radius must be taken into account. This feature seems to be the one which is causing the most concern regarding the outcome of the trials in New York. To our mind the advantages of the pay-as-you-enter car will far outweigh this disadvantage that has been mentioned. It can safely be assumed that the continual presence of the conductor on the back platform, where both loading and unloading takes place, will serve to reduce the accident factor to such an extent that the disadvantage of the long overhang need not be considered. The reason for the pay-as-you-enter car ever having been considered as feasible is most important. It is generally known that a considerable portion of the passengers handled by metropolitan companies in the usual type of car ride without paying fares. As the new arrangement of platforms and doors in the pay-as-you-enter car assures the company that each passenger must in entering come in close contact with the conductor, there should be little doubt as to the advisability of accepting this design.

THE CAPACITY OF FUTURE GENERATING UNITS.

One of the first questions asked about the details of an important new power project is, "What sizes are the generating units to be?" The choice of sizes has been so often discussed that the problem need not be elaborated in these columns at this time, but in view of the development in prime movers now in progress it is interesting to consider the future tendencies in capacity indicated by present power plant conditions. In a general way, of course, the trend of designs is toward larger individual capacity in all kinds of prime movers, but this set in the direction of larger output ability per machine is much more evident in certain lines than in others. The requirements of the metropolitan transit and lighting systems and the demands of steam railroad terminal electrification call for total station capacities in kilowatts measured by the scores of thousands, but how far the size of units will be increased beyond those at present in vogue is something of a problem. On the one hand there are not lacking predictions that steam-driven generating units of 15,000 or 20,000 kilowatt rating will be in service within a very few years, and there is little question that the manufacturers could meet such a specification if given sufficient time to prepare the designs, patterns and special tools required for such enormous prime movers. On the other side of the case, however, are some interesting commercial and technical matters which illustrate the difference between what is possible and what will pay, and which certainly tend to limit the maximum ratings of individual machines.

A steam engine and generator of 5,000 kilowatts normal rating represent an investment of between \$150,000 and \$200,000 on a conservative estimate. Such a machine calls for the best operating ability in the station force and requires the most constant care in daily service against experimental methods and mistakes in handling. The failure of such a unit at a critical time is a calamity in all but the largest stations. If these points are forceful with machines of this size, they become immensely significant in a machine of from 7,500 to 10,000 kilowatt normal rating. The latter size of unit approaches an investment of a third of a million dollars, and it is scarcely conceivable that a 20,000-kilowatt unit could be sold for less than half a million dollars under any conditions in sight at the present time. The loads which could utilize four or five such units may be present today in four or five of the largest cities of this country, but in view of the fact that only a small increase in economy can be reasonably expected in machines exceeding 7,500 kilowatts

in rating, it is a serious question whether it will be worth while for a long time to come to tie up so much capital in a single engine and generator combination, including, of course, the steam turbine in the engine class. During the past five years there has been a marked flattening of the capacity increase curve for generating units.

Like reasoning applies to the gas engine, though the economy of very large units driven by gas power is as yet not definitely appreciated in terms of increased size. It is probable, however, that the utilization of blast furnace gases will open the way toward the construction of at least 10,000-kilowatt units in the not distant future. The oil engine is as yet almost out of sight behind the motive power horizon, from 500 to 750 kilowatts being a very large machine in this type. Plenty of room for expansion exists here. In the field of hydraulic power a 5,000-kilowatt turbine is today a standard machine, but the prospect of very much larger units does not appear definite in the face of existing power transmission limitations, both in the water supply and on the high-voltage lines. It would be idle to limit the ultimate capacity of any type of prime mover, but a conservative point of view is worth taking until greater gains in economy than are now in sight offset the foregoing disadvantages of very costly and high-powered units.

THE MILWAUKEE DECISIONS.

On the questions of service involved in the complaints against the Milwaukee Electric Railway & Light Company and its subsidiary, the Milwaukee Light Heat & Traction Company, the decisions of the Wisconsin railroad commission, of which abstracts are given in another part of this issue, are generally favorable to the corporations. A reduction in fares between Milwaukee and Wauwatosa, a suburban point, which was asked on the ground that existing rates are unreasonable and discriminatory, was denied; but the question of the absolute reasonableness of fares, both on this inter-urban line and within the Milwaukee city limits, is deferred until the physical valuation of the properties has been completed.

The amount of time and labor spent in the investigations is shown by the fact that hearings were held on eight days in February and March last, during which nearly 100 witnesses were examined. The transcript of the testimony taken at the hearings covered nearly 2,000 pages, and, besides physical valuation of the properties, an audit of the books was undertaken in order that all information bearing on the important questions involved might be secured.

The chief questions at issue, so far as service within the Milwaukee city limits complained of by the municipal authorities is concerned, related to the construction of extensions which President John I. Beggs believes are essential, the use of air brakes or hand brakes, rush-hour service and the cleaning of cars. The commission paid Mr. Beggs the tribute of wholly approving his plans, which were indorsed also by Bion J. Arnold, Prof. W. D. Pence and George Weston. The latter experts considered the subject on behalf of the commission. Construction of these extensions, aggregating 18 lines, will provide for present and future needs of the city and will relieve materially the congestion of traffic on the downtown streets.

Accounts of the testimony which have been published from time to time in the Electric Railway Review have shown the diversity of the expert judgment which was submitted as to the relative need of hand brakes or air brakes on city cars. In its decision the commission prescribes the use of air brakes or other power brakes on all double-truck cars hereafter acquired or constructed, and recommends that they be added to existing cars when practicable. In reaching this conclusion the commission was evidently guided not so much by the thought that this improvement would facilitate the movement of traffic as by the idea that air brakes "do make

it possible to prevent accidents which it might not be possible to avoid with hand brakes."

As to cleaning cars, the ruling of the commission was not inconsistent with the policy of the company as revealed at the hearings. The commission believes that the most rigid discipline and supervision should be exercised in order that the cars may be kept clean. As an elementary principle, operating officials of all railways strive to enforce discipline in this respect, but it must be recognized that no penalties can successfully preserve peace and assure constant obedience to rules in all cases. An official of the Milwaukee company testified at one of the hearings to the familiar fact that large numbers of men leave the service because they will not submit to the discipline, and that in 1906 of 546 men who were employed 356 resigned and 67 were discharged. These few figures illustrate the true nature of the problem of discipline on street railways.

In the Wauwatosa service case, the thoughtful consideration which the commission gave to the subject is testified by its conclusion that "the conflict in evidence on crucial points is not great." There was slight basis for some of the complaints against the companies. Disposing of one of these, the commission states that "the mental process by which a logical conclusion could be reached to the effect that the service is inadequate, but if there was a little less headway between the Wauwatosa cars and those which preceded them, the service would be adequate, would be the result of a refinement of reasoning that is better suited to the casuist than to one dealing with the practical mundane affairs of life." Thus the commission finds that while it might be an improvement in the service to start two of the Wauwatosa cars six minutes earlier, this change would necessitate the construction of a siding; and the commission inclines to the "belief that if the service would be adequate after the proposed change was made, it is reasonably adequate at the present time."

If the authority of the commission is admitted, the most costly change will result from the equipment of double-truck cars with power brakes. The unprejudiced attitude of the commission makes its frank and full approval of the comprehensive plans for the Milwaukee street railway system of the future of especial value. Instead of bickering over each block of track and every route suggested, the commission was convinced of the wisdom of the plans for expansion and did not hesitate to say so. Its broad views on this question are in refreshing contrast to the narrow actions of many city authorities, whose false conception of duty leads them to obstruct the fulfillment of plans framed by those who are best able to judge of the direction of future growth of population and of the routes for transportation to and from congested centers.

Benefit Association for Illinois Traction Employees.

At a meeting of delegates from the various companies forming the Illinois Traction System, held at Springfield, Ill., there was organized on July 10 a hospital relief association. The object of the organization is to provide proper medical treatment for employes during sickness or injury and funeral expenses in the event of death. A plan of financing was adopted whereby each member will be assessed according to the salary received, the scale being as follows: Those receiving \$100 or over, 75 cents a month; between \$50 and \$100, 50 cents; between \$40 and \$50, 35 cents; less than \$40, 25 cents. In a statement issued by L. E. Fischer, general manager of the Illinois Traction System and president of the new association, it is announced that should the funds created by the collection of dues prove to be insufficient the deficit would be made up by the company. While those in the employ of the company at the present time are not required to become members of the association, it is believed that the obvious benefits to be derived will result in a large membership within a short time. After August 1, on which date the organization becomes effective, new employes of the system will be requested to become members of the association.

PACIFIC ELECTRIC PASSENGER CARS.

The various types of rolling stock owned and operated by the Pacific Electric Railway Company, Los Angeles, Cal., afford an illustration of the especially high-class service that this railway offers its patrons in Los Angeles and that vicinity. The Pacific Electric has more than 525 miles of single track

Illustrations are presented showing the general design and some of the details of the standard type of passenger cars of this railway system. In the Electric Railway Review for May 18, 1907, page 646, illustrations were also presented showing a train of 18 of these cars out of an order of 52 standard passenger equipments that were shipped on their own wheels from the plant of the St. Louis Car Company at



Pacific Electric Rolling Stock—Exterior of Private Car.



Pacific Electric Rolling Stock—Standard Passenger Coach.

built as double and four track roadway in and radiating from Los Angeles.

The number and types of cars now operated over this system are as follows:

Express	13	Combination passenger and express	7
Tower line cars	4	Combination mail and passenger	4
Material car	1	Private cars	7
Wrecker	1	Flat cars	36
Work motors	12	Box cars	34
Electric freight locomotive	1	Box cars (building)	25
Straight passenger with motors	249	Oil cars	8
Combination smoking and passenger with motors	52	Double-truck cabooses	2
Combination smoking and passenger without motors	11	Portable substations	2

St. Louis, Mo., 2,717 miles to the shops of the Pacific Electric Railway in Los Angeles, where the electrical and brake equipments were assembled. Reference to the accompanying line illustration will serve to show the general dimensions of this very excellent type of car. The length of the car body over bumpers is 48 feet; the width over sheathing is 8 feet 10 inches, and the height from rail to top of roof is 12 feet.

The underframing of the car comprises two center sills and two side sills, each being a 7-inch 15-pound I-beam. The center sills extend from bumper to bumper, but on account of the steps in the vestibules the side sills are somewhat shorter. They are, however, carried by the steps with a bent I-beam of similar section. The methods of joining these beams is of

particular interest and will be noted by reference to the upper left-hand corner of the framing plan of the standard passenger car.

The 7-inch I-beams, of which the sills are made, are

equipment of these cars comprises quadruple sets of GE 76 or Westinghouse 112 motors, each of which has a capacity of about 75 horsepower. The motors are controlled by the Westinghouse electro-pneumatic multiple-unit system. The brake

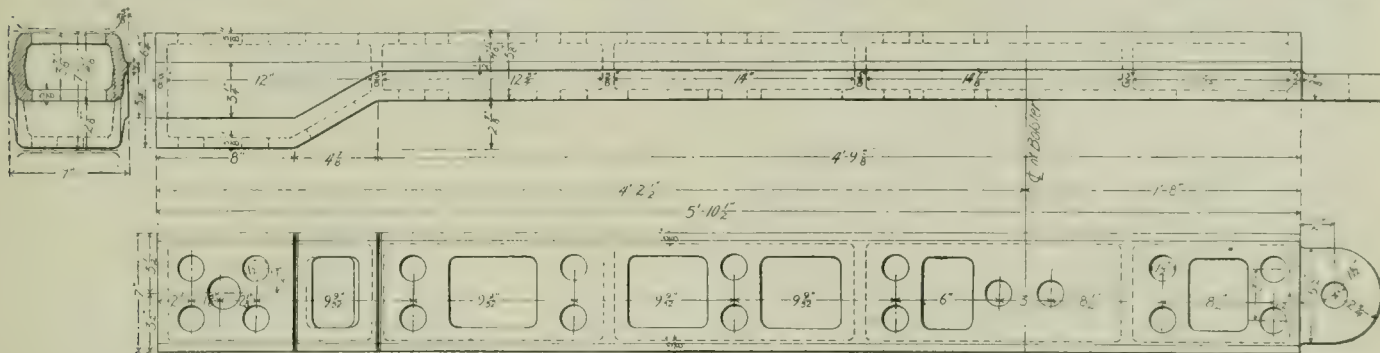


Pacific Electric Rolling Stock—Three-Car Train as Operated in Regular Service.

filled with wood and a special platform beam is provided at the ends of the sills. This beam, which is of cast iron, conforming to the dimensions shown in one of the illustrations,

equipment is the Westinghouse AMM schedule automatic air, adjusted to brake at 120 per cent of the light weight.

The trucks are of the St. Louis Car Company's type 23B,



Pacific Electric Rolling Stock—Details of Platform Beams.

is of a box section at the end which fits the space between the two sills. It will be noted that the platform beam is designed with a contour so that it can be bolted to a snug fit

with swing bolsters, and the motors are inside hung. An illustration of the bolster is presented. It consists of two 10-inch 15-pound channel irons, with riveted top and bottom plates $\frac{5}{8}$ by 7 inches. The center plates and side bearings are bolted through the bolster to facilitate easy removal for



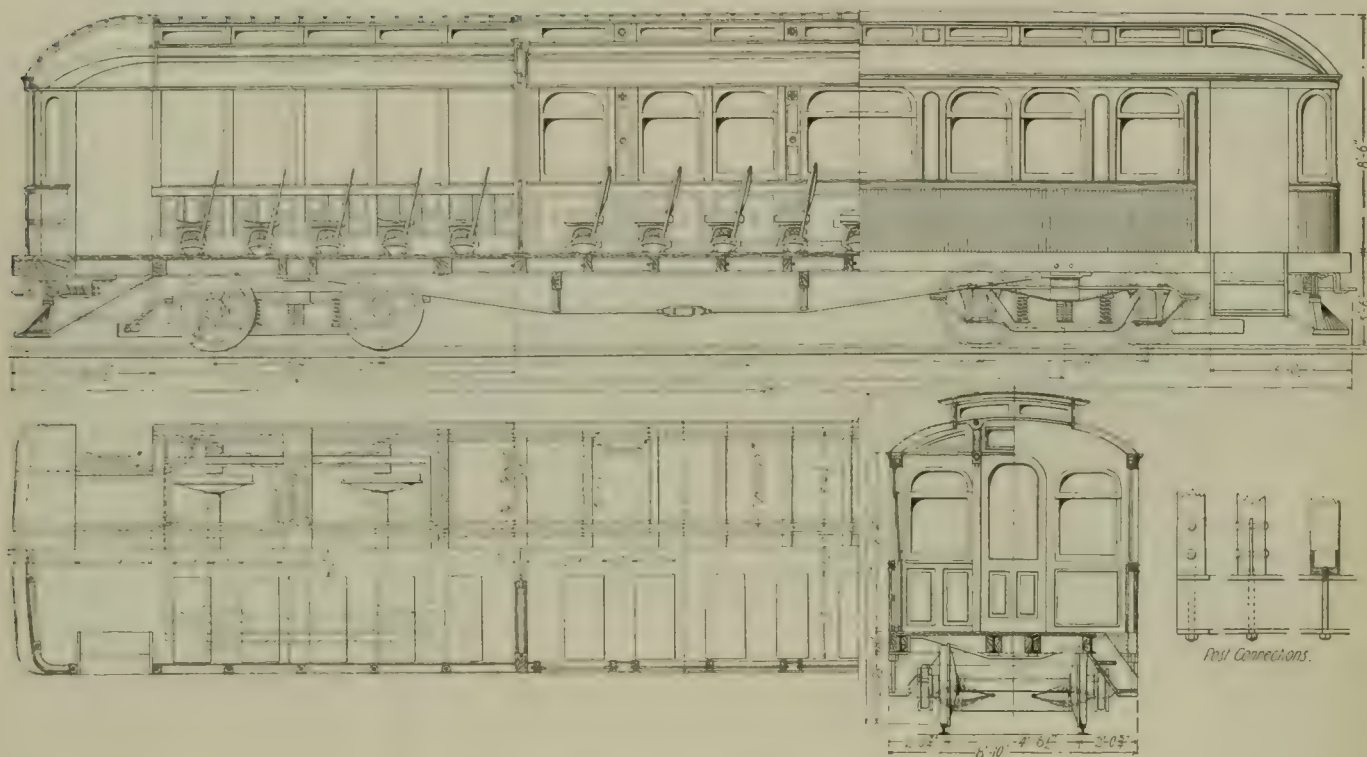
Pacific Electric Rolling Stock—Interior View of Private Car.

between the I-beams. It is of such a length that with the truss rod fastened at its inside end the forces are so balanced over the bolster that there is a tendency with a heavily loaded car to raise the platform rather than lower it. The electrical

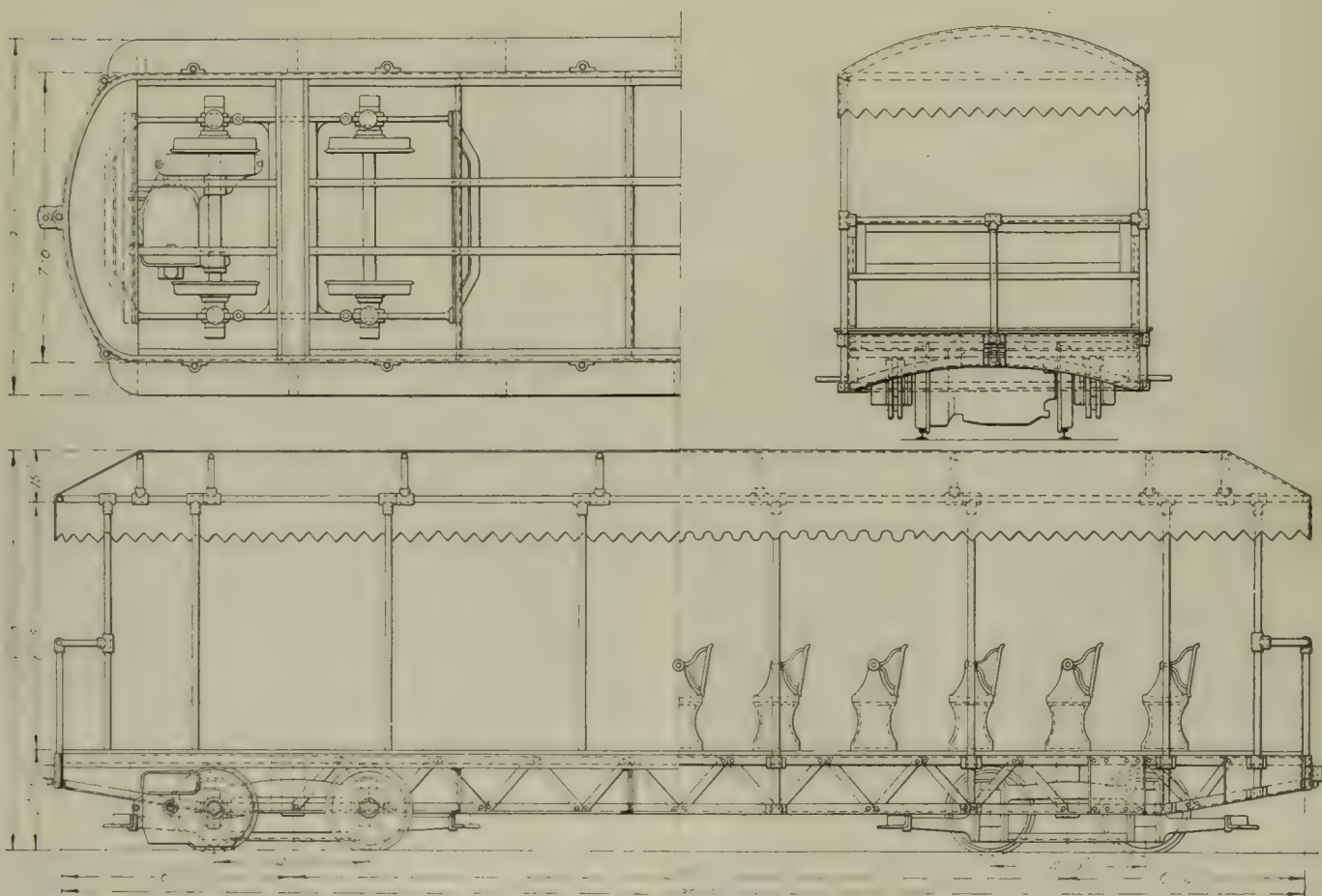


Pacific Electric Rolling Stock—Alpine Car.

repairs. The channel irons which comprise the main members of the bolster are separated by end castings, which serve as spring pockets, and also tie the top and bottom plates together. The proportions of the parts are such that the bot-



Pacific Electric Rolling Stock—Standard Passenger Coach.

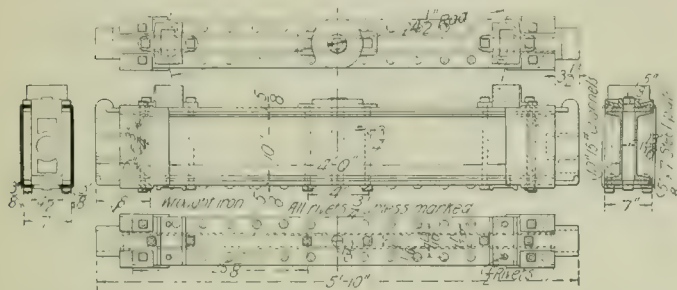


Pacific Electric Rolling Stock—Plan, Vertical and Cross Sections and Elevation of Alpine Car with Special Underframe.

tom plate is in tension and the top plate is in compression, the equalization of the stresses being made through the end castings.

It has been found by experience that the sand in the vicinity of Los Angeles greatly shortens the life of car parts. One such part which frequently requires renewal is the chafing iron on the bolster. The irons on this design of truck are made to be renewed readily, and have the form shown by the heavy lines in the accompanying illustration. Steel plate $\frac{5}{8}$ by 7 inches is used for making these chafing irons, the work being economically done in a bulldozer. The chafing iron is supported at the back by the cast-iron filler and the single bolt which secures the filler block also secures the chafing iron. This iron may be removed by removing only this bolt. The dimensions of the parts of the bolster and remainder of the truck are such that no part of the bolster except the chafing irons touches the truck transom.

The standard passenger cars, as described, have seats for 56 passengers and weigh complete 68,800 pounds. The coupler details, which comprise a special type of attachment with M. C. B. head, as built by Edwin C. Washburn, Minneapolis.



Pacific Electric Rolling Stock—Passenger Car Bolster.

Minn., were described and illustrated in the Electric Railway Review for May 18, 1907, page 646.

Alpine Car.

The Alpine division of the Pacific Electric Railway comprises that portion of the system between Pasadena and the top of Mt. Lowe. On account of the severe grades a portion of this trip must be made by means of an incline cable railway, with grades of 58 and 62 per cent for 3,000 feet. From the upper end of this cable railway a narrow-gauge trolley line negotiates an average grade of 7 per cent for its entire length of five miles. At the upper terminus of this line hotel accommodations managed by the railway are provided for tourists and the trip to the summit of this mountain, about 1,100 feet higher, can be made by burro. A special type of car has been built for operation over this 5-mile railway, which winds along the side of the mountain.

To provide a car with a center of gravity as low as possible the rigid type of roof structure was not used, but in its place, as will be noted from the halftone illustration, is a neat canvas canopy, supported on a framework of $1\frac{1}{2}$ -inch iron pipe, with standard fittings. Probably the most radical departure from the usual type of car construction is to be noted in the car sills. There are but two sills and each of these is a built-up girder of the lattice type, about 16 inches deep. The sections used in this girder comprise mainly 2 by 3 inch angles. The electrical equipment for the Alpine car consists of four GE 800 25-horsepower direct-current motors, outside hung. Independent air and hand brakes increase the safety of operation. The length of the car over all is 32 feet, the width over all, 9 feet 3 inches, and the seating capacity is 66. The total weight of this equipment is 29,300 pounds.

Work on the Manhattan bridge over the East river in New York City has reached the point where erection of the superstructure has begun. On June 26 erection was started with the setting of tower shoes at the Manhattan tower. The Ryan-Parker Construction Company has the contract for the superstructure.

REDUCING ACCIDENT RISKS AND COSTS.

The Electric Railway Review realizes that the subject of accidents and their prevention is an especially important one. Those whose duties require familiarity with this subject are invited to contribute to its discussion. The following communications will indicate that the problem of lessening accident risk and reducing the resultant expense is being carefully considered by many transportation departments:

Peoria Railway Company.

S. L. Nelson, vice-president and general manager Peoria Railway Company, Peoria, Ill., writes:

Some time ago we issued a bulletin prohibiting our employes from visiting saloons or gambling houses while on duty and warning them that if these places were frequented at other times they would not be considered desirable persons to continue in our employ. That had a very good effect. However, a little later we issued another imperative notice that any employe wearing a badge or uniform of the company who visited a saloon or gambling house, whether on duty or not, would immediately be dismissed from the service and would not be re-employed. In six months our accidents have been reduced in number about 30 per cent and the cost more than 50 per cent.

At the present time all of our cars have single trucks and hand brakes, but we will commence within 30 days the operation of 15 double-truck cars equipped with air brakes. Our track is in first-class condition and our barn inspection thorough; the overhead is fair and is now being rebuilt to some extent. We contemplate installing an instruction department and may introduce a traveling instructor. This has not been fully determined.

The Denver City Tramway Company.

S. W. Cantrill, superintendent Denver City Tramway Company, Denver, Colo., advises as follows:

Regarding our accident risk and cost I would say that our earlier advice to you, concerning instructions given to conductors and motormen, included about the only new features we have adopted along this line (Electric Railway Review, February 9, 1907, page 185). We have been constantly adding air brakes to our car equipment, which, no doubt, have a tendency to lessen accidents.

We long ago adopted the practice of placing "Slow" signs on the span wires, approaching dangerous places along the line. This we find very satisfactory. These signs read "Slow 2," "4" or "6," according to the necessity. Trainmen are instructed that such signs mean to reduce speed to two, four or six miles per hour accordingly.

The United Railways & Electric Company of Baltimore.

W. C. Ludwig, superintendent transportation United Railways & Electric Company of Baltimore, says:

I would state that we endeavor to keep our rolling equipment up to the highest standard and in the best of condition, as well as our trackage and overhead construction.

At all dangerous points we have installed red stop and green slow semaphore signals, whichever the case necessitates. We also have these red semaphore signals at the entrances of all bridges, viaducts, etc., and at the draw of any bridge.

At steam railroad crossings we have derailing switches, and have also adopted trolley troughs in order to prevent the trolley from flying the wire while going over these crossings.

I might also add that our motormen are put through a school of instruction and are also instructed on the car while operating through the streets, before they are put in charge of a car by themselves.

Meridian Light & Railway Company.

A. B. Paterson, manager Meridian Light & Railway Company, Meridian, Miss., writes:

We have adopted a number of rules, such as having the

cars stop before they cross certain streets, on which there is a great deal of travel; we run our cars slowly in the fire limits of the city; we try to have our conductors and motormen be very politic with the passengers; and we have recently put on an inspector for the purpose of getting the names of the different people who are continually complaining. We have him investigate complaints thoroughly, also have him run as conductor on the line on which the complaints originate, to see whether or not the parties have reason to make complaint.

We also have adopted an examination paper, which must be answered and passed on by the superintendent of the department before a man is allowed to take charge of a car in regular operation. The examination includes questions on the rule book and other important matters in regard to electric equipment, etc., of the cars.

In case of accidents for which we are to blame, or for which there is any doubt, we make liberal settlements. And in case of accidents where we think we are not to blame we fight to the end. In this way we think we have established a very good name in regard to being fair to any person, or thing, that is damaged by us.

Petaluma & Santa Rosa Railway Company.

E. M. Van Frank, general manager Petaluma & Santa Rosa Railway Company, Petaluma, Cal., says:

Concerning what is being done by various companies to lessen accident risk or cost, I beg to advise that this company operates some 31 miles of single-track standard-gauge railroad, giving both passenger and freight service, under steam railroad rules.

The track is laid almost wholly on private right of way, except through the towns of Santa Rosa, Sebastopol and Petaluma. The right of way is well fenced and road crossings are guarded by cattle guards and provided with customary crossing signs.

Our policy is to make settlement only where our liability is shown. All other claims are contested vigorously. Inspection of rolling stock, maintenance of track and overhead are carefully attended to, with the result that the sum charged to accidents and personal injuries for the last 12 months amounts to less than one-tenth of 1 per cent of the gross receipts, and there remains pending only one claim of \$100, which is being contested.

Nashville Railway & Light Company.

H. A. Davis, superintendent railway department Nashville Railway & Light Company, Nashville, Tenn.:

There is such a wide difference of opinion on this subject that I hardly feel competent to go into the matter without giving it thought and study. However, it occurs to me that the better disciplined a road is the fewer accidents there will be.

I note that you state that one manager reduced his accident risk and cost by making fewer settlements. I do not believe it would be possible to know whether this was the case or not, as the company might be forced, at the end of a lawsuit, four or five years after an accident, to make settlement.

Of course, where the speed is slow there are a great many less accidents; local conditions, however, have a great deal to do with the number of miles and hours made per day. Where the streets are very wide good speed can be maintained, with fewer accidents than in a city where the streets are narrow, and even a slow or a moderate speed made.

Benton Harbor-St. Joe Railway & Light Company.

H. C. Mason, manager Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., writes as follows:

In reply to yours asking what we are doing to lessen our accidents. The most important thing we are doing is reducing our speed on the mainly traveled streets. We are constantly cautioning our motormen to be careful and at all

times keep their car under perfect control when they see any children along or near the track, and also in the morning, noon and evening, when the streets are crowded with people going to and from work. These are the main things we are doing to avoid accidents.

We do not settle any claims where we do not think we are liable, unless it is a matter of charity. At the present time we have but one damage case on the dockets against us. This is the only case we have had in court in the last 15 months.

DECISIONS OF WISCONSIN RAILROAD COMMISSION IN MILWAUKEE SERVICE CASES.

The decisions of the Wisconsin railroad commission in the cases of the city of Milwaukee against the Milwaukee Electric Railway & Light Company and of Charles Gillett against that company and its subsidiary, the Milwaukee Light Heat & Traction Company, were rendered on July 12. In general the findings were in favor of the company on the points decided.

Findings in City Case.

In the city case the commission summarized its findings as follows:

First—That the Milwaukee Electric Railway Company maintain in the future at least as good, or better, service than it maintained during the months of February and March, 1907.

Second—That all double-truck cars, hereafter acquired or constructed by or for the Milwaukee Electric Railway & Light Company, shall be equipped with power brakes.

Third—That every car in the regular service of the Milwaukee Electric Railway & Light Company be thoroughly cleaned at least once each day, and that no car be taken out of the car barns unless it has been properly cleaned.

Fourth—That all charges of this complaint not covered by the above order, or otherwise disposed of herein, be denied.

The commission says in its decision that the contentions of the city of Milwaukee fall into two broad divisions, namely, the complaint regarding rates of fare and the complaint with respect to service. By common consent the question of the reasonableness of fares was left in abeyance until after the valuation of the property, which is in progress now, shall have been completed.

Rush-Hour Service.

The burden of the testimony offered on behalf of the city bore on the service during rush hours. Reviewing the sheets for the Eighth street line the committee says it was able to discover only three instances of cars carrying 100 passengers each "and relatively few cars with 70 and more passengers each. It cannot, therefore, be maintained that the Eighth street line is suffering from overcrowding to an unreasonable extent."

The commission goes into detail as to the congestion during rush hours at Third street and Grand avenue and, based on an opinion which was furnished by George Weston of Chicago, who was in the employ of the commission as an expert, it says that 350 cars an hour, the number which officials of the company testified was being operated at that intersection during such hours, was not the maximum possible. "Better policing and a closer headway," Mr. Weston says, "would make it possible to move 675 or more cars per hour over that point."

Cleaning Cars.

On the subject of cleaning cars the commission states:

No cars should be permitted to leave the car house except in a perfectly clean condition, and only in the most exceptional cases should it become necessary to let a car go out during cold weather without a fire. The rule regarding cleaning should be absolute. We realize that under extraordinary circumstances, especially during days of sudden changes in temperature, a car may have to be started from the car house without a good fire, but this should not be necessary often.

Some testimony was offered to the effect that the free use of water in cleaning cars was damaging to the machinery. Independent advice does not substantiate this assertion. We

find that cars are so constructed that water may be used freely in cleaning them without injury to machinery.

Air Brakes.

No single point at issue, the commission says, was contested more stubbornly than the subject of air brakes. The commission says that the import of the testimony was generally identical with the deposition of Mr. Weston, who stated that "for ordinary scheduled stops there is no question but that the hand brake is just as efficient as the air brake," but that "where it is necessary to make emergency stops and in congested territories particularly, an air brake is superior to a hand brake." The commission reaches the following conclusions on this subject:

Yet there is no escape from the conclusion that air brakes, as a matter of fact, do make it possible to prevent accidents which it might not be possible to avoid with hand brakes. And if a single life can be saved through the use of the air brake, who will say that it should not be done? Taking into careful consideration all the testimony upon the question of brakes, we are convinced that the adoption of air brakes is in the direction of progress. We do not believe that the facts in this case warrant an order from this commission compelling the railway company to equip all its cars with air brakes, but we do believe that it is our duty to prescribe the use of air brakes or other power brakes on all double-truck cars which may hereafter be constructed or acquired by the company. We also recommend that whenever it is practicable in reconstructing cars now in use to add the power brake equipment, that it be done.

The company does not operate its utility cars as a common carrier or for other than its own convenience, the commission finds, and it has the right to transport its materials and supplies in that manner. While these cars are being operated at night the commission says they should "be operated in such a manner as to interfere least with the transportation of passengers and with the comfort of people living near lines over which such are being operated."

The contention of the company that sending a conductor forward to see that the Kinnickinnic avenue crossing is clear is much safer than placing a flagman at the crossing is approved by the commission.

Extension Plans Approved.

Plans for extension which were submitted during the hearing by John I. Beggs, president and general manager of the company, are unqualifiedly favored by the commission. The report says on this subject:

By far the most important question which developed relates to the extent of the present street railway trackage and the future development of the system. The general manager of the railway company testified at great length with respect to plans calculated to meet the requirements of the Greater Milwaukee of the future. "Looking comprehensively into the future," he sketched a great network of street railway lines so laid out as to permit of extensions which the growth of the city will make necessary and the operation of this larger network of railways as a unified system and organic whole.

Testimony, personal observations and inquiries and conferences with Prof. W. D. Pence, its engineer, Mr. Weston and Bion J. Arnold, chief engineer of the board of supervising engineers of the Chicago traction companies, all of whom indorse its position, lead the commission to indorse the plans of Mr. Beggs and to recommend that the city council grant the franchises which he considers necessary to unify the system. In the *Electric Railway Review* of June 29, 1907, page 870, there was published a map showing the entire system of the Milwaukee Electric Railway & Light Company and the Milwaukee Light Heat & Traction Company, lines constructed and in operation, lines surveyed and projected, and possible future extensions.

The commission considers the execution of the plans outlined before it by Mr. Beggs "absolutely necessary in order that the citizens of Milwaukee may secure relief from present conditions and to give all the citizens of the city adequate service in the future." In discussing the desired extensions the commission says:

It does not admit of argument that when a street railway company can operate its cars over several routes in order

to better serve the public it should do so in preference to running more cars on a closer headway over a street already congested. This applies especially to the situation on Grand avenue and the ready relief which extensions on Wells and Sycamore streets would provide. Again, the present stub-end terminal on Wisconsin street, near the Chicago & Northwestern Railway depot, should be superseded by loop operation over Michigan and Mason streets, with the necessary connections to complete the loop with Wisconsin street. The continuance of the spur to hold extra cars for the accommodation of especially large aggregations of people may be desirable on Mason street beyond Marshall, as well as at various other points in the city.

The Wauwatosa Case.

In the Gillett case, concerning the interurban service from Milwaukee to Wauwatosa, the commission orders:

First—That the number of cars run between Milwaukee and Wauwatosa in the future shall not be less than the number of cars run during the month of February, 1907, as shown by the timecards and schedules now on file with the commission, and that such cars be run substantially as shown in such cards or schedules.

Second—That no greater headway be maintained in the future for the purpose of handling traffic in the city of Milwaukee during the hours of 6:30 to 8:30 a. m. and from 5 o'clock to 6:40 p. m. than is shown by the timecards and schedules during the month of February, 1907, hereinbefore referred to.

Third—That no change in the time schedules be made except on giving five days' notice, and that sufficient publicity be given such notice to afford patrons of the street car lines reasonable means of information concerning the nature of such change in time before the same becomes effective.

Fourth—That commutation tickets good for transportation between Milwaukee and Wauwatosa be kept on sale and sold by the conductors operating the street railway lines running to Wauwatosa, such sale, however, not being required to be made east of the single fare limit on said lines.

Fifth—That cars at the Walnut street terminal in Wauwatosa shall wait for delayed westbound street cars at least three minutes under ordinary conditions and at least five minutes in inclement weather, so as to obviate a reasonable delay and hardship to passengers desiring to make the transfer.

Sixth—That cars on the Wells street line bound for West Allis shall be so operated as to maintain close connections with Wauwatosa cars at Fifty-second street, and in the event of one car being behind time a wait of three minutes at least shall be made for it by the car with which it is intended to connect.

Relief on the grounds that the existing rates of charge are unreasonable and discriminatory is denied.

In reviewing the evidence in the Wauwatosa case the commission finds that "the conflict in evidence on crucial points is not great." As far as the Wells street line is concerned the company is furnishing substantially what the petitioner asked. In inclement weather the commission thinks that under all the circumstances it would be entirely reasonable to require cars at the Walnut street terminal in Wauwatosa to wait at least five minutes for delayed westbound Wells street cars.

The giving of five days' notice of a change in time schedules the commission regards as entirely reasonable, but it did not feel disposed to prescribe any particular method of giving notice, as desired by the petitioner.

Regarding the request that conductors carry commutation tickets the commission concluded:

We do not understand that there is any particular reason why street car conductors should not run on the Wauwatosa lines continuously, instead of making an occasional trip over such lines and spending the rest of their time while in service on lines running to other points of the city. It seems to us that the conductors could, after the single fare limit is reached going west, and before it is reached going east, handle commutation tickets without confusion and without being overburdened with work.

Reasonableness and Discrimination in Fares.

As the commission is having a valuation made of the properties the question of the absolute reasonableness of the rates is left for future consideration, but "the question as to whether or not a discrimination is being practiced may often be determined without passing upon the absolute reasonableness of the rates charged." The commission says:

Considering only conditions as they exist at the present

time it would be difficult to give any good reason why some of the points outside of Milwaukee enjoy a single fare rate, while Wauwatosa does not. When such zones extend beyond the limits of Milwaukee, the outer limits must, perhaps, be fixed in a more or less arbitrary manner. Wauwatosa comes close to the dividing line, considering the way in which the boundary lines are now fixed, with perhaps more reason for including it within the single fare limit than for excluding it.

From the standpoint of unfair competition there is no unjust discrimination practiced, if there is any discrimination at all. We mean by this that if the defendants should seek to avoid alleged discrimination by shortening the single fare limits with which comparison is made, such action would not result in any benefit to the people of Wauwatosa. If they are paying a reasonable rate they are not suffering any injury by reason of the fact that other communities are paying less than a reasonable rate. We do not mean that this is a controlling reason for holding that there is no discrimination in the present case, and neither do we wish to be understood as holding that it is necessary to determine that a rate is unreasonably high, before lowering it on the ground that it is discriminatory. It is our conclusion in the present case that the evidence is not sufficiently clear to warrant us in now holding that the rate should be lowered because it is discriminatory, in view of the fact that the whole question of the absolute reasonableness of the rates charged by the defendant is coming up for consideration as soon as its property is valued and its books are audited, and the fact determined as to whether or not its rates of charge are unreasonable.

We are not satisfied that any such discrimination has been shown to exist as would warrant us in ordering a reduction in rates on that ground alone. The facts and figures will soon be available from which we can determine with a reasonable degree of accuracy whether or not the present rate exacted is excessive, and if it is found to be reasonable, we hardly think the facts shown in the testimony are sufficient to warrant us in making a non-compensatory rate, on the ground that other communities similarly situated are enjoying what appears to be more favorable rates than Wauwatosa. It is not practicable in street car operation to make rates on a mileage basis and the ordinances under which the street car lines in the city of Milwaukee are being operated recognize this fact and establish the zone system.

While the commission feels "that improvements in the service were made in good faith and will be voluntarily continued inasmuch as such improvements were entirely reasonable, we think that any possibility of a further hearing should be avoided as to matters that have been gone into with great detail and at the expense of a great deal of time."

The commission, in concluding, discusses legal points that were brought up in the briefs of the companies, in which it was said that the "determination of such questions as the test of discrimination or excessive discriminatory rates, the expediency of adopting one measure or another are legislative questions, and these cannot be delegated." The commission presents arguments that it has the power to inquire into such matters under the act under which it was created.

TRADEMARK OF THE PITTSBURG & BUTLER.

The Pittsburgh & Butler Street Railway has adopted a trademark which directs attention to several features of construction of the road. The design is shown in the accompanying illustration, but an attractive arrangement of colors adds to its value. The extreme outer circle is black and the next one is aluminum. The words, "Pittsburg & Butler Street Railway, general offices, Pittsburg, Pennsylvania," are aluminum on black. The small band just inside of this circle is of gold. The background of the circle containing the car is of aluminum. The car body is of green and the roof of copper, the windows and doors being of mahogany color. The triangle is of gold, with black letters. The design was made by H. C. Reagan, electrical engineer, and the colors were selected by H. F. Layton, chief engineer of the company.



A Comprehensive Trademark.

WALTON CLARK AND OTHERS ON MUNICIPAL OWNERSHIP.

A critical review of the reports submitted for the municipal ownership commission of the National Civic Federation has been made by a committee of four, as follows: Walton Clark, vice-president of the United Gas Improvement Company, Philadelphia; Charles L. Edgar, president of the Edison Electric & Illuminating Company, Boston; Prof. Frank Parsons, Boston, president of the National Public Ownership League; and Edward W. Bemis, superintendent of the Cleveland, O., waterworks.

Mr. Edgar and Mr. Clark agree in setting forth numerous objections to municipalization, an important one being that in several British cities which have tried public ownership, it has been found that the organization of municipal workmen constitutes a serious threat against the municipality itself and as a result the disfranchisement of city employes is being seriously considered in England.

Proper Auditing.

A review of the economic operations of municipal and private undertakings in Great Britain and the United States is given. The reviewers find that it is admitted by the advocates of municipalization that the debts of British cities have been enormously increased by its operations. "We venture to believe," they say, "that the loss to the communities the municipal industries of which we have investigated from bad management and lack of enterprise, resulting in restricted service of modern utilities, is many times the profit these cities claim to have realized from their Rip Van Winkle methods of serving the public. They continue:

It is not worth while to discuss the effect on the finances of American cities of the municipal operations of the industries that we have here investigated. Properly audited they have, with one or two exceptions, lost money, and their plants are all inadequate to good service and have, with the exception of the water plants, little more than a scrap value in view of the present state of the arts. What effect could such poor efforts as we have witnessed have on public wealth or public comfort? It cannot fail to be bad.

Whatever the subjective relation of municipalizers to their reform, their objective relation, as we have seen, is far from what it once was regarding the commodities and services to be municipalized. They have been obliged by the logic of events to cut away from much that seemed precious to themselves and to many who trained with them. Their opponents, taking cognizance of the project abandoned, hoped that now municipalizers might be pinned down to the consideration of ascertained facts relating to undertakings which their representatives have had an opportunity to visit and to developments obvious to all who are interested in the progress of the debate on the question. The voluntary movement of the municipalizers to this not easily shiftable point would, we submit, in itself have been a contribution to the cause of truth and a source of gratification to their adversaries. But the radical British municipalizer has exhibited the resources of hope and fancy, if not of logic and consistency. While his American comrade is still shouting for municipal ownership, he is today, in his latest frame of mind, looking expectantly to "municipalization by provinces"—that is, for gas, water, tramways and electricity he now wants national government, appropriation, ownership and operation. He has dropped municipalism and comes out for what he all the time had in the background of his thought—socialism.

In favoring municipal ownership Professor Parsons declares that in most discussions of the subject too much attention is given to the purely financial side of the question. "Dollars and cents are not to be neglected," he says, "but life, liberty, justice, virtue and intelligence—the whole character product and social product of our institutions—are of greater moment than their money product." Taking up financial results, Professor Parsons gives it as his view that the municipal plants are more economical.

Municipal operation of public utilities in Great Britain, as observed by the committee of experts, is treated in a series of reviews by members of the committee. These reviews, written by Milo R. Maltbie, Walton Clark, vice-president of the United Gas Improvement Company of Philadelphia, and

Charles L. Edgar, president of the Edison Electric & Illuminating Company of Boston, are divided in opinion as to the success of the undertakings as a whole. Mr. Maltbie is a member of the public service commission, first district, New York. Mr. Maltbie declares that the gas and electric plants operated by municipalities generally give a superior service at a relatively lower cost, as compared with the privately owned companies. This condition he finds to be due principally to the higher rate of interest and profit and the greater amount of liabilities of the private companies. Mr. Maltbie says that the power to operate, if necessary or desirable, in many instances, has been as effective as actual operation—that the mere fact that a city has the power to step in and operate an undertaking itself often makes the exercise of this power unnecessary.

Changes, but with Caution.

Messrs. Edgar and Clark in closing their review summarize their opinions as follows:

The efforts of the National Civic Federation have resulted in a commission of Americans, whose first interest in this investigation, as in all else, is to do what they may to preserve and continue the American idea and American institutions, believing that the high state of civilization and of prosperity in America justify the American idea and the American method, and place the burden of proof heavily upon those who would say another idea and another method would result in improvement in the condition of the people.

Believing this to be the thought and intent of the membership of the commission and of the committee subordinate to it, we still believe that there are ills in the American body politic that may be remedied or cured. We believe that the remedy should be applied and the cure effected without any unnecessary departure from the American idea and the American system. We believe that the framework upon which may be built purity of administration and the highest possible good of the citizens is in existence with us, and that it is not necessary, in the effort to cure the ills from which the body politic may be suffering, to destroy that body. We submit that, living in a land where peace and prosperity are the common lot, we must be very cautious of change. This does not mean that where abuses are found to exist they should not be promptly and mercilessly eradicated, but it does mean that changes in system should be undertaken only after conclusive proof that such changes will result in bettering the condition of the individual. We had better bear the relatively few ills we have than subject ourselves to unknown conditions that may bring in their train greater ills of which we do not know.

Our investigation has determined with certainty many heretofore mooted questions. It indicates the probably correct answers to other mooted questions. Where the facts are clear and the conclusion evident our task has been to summarize and indicate. Where there is remaining uncertainty as to facts, and conclusions are not evident, we have made an effort to determine the probabilities. This has resulted in arguments based on such facts as our investigators have recorded, and on our own experience as operators and observers.

We believe no intelligent reader of the voluminous record of this commission's work will fail to conclude that it clearly proves municipal ownership to be productive of many and serious ills, with little or no compensating good.

Pittsburg Bridge Case.

Arguments in the case of the Monongahela Bridge Company against the Pittsburg Railways Company were heard in Pittsburg on July 12. The city of Pittsburg owns the stock of the bridge company and seeks either to prevent the use of the main passage of the Smithfield street bridge or to secure toll for both sides of the bridge. The Pittsburg Railways Company asserts that the leases of the Sycamore Street Railway Company give it the right to use the bridge, and that ex-Director of Public Works E. M. Bigelow, formerly president of the Monongahela Bridge Company, gave permission for the use of the bridge. The company also alleges that as this right has been recognized for years, and the annual rental due from the Sycamore Street Railway Company has been paid and accepted, the claims of the bridge company are without foundation.

PLAN FOR DISTRIBUTION OF CHICAGO RAILWAYS COMPANY SECURITIES.

Judge Grosscup of the United States circuit court made public on July 13 the plan for distribution of the securities of the Chicago Railways Company to holders of the stocks and bonds of the Chicago Union Traction Company and its underlying companies. While Judge Grosscup approves the general terms of the reorganization as set forth in the plan, he raised objections to certain features. Stockholders of the original underlying companies will try to have the plan amended in their interest.

To carry out the arrangement there will be two syndicates. The required funds for the rehabilitation of the property, amounting at present to about \$12,000,000, will be furnished by one syndicate. Another syndicate will provide the money to meet the obligations of the Union Traction company and the expenses of reorganization.

The Chicago Railways Company, according to the plan, will issue the following securities:

Bonds and Debentures.

First mortgage 25-year 5 per cent gold bonds, secured by all the properties and franchises of the company, to provide funds for rehabilitation specified in Section 7 of the ordinance. Amount of issue limited in accordance with the terms of the ordinance, but unrestricted as to total amount when and as so issued.

Consolidated (or second) 20-year 4 per cent gold bonds, aggregating \$32,800,000; divided in series A, \$15,000,000, and series B, \$17,800,000. Series A bonds have priority over series B bonds. The consolidated bonds are secured by mortgage on all the property and franchises of the company subject to the lien of the first mortgage.

Twenty-year 4 per cent sinking fund income debentures, entitled to the benefit of a sinking fund in an amount designed to redeem and discharge principal at or before maturity, payable if and when earned and before payment on any subsequent obligations, \$5,000,000.

Capital Stock.

Capital stock, \$100,000. Against this stock there will be issued participation certificates as follows: Series A, entitled to receive net annual income remaining after interest and sinking fund on prior obligations to the extent of 8 per cent on certificates of the nominal value of \$100 each, and to priority in both interest and principal payments over series B and series C, \$12,250,000. Series B, entitled to receive net annual income remaining after interest and sinking fund on prior obligations to the extent of 8 per cent on certificates of the nominal value of \$100 each, and to priority in both interest and principal payments over series C, \$6,000,000. Series C, subject to the prior rights of series A and series B, \$5,000,000.

Temporary Obligations.

To provide for cash requirements and for expenses of reorganization, and to prevent the sacrifice of bonds and debentures at the present time, it is proposed that the company shall issue the following temporary obligations:

Six per cent promissory notes, payable five years from date, with option of redemption on any interest day after three years from date, said notes to aggregate \$4,500,000, secured by the following collateral: Consols bonds, series A, \$6,617,200; consols bonds, series B, \$150,000.

For the purpose of settling with the holders of notes, certificates of indebtedness, and other claims not entitled to payment in cash in priority to bonds, it is proposed to issue the company's 5 per cent notes, payable 10 years after date, interest payable only if and when earned, after payment of interest on prior obligations, redeemable at the option of the company on any interest day on or after three years from date, to an amount not to exceed (referred to in said plan as junior collateral and reserve notes) \$5,000,000.

Payment of said notes to be secured by a second lien on the collateral pledged under the \$5,000,000 three-five-year notes above mentioned and by direct lien on the securities not otherwise used for sale or exchange.

The notes last described shall be divided into two series, viz., series 1 and series 2. Series 1 shall have priority of lien upon collateral and over series 2, and shall be used only for allotment by the arbitrators to the extent, if any, deemed by them fair and just to the holders of stock of the North Chicago City Railway Company and the Chicago West Division Railway Company, in addition to the allotments to said stocks hereinbefore shown.

The agreements under both series of notes are to provide

for the right of withdrawal of the securities upon deposit of agreed amounts to be applied to redemption of the notes.

Proposed Basis of Exchange.

The securities are to be issued in exchange for existing securities as follows:

	Consolidated bonds. Series A.	Consolidated bonds. Series B.	Debentures.
North Chicago City Ry. first mortgage bonds	\$ 500,000		
	100 per cent		
North Chicago City Ry. second mortgage bonds...	2,500,000		
	100 per cent		
Chicago West Division Ry. first mortgage bonds...	4,012,000		
	100 per cent		
North Chicago Street R. R. first mortgage bonds...	634,200	\$ 2,536,800	
	20 per cent	80 per cent	
North Chicago Street R. R. refunding bonds		1,614,000	
		100 per cent	
West Chicago Street R. R. first mortgage bonds...	736,600	2,946,400	
	20 per cent	80 per cent	
West Chicago Street R. R. consolidated bonds ...		6,317,000	
		100 per cent	
West Chicago Street R. R. certificates of indebtedness		298,200	\$ 198,800
		60 per cent	40 per cent
Chicago Passenger Ry. consolidated bonds		653,000	653,000
		50 per cent	50 per cent
West Chicago St. R. R. tunnel first mtge. bonds...		1,500,000	
		100 per cent	
North Chicago City Ry. stock outstanding		499,800	
		200 per cent	
Chicago West Division Ry. stock outstanding		1,249,200	
		200 per cent	
Chicago Passenger Ry. stock		152,575	
		25 per cent	
Collateral notes	6,617,200	150,000	
Junior collateral and reserve		35,600	3,995,625
Totals	\$15,000,000	\$17,800,000	\$5,000,000

Division of the series A stock participation certificates is proposed as follows:

Stock of North Chicago St. R. R., 100 per cent.....	\$ 5,920,000
Stock of West Chicago St. R. R., 62½ per cent.....	6,243,125
Junior collateral and reserve.....	86,875

Total

Series B certificates will be allotted to holders of Chicago Union Traction preferred stock, of which \$12,000,000 is outstanding.

Series C certificates will be exchanged for Chicago Union Traction common stock, of which \$20,000,000 is outstanding.

Modifications of Judge Grosscup.

Judge Grosscup gave out a statement in which he said:

The modifications in the plan, made at the instance of Professor Gray and myself, relate only to provisions made for the claims of the underlying companies. All other interests and all other questions are left open for the hearing set for July 24. Although the plan now represents in its general outlines my ideas on what the reorganization ought to be, there are details that must be modified.

The plan provides, for instance, for cash on account of costs and allowances in the receivership cases, \$250,000; and for organization, legal and other expenses of reorganization, to be paid on demand of the committee or board of directors, an unnamed sum out of the \$4,000,000 set apart to take up car trust certificates, personal injury claims, and like matters that are prior liens. This will have to be modified.

Whatever allowances are made will have to be made by the court or Messrs. Bartlett, Dawes, Keep, Hurlburt and Sprague, trustees of the new company, who themselves have no interest in the allowance.

The stock of the new company is kept down to \$100,000. The plan provides for the distribution of this stock among the present stockholders on participation certificates in the ratio of their present interests. But in the plan these certificates are given a so-called independent nominal value, run-

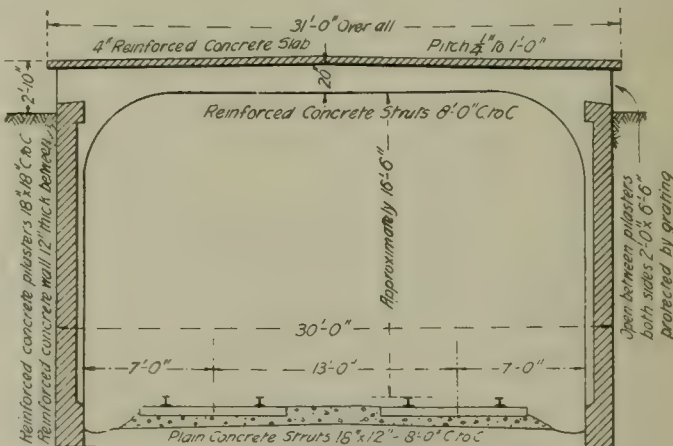
ning toward \$24,000,000. I see no reason for this, or why any nominal value should be given to them now; for it would add nothing to their real value. The certificates, in my judgment, should indicate the proportion of the capital stock that each individual holds, leaving its value to what the future may make for it.

PROPOSED HIGH-SPEED LINES FOR BOSTON AND VICINITY.

Since the passage by the commonwealth of Massachusetts of the electric railroad act of 1906, giving electric railroad companies the right of eminent domain and all duties, rights and privileges of railroad corporations subject to the supervision of the state railroad commission, the commission has held extended hearings concerning four prominent electric railroad enterprises, embracing plans for high-speed lines out of Boston. These, in the order in which they were filed with the commission, are as follows:

Boston Lowell & Lawrence Electric Railroad Company—A proposed line from Boston to Lowell, 22½ miles, to be later extended to Lawrence. Congressman Butler Ames, originator; Westinghouse, Church, Kerr & Co., consulting engineers; C. F. Remington of Boston, chief engineer.

Boston & Eastern Electric Railroad Company—A proposed line from Boston through Everett, Revere, Lynn, Peabody and Salem to Beverly, 16½ miles, with a 3½-mile line



from the junction at Peabody to Danvers, and a ½-mile line from Revere to Revere Beach. John H. Bickford, chief engineer, Boston.

Boston & New York Electric Railroad Company—A proposed high-speed line to extend at first from Boston to Providence, R. I. Financed by Leach & Co., New York. J. B. Blood, consulting engineer, Boston.

Boston & Providence Electric Railroad Company—A high-speed electric line from Boston to Providence. This enterprise is in charge of the Stone & Webster Engineering Corporation of Boston.

The commission has held extended hearings concerning these various projects and is now concluding its investigation of the Boston & Eastern Electric Railroad Company, withholding its decision regarding all lines until all testimony is in, in order to avail itself of any light which may be shed on high-speed interurban possibilities for Boston and vicinity by any of the engineers connected with these various projects.

Boston Lowell & Lawrence.

The Boston Lowell & Lawrence Electric Railroad Company was organized some two years ago by Congressman Butler Ames and his associates for the purpose of building a high-speed electric railroad between the cities of Lowell and Lawrence and Boston. About 60 per cent of the right of way has been secured, either by option or direct purchase. The line, as surveyed, will be entirely upon a fenced-in right of way five rods wide, with the exception of approximately 1,100 feet at the terminals, where it is proposed to construct an elevated structure longitudinally over the public highway

in order to reach the terminal stations. The line is 22.75 miles long. The road is to be double-track its entire distance and there is ample provision for four-tracking in case traffic warrants. The physical conditions obtaining between the two termini make possible the laying out of long tangents and it is the purpose of Congressman Ames to test out the possibilities of electric motors along speed lines. The engineers, Westinghouse, Church, Kerr & Co., testified before the commissioners that a maximum speed up to 75 miles an hour was practicable with safety.

Sixty-two steel and reinforced concrete bridges provide for the abolition of grade crossings. Express service between Lowell and Boston and accommodation service for the intermediate towns and cities will be provided.

Lowell, with its environs, aggregates 120,000 in population, almost entirely dependent upon Boston for amusement and institutions of learning. Lowell, in point of population, is the third largest city in Massachusetts. Lawrence, with its environs, exceeds 100,000 in population and the community of interest with Boston is very strong and well established. The proposed railroad will operate through a great deal of territory not at present served by either electric railways or steam railroads.

Current is to be generated from one central power station located midway of the line, with three substations. A protected third-rail system will be used and the block system will be adopted. It is the purpose to carry light freight and a large revenue is expected from this source.

The undertaking is backed by Congressman Ames, Paul Butler, Oakes Ames and Spencer Borden.

Boston & Eastern.

In a statement before the state railroad commission John H. Bickford declared that the electric railroad act of 1906 was the result of a popular demand for a method of transportation different from the steam railroad or street railway, and that the law was passed with a full knowledge that the state is crossed and recrossed by many lines of steam railroads and street railways paralleling one another, and of necessity to be paralleled by lines built according to the new method.

He stated that an improved form of transportation was demanded as the result of changed methods of living, industry and commerce. The concentration and, at points, congestion of industrial pursuits produced a large daily movement of laborers. Taking Lynn, the third city in New England in the value of its manufactured products, it was shown that while the population in 1905 increased 12.4 per cent, the number of wage earners employed in Lynn increased in that year 31.5 per cent, showing the rapidly increasing number of employes who travel a long distance to their work. It was stated that the community of interest of one municipality with another and of all with Boston is increasing rapidly, thus adding substantially to the large volume of traffic. Moreover, the influx of immigrants is producing densely populated centers which need rapid transit facilities.

It was shown that the road would traverse a territory more densely populated than any other equal area in New England, there being five cities and three towns, exclusive of Boston, directly tributary to the lines, and several other towns and cities which would contribute more or less to the traffic of the road. Salem, Beverly, Peabody and Danvers, with their environs, have a combined population of over 80,000, at an average distance of about 17 miles from Boston. Lynn, with its environs, has an average population of 90,000, at an average distance of about 11 miles from Boston; and Chelsea, Everett and Revere together have a population of 87,000, at an average distance of about four miles from Boston. The density of the population in this territory in 1905 was 2,855 per square mile, omitting Boston, Cambridge and Somerville, while the population density of Massachusetts as a whole is 361.

Mr. Bickford stated that the engineers had gone more thoroughly into every phase of the proposed project than would generally be warranted before a certificate had been secured. This work had included not only the usual preliminary estimates, but extended to all general engineering details. As a result of the various estimates it is the opinion of the engineers that the proposed road, when in operation four years hence, will relieve a congestion which by that time would be unbearable if the road were not built.

Details of Construction.

The road will be constructed wholly upon private right of way, without grade crossings, and in accordance with steam railroad standards. It has not yet been determined whether the third-rail or overhead catenary construction will be used, but the estimates have been made on the basis of a third-rail direct-current system of distribution, with alternating-current transmission, which would require one generating station of 8,000 kilowatts and three substations.

According to the figures of the engineers the maximum curvature on the main line will not exceed 2 degrees, except at Salem and Lynn central stations, where the curves will be 4 degrees 10 minutes and 2 degrees 55 minutes, respectively, but these will be stopping points for all trains. The maximum gradient will be $3\frac{1}{4}$ per cent. The specifications call for three tunnels aggregating 4,800 lineal feet. The longest tunnel will be 2,500 feet and all the tunnels will be principally in rock.

The only departure from standard practice will be the construction, through the center of Lynn, of a semi-subway about 6,600 feet long, a cross section of which is shown in the accompanying engraving. This will be of concrete construction and will extend three feet above grade. This will consist of 12-inch reinforced concrete retaining walls between 18-inch pilasters, the latter spaced every eight feet. The bottom will consist of plain concrete struts, 18 by 12 inches, placed eight feet apart on centers. Reinforced concrete struts across the top will support a 4-inch reinforced concrete slab. Ventilation will be secured by openings above ground between the pilasters and these will be protected by gratings. All streets crossing this semi-subway will be bridged with steel and concrete. The crossings at streets and ways will necessitate 102 bridges, most of which will be of reinforced concrete, and several steel and concrete viaducts. Railroads will be crossed by means of eight steel double-track bridges and one steel single-track bridge, one reinforced concrete double-track and one reinforced concrete single-track bridge. Bridges over waterways will be principally pile structures. The road will be ballasted with crushed rock and the track will be laid with rails weighing not less than 90 pounds per yard. The right of way will be well fenced in and a modern block signal system installed.

Stations have been planned as follows: One at Charleston, one at Everett, two at Chelsea, three at Revere, six at Lynn, two at Danvers, one at Peabody, three at Salem and one at Beverly.

The preliminary train sheet shows the operation of trains between Beverly and Boston on a 15-minute headway, every other one being an express, stopping only at Lynn and Salem. It is expected that the express will make the run from Beverly to Sullivan square, Boston, $16\frac{1}{2}$ miles, in 21 or 22 minutes. It is proposed to establish a local service between Boston and Chelsea and Revere on a 15-minute headway. It is intended that the rolling stock shall consist of steel cars with quadruple motor equipment, and the cars will be run singly or in trains as the volume of traffic may require. The cars will be similar to the Boston Elevated type, except that they will have two side doors, in addition to the doors in the ends of the car. In determining the cost of construction typical plans have been made and submitted to reliable contractors and estimates obtained for all construction work and equipment.

THE TRANSMISSION PLANT OF THE NIAGARA LOCKPORT & ONTARIO POWER COMPANY.*

BY RALPH D. MERNISON, CHIEF ENGINEER.

The prospective system of the Niagara Lockport & Ontario Power Company is a comprehensive one for the delivery of power in the United States within an economic transmission radius of Niagara Falls, and especially for its delivery in the northern and western portions of the state of New York. The company expects within the next two years to be transmitting 60,000 horsepower, and its present right of way purchases are with reference to an ultimate transmission of 180,000 horsepower. The plans of the company as at present laid out contemplate the transmission of this power by means of main lines and branch lines herefrom; the contracts for power being, wherever possible, made for delivery of the power at the main line voltage of 60,000 less line drop.

The Niagara Lockport & Ontario Power Company is a transmission company only; that is, it buys the power to be transmitted and has, therefore, no generating plant of its own. The power for the transmission is generated in the hydraulic power station of the Ontario Power Company, situated on the Canadian side of Niagara Falls. The power house generating units have a capacity of 7,500 kilowatts each, and deliver three-phase, 25-cycle current at 12,000 volts. From the power station the current is taken at 12,000 volts to the transforming and switching station of the Ontario Power Company, located on the bluff above the falls. It is stepped up from

making, as previously mentioned, a maximum transmission of 160 miles.

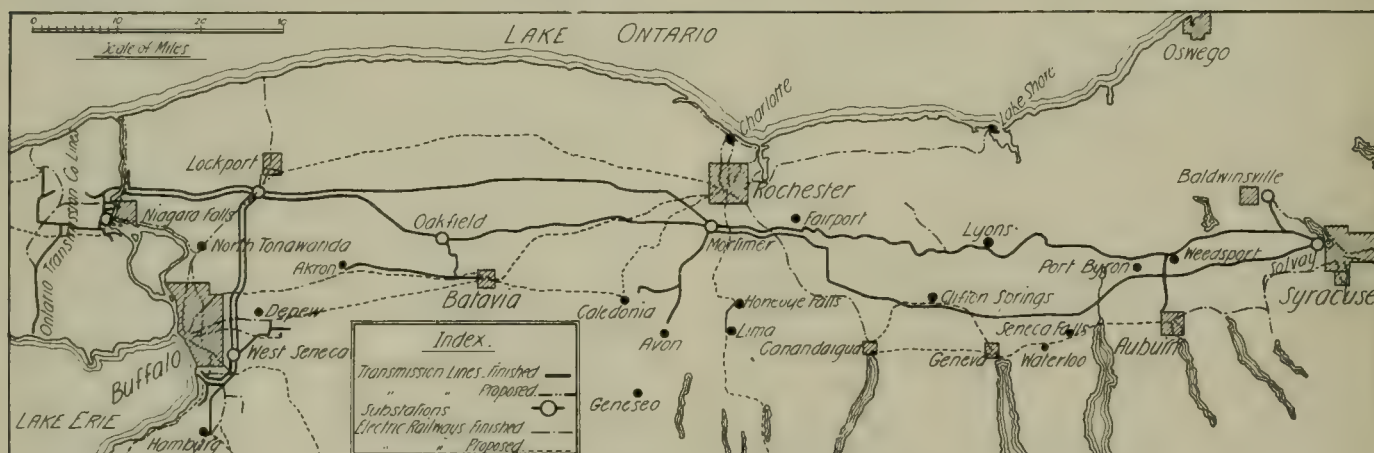
In delivering power in Lockport, in the neighborhood of Buffalo, Rochester, Syracuse and at intermediate points, the company will have transmission circuits in duplicate, each capable of transmitting the full amount of power to be delivered at the several points.

Steel Cantilevers.

As previously stated, the power is brought across the Niagara river, by means of aerial cables spanning the river, and delivery of the power is taken by the transmission company at the international boundary line. The cables are brought across the river in three spans, utilizing steel towers and cantilevers. The steel cantilevers and the river-edge towers are all designed to withstand the most extreme conditions of sleet and wind that will probably ever exist. The requisite mechanical strength of the insulation at the points where the cables are attached to the steel structures is obtained by using a sufficient number of line insulators, and the proper distribution among these insulators of the forces which will come upon them is effected by means of malleable cast-iron caps cemented to the tops of the insulators and to which the cables are fastened.

Poles and Towers.

With the exception of that portion of the main line on the West Shore between Churchville and Syracuse, the main line structures are all steel towers, and the standard line span is 550 feet. On some portions of the transmission line, however, much longer spans are used, the longest at present



Map Showing Routes of Transmission Lines.

12,000 volts to 62,500 volts, and at this latter voltage delivered to the transmission lines. The transmission lines of the Ontario Power Company extend from their transforming station to a point some six miles farther down the Niagara river, at which point the lines connect to circuits spanning the Niagara river. The Niagara Lockport & Ontario Power Company takes delivery of the electric power at the international boundary line in the middle of the Niagara river.

At the present time the Niagara Lockport & Ontario Power Company has in its possession a private right of way 300 feet wide from the Niagara river to the town of Lockport, about sixteen miles east; from Lockport east to Mortimer (six miles south of Rochester), a private right of way 200 feet wide, a distance of about fifty-seven miles; from Mortimer to Fairport a 100-foot private right of way a distance of 10 miles; from Fairport to Syracuse a private right of way 75 feet wide, a distance of 71 miles. From Lockport south, in the direction of Buffalo, the company has a private right of way 100 feet wide. In addition to this the company has the right to install transmission lines on the right of way of the West Shore Railway Company, and has acquired the necessary private right of way to get from its main private right of way to that of the railway company. The locations of the various transmission lines constructed and in contemplation are shown on the accompanying map.

The installation which the company has now in operation was designed for receiving 30,000 horsepower and is delivering this amount, less the line loss. The main transmission consists of two lines in duplicate. The distance from the Niagara river to Syracuse is 154 miles. In addition to this, the transmission from the transforming station of the Ontario Power Company to the Niagara river has a length of about six miles,

installed being 1,253 feet. In some cases these long spans had to be provided with towers heavier than the standard, but in some cases it was possible to put them up with little, if any, modification of the standard tower construction. The main line conductors installed so far are all of them of aluminum cable, except on a portion of the line between Mortimer and Syracuse where, because of the long spans employed, it is preferable to use copper.

The first of the steel towers installed were of the tripod type, made of lap-welded pipe; but the later towers, and those which in the near future will be installed, are of structural shapes and galvanized. The towers are interchangeable; that is, the guyed and unguyed towers are exactly similar except for the guys and double insulators of the former. Contrary to the practice which has heretofore been followed in the matter of steel line towers, the towers of this transmission line are mounted on foundations of reinforced concrete. These foundations are designed to utilize the weight of the earth around them in resisting uplift. The towers and their foundations are capable of withstanding transverse forces which will be brought upon them when the line cables are covered with 0.5 inches of ice all around them and the wind blowing transverse to the line at a velocity of 75 miles an hour. The towers have the same strength in all directions. There are at intervals along the line certain towers guyed both ways in the direction of the transmission line, and having double fixtures.

As stated, on the West Shore right of way it was necessary to use wooden line structures. The type of construction employed is that which has been designated by the company as "A-frame construction." By adopting this type of construction, in which each structure consists of two poles instead of one, it is possible to use twice the length of span that would be used in ordinary wooden pole construction, and employ, therefore, one-half of the number of insulators. The standard length of span of this type of construction is

*Abstract of paper read before the American Institute of Electrical Engineers, Niagara Falls, N. Y., June 26, 1907.

220 feet. On some portions of the West Shore right of way it was necessary to use steel construction, and in such places there were installed galvanized lattice steel poles. The span on these poles is the same as that on the A-frame construction.

Special Foundations.

Where the line crossed the Montezuma marsh steel tower construction was used. The concrete foundations for the steel towers were built by first excavating the swamp through the soft mud until the soft marl was reached. On the marl was laid a platform of two layers of corduroy, and on this platform were built the concrete foundations, the weight of which was made sufficient to take care of any uplift which will come upon the towers. These foundations were installed, some of them, in cold weather and, so far, they have shown no settlement. Where this marsh was crossed with A-frame construction, it was found in places much too expensive to excavate for the proper foundation for the A-frames. The A-frames were, therefore, installed by laying on top of the ground four line poles in two pairs; the poles of one pair being parallel to the line, and the poles of the other pair being at right angles to the line. These poles were spiked together at the point where they cross, and at the point of crossing the A-frame spiked to them; the A-frame being further secured to the poles by braces. On each end of each pair of poles was spiked a box, built up of planking and filled with stone, in order to give sufficient weight to take the uplift due to any pull at the top of the tower. This structure, while far from beautiful, has, so far, proved very satisfactory.

Lightning Arresters.

It will be noted that, in one of the illustrations, there is shown a horn attached to a cap on the top of the insulator



Niagara Transmission Plant—Cable Cantilevers, American Side.

and another horn alongside of it fastened to the structure and extending some distance above the insulator. This comprises a combined line structure lightning arrester or spark gap and lightning rod. It has been decided to make a careful trial of this method of protection of the line before resorting to a grounded cable; partly because of the great expense of the grounded cable, and partly because there is no reason to think, so far, that it will necessarily afford complete protection in every case. For the present these line structure lightning arresters will be installed only on the top cable, in view of the fact that during the last lightning season, in the course of which a number of insulators were broken by lightning, more than three-fourths of the insulators so broken were top insulators.

Insulators.

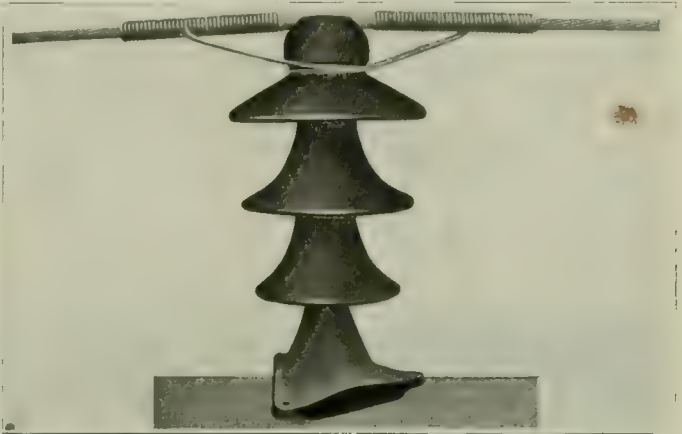
The insulator used on all the main line construction is one especially designed by the writer for this plant. It has probably the greatest factor of safety as regards flashing, etc., of any insulator in practical use today, and is considerably larger and heavier than any insulator of which corresponding use has heretofore been made. It consists of three shells nesting in each other and cemented together by means of neat Portland cement, the whole insulator being cemented in a similar manner to a steel pin before attachment to the tower. The insulator is clearly shown in one of the illustrations. The total height of it from the edge of the lower petticoat to the top of the head is 19 inches. The diameter of the upper petticoat is 14.5 inches.

Fuses and Cables.

Each branch line has in series with it, at the point where it is tapped off the main line, 60,000-volt outdoor fuses to

cut out the line in case of trouble upon it. The fuses consist of lengths of thin copper wire 16 feet long, run through an ordinary small rubber bathroom hose and laid in clips on top of a wooden bar, supported at each end and the center by line insulators mounted on poles. The fuses are parallel to each other, in the same horizontal plane, and the distance from center to center is about 25 feet. These fuses have so far proved very satisfactory, but will probably in time be replaced with fuses of the expulsion type.

There are only three sizes of cables used on the main transmission line. The largest one is an aluminum cable,



Niagara Transmission Plant—60,000-Volt Insulator with Tie and Cable Protection.

consisting of 19 strands, and having a total area of 642,800 circular mils, being equivalent to 400,000 circular mils copper. The areas of cross section of the other cables are respectively two-thirds and one-third that of the largest one.

In ordinary straightaway work, the cables lie in the top groove of the insulator, and the pull of the cable is taken care of by means of two aluminum wire ties around the neck of the insulator. One of these ties extends each way along the cable. The tie itself consists of a single loop around the neck of the insulator, the two ends of the loop being twisted



Niagara Transmission Plant—Making a Joint.

around the line cable. The result is that the cable is not really fastened to the insulator at all, but simply lies in the top groove. The ties do not, therefore, perform any function, except when there is a pull on the cable tending to slide it in the direction of its length. The advantage of such a tie is twofold. First, the full strength of the tie wire is developed, which is not the case if a tie is twisted or "pig-tailed," since, in such case, the tendency is for the tie to cut itself in two at the twist; secondly, the tie does not damage the soft aluminum cable, as would be the case with most of the other ties usually employed.

In special work there is employed a cable clamp with a yoke extending each way on the cable.

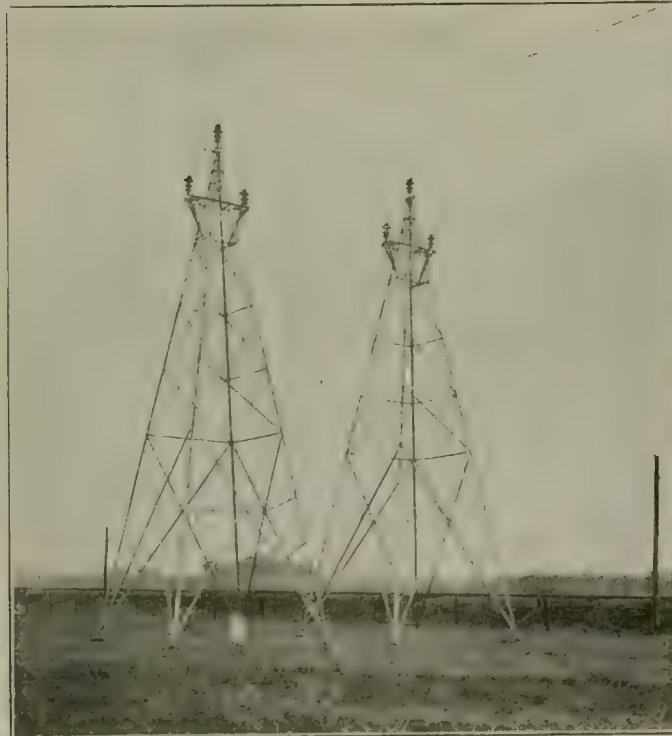
In every case the cable near the insulator is protected from possible arcs, so that in the event of an arc there will

be a chance for the circuit-breaker at the generating station to open before the cable shall have been burned off. This protection is accomplished in the top groove of the insulator



Niagara Transmission Plant—A-Frame Construction Showing Lightning Arrester.

by means of sheet aluminum wrapped around the cable at this point to a thickness of $\frac{1}{8}$ inch, and is accomplished on each side of the head of the insulator to a distance of 12 inches from the head partly by the turns of the tie wire men-



Niagara Transmission Plant—Line Structure Lightning Arrester on Steel Towers.

tioned above, and partly by an additional serving of tie wire. Where, in the case of the use of cable clamps, no tie wire is used, its absence is made up for additional serving.

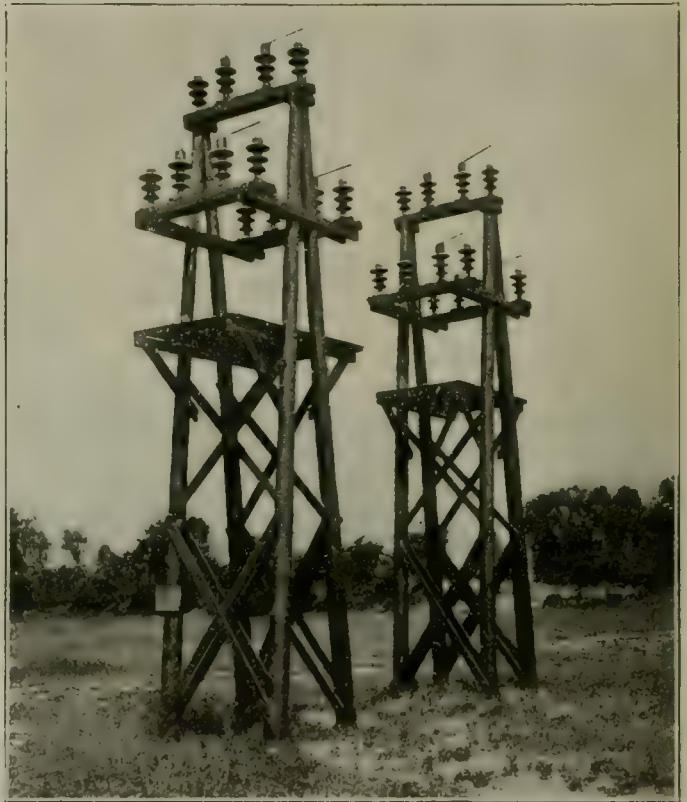
The ends of the line cables are connected by means of twisted sleeve joints.

At intervals along the line there are provided disconnecting switches for sectioning the line to facilitate testing out in case of trouble or cutting out any portion of the line which is damaged. There are also provided cross-connecting switches, enabling the interconnection of different portions of the two lines.

On a considerable portion of the company's right of way is a wagon road, for use in patrolling the line and delivering materials for construction or repair. At certain points along the line there are patrol houses for the storage of material, for taking care of teams and for the comfortable housing of the patrolmen. Each house has in it a sleeping-room, kitchen and sitting-room. On all of the transmission lines, also, the company has a private telephone line on a separate set of wooden poles. Taps from this line are brought into each of the transmission houses, and in addition to this the line patrolmen have portable telephones which can be connected to the telephone line at any point.

Substations.

Most of the contracts which the company has for the supply of power cover the delivery of the same at the main line voltage, so that, so far, the company has installed only



Niagara Transmission Plant—A-Frame Disconnecting Switches.

three substations. Stations at Lockport and Gardenville have each a normal capacity of 3,000 kilowatts, not including the spare apparatus. They are so designed that their capacity can be indefinitely increased. The Baldwinsville station has a capacity of 750 kilowatts.

The 60,000-volt busbars at these substations are out of doors; in other words, these busbars have been treated exactly as if they were part of the transmission line and located out of doors in a manner, so far as insulation is concerned, similar to the transmission line cables. In connection with them are disconnecting switches for making various combinations of the apparatus connected to them. Of course the disconnecting switches are not intended to break the working current. When it is necessary to break the circuit under load, it will be accomplished by means of the 60,000-volt electrically operated oil switches installed in the station which, in the case of the Lockport substation, serve also for the control of the two lines to the Buffalo district.

Another feature out of the ordinary in connection with this station is the lightning arrester equipment. This equipment is also out of doors and consists of a number of horn-type lightning arresters mounted on wooden poles in much the same manner as such arresters are ordinarily mounted.

The installation differs, however, from the ordinary lightning arrester installation of this kind in that, instead of there being only one pair of horns for each line conductor, there are three such pairs. One pair is set for a comparatively low striking electromotive force and has in series with it a high resistance; the next pair is set for a higher striking electromotive force, and has in series with it a lower resistance; a third pair is set for very high striking electromotive force and has in series with it a fuse.

The theory on which these arresters are installed is that for ordinary slight static disturbances in the line the arrester having the lower striking electromotive force will discharge,

lightning season with the protection afforded at the Lockport station, the writer believes this method of protection to be entirely effective in the matter of preventing damage to apparatus in the substation. Such an installation may, in the case of a very severe discharge, such as that due to a direct stroke of lightning, mean a temporary shutdown of the system, or at any rate of the synchronous apparatus operating upon it; but it does not necessarily follow that this will be the case if expulsion fuses be used on the highest gap arrester. Such fuses as have been experimented with in connection with this work operated very satisfactorily. It may be noted in passing that a lightning arrester equipment similar to that just described for substations is installed also at each point where a branch line is taken off of the main line. The other features of this station are very similar to those usually found in such an installation.

There will be installed shortly on the company's system two switching stations, one at Mortimer and one at Syracuse. The one at Syracuse will be for taking care of the two incoming 10,000-horsepower lines and the outgoing lines to the consumers in Syracuse. The one at Mortimer will be for taking care of the two incoming 20,000-horsepower lines and five outgoing lines.

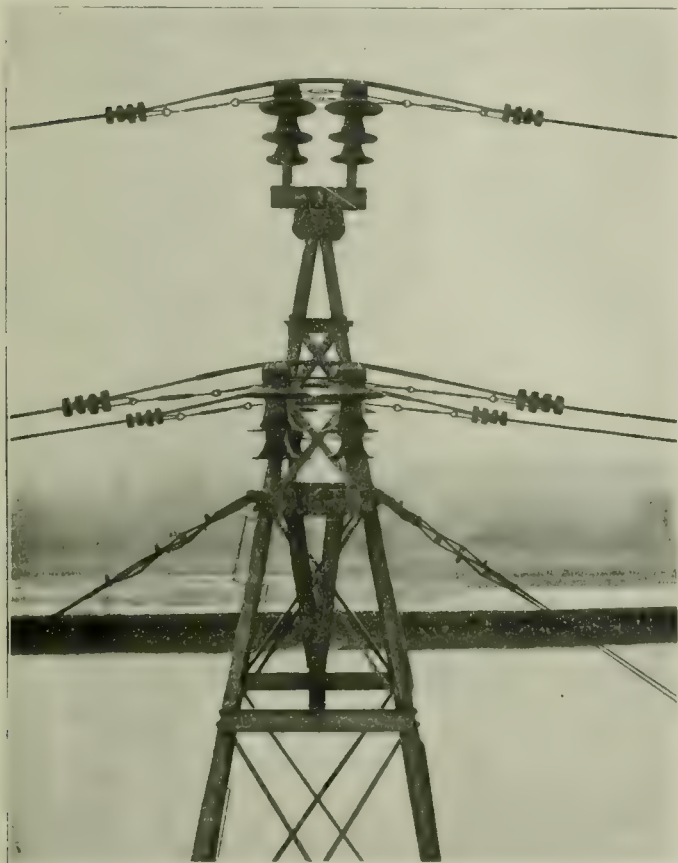
The transmission plant has been built in accordance with the designs of the writer, acting as chief engineer of the Niagara Lockport & Ontario Power Company, and has been constructed under his supervision and that of his assistant in the work, H. L. St. George. The construction work has been done by the Iroquois Construction Company of Buffalo, headed by General Francis V. Greene, president; the construction work itself being directed by F. B. H. Paine, vice-president and chief engineer of the construction company, assisted by Walter S. Skinner and S. Piek.

SETTLING TANKS FOR BOILER FEEDWATER.

The power house of the Auburn & Syracuse Electric Railway, the high-speed line connecting Auburn and Syracuse, N. Y., is located on the Wasco river, about one-fourth mile below the Auburn state prison. The company has experienced a great deal of trouble in its water supply owing to the great amount of prison sewage as well as to the fact that the Wasco river runs through a soft sandstone that crumbles readily and forms a troublesome deposit in the boilers. A recent investigation made by R. P. Stevens, superintendent of the company, revealed the fact that the condition of the water supply, as a result of the two factors mentioned, was very much worse than had been realized, and it was decided to adopt some measure of relief.

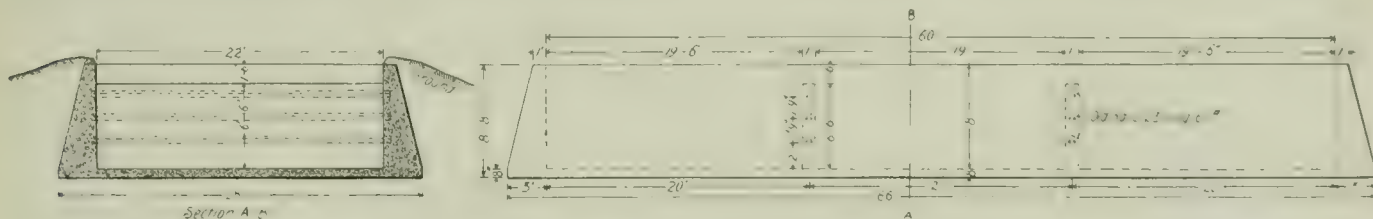
The overflow from the surface condensers is about 10,000 gallons a day, and as this water has passed through a screen and had the advantage of being heated and cooled, it is suitable for boiler use. Mr. Stevens has adopted the plan of providing a concrete reservoir for settling out the impurities. This reservoir has inside dimensions of 28 feet by 66 feet, and consists of a bottom of concrete 8 inches thick with side walls 3 feet thick at the base and 1 foot thick at the top.

The reservoir is divided into three 20-foot sections by



Niagara Transmission Plant—Top of Double-Guyed Steel Tower.

and since it has in series with it a comparatively high resistance, the resultant disturbance to the system due to the generated current which follows the discharge will be comparatively slight. A more severe static disturbance (whether due to lightning or to any other source) will cause both the arrester having the lowest gap and the arrester having the next higher gap to discharge simultaneously, thus affording



Details of Settling Tanks for Boiler Feedwater.

two discharge paths to earth, the combined resistance and inductance of which is considerably lower than that of the first path. This will mean a somewhat more severe disturbing effect on the system due to the generated current which follows. In the case of a very extreme condition, for instance, a direct lightning stroke on the line, the three arresters would discharge simultaneously the fuse, in the case of the arrester with the highest air gap, blowing and interrupting the arc upon it, the disturbance of the circuit finally ending upon the other two arresters. Judging from experience in the case of other plants with a much less elaborate arrangement than that outlined, and the experience during the last

transverse partition walls of concrete, 1 foot thick, rising to within 1 foot 6 inches of the top of the reservoir. Each of these partitions is reinforced with three 60-pound old rails. The overflow from Section 1 does not occur until the sediment in the water has had opportunity to settle, and by the time this process has been repeated in the second compartment it is expected that the water will be in good condition for boiler use. It is also planned to connect the station rain pipes with the reservoir, so as to secure for boiler use the rainfall on the roof.

News of the Week

Electrical Show at New York.

Announcement has been made of the annual electrical show, which will be held in Madison Square Garden, New York, September 30 to October 9, inclusive. This exposition has for its chief aim the enlargement and upbuilding of the electrical trade in all its branches. It will provide a medium for the display of new developments and advancements in electricity and help to familiarize the public with the countless appliances producing electricity for the daily use of mankind. The headquarters of the Electrical Show (Inc.) are at 116 Nassau street, New York.

Central Electric Accounting Conference Meeting.

The third meeting of the Central Electric Accounting Conference was held on July 13 at Overlook park, West Milton, O., on the Dayton Covington & Piqua Traction Company. A special car was furnished by that company for the purpose of carrying the members of the conference from Dayton to West Milton. E. C. Spring, the general manager of the company, tendered the use of the club house at Overlook park to the conference and entertained the members in his usual lavish style.

The committee on uniform blanks, which was appointed at the Indianapolis meeting, reported that it was unable to agree on uniform interline waybills and report blanks, and the matter was considered by the conference, with the result that it was found to be impossible to secure unanimous action by the lines interested. Certain details covering interline billing were arranged between the lines which could agree on uniform blanks, and it was decided that interline billing should be discontinued with those lines which were unwilling to change their form of billing. As representatives of the traffic departments of all the lines were present, there was a full discussion of the question.

Mr. Spring addressed the conference on the importance of working in harmony with the Central Electric Railway Association, and invited the conference to hold its next meeting at Columbus, O., at the time of the next regular meeting of the railway association. The conference, therefore, decided to hold its next meeting in Columbus on September 25.

The thanks of the conference were tendered to Mr. Spring and to M. M. Smith, auditor of the Dayton Covington & Piqua Traction Company, for the courtesies extended.

Low Fare Road on Euclid Avenue, Cleveland.

Three judges of the circuit court upheld at Cleveland on July 12 the constitutionality of the law requiring consents of property owners in the Low Fare Company case. This decision barred the company from Central and Quincy avenues. In the decision the court said: "A street railway franchise, carved out of the sovereignty of the state, is not a thing to be played with, in the courts or out of them. We are of the opinion that the municipality was without authority to grant the Low Fare Company franchise, with or without consents. It undertakes to grant to the Low Fare Company not only the right to use the tracks of the Forest City Company, but to pre-empt the right of way to the exclusion of the Forest City Company's tracks. The Forest City Company grant included the right to make traffic arrangements with other companies. Its right to sell or assign cannot be violated, either by the city or the property owners. An ordinance which assumes the contrary is void, as a violation of the obligations of contract."

On the night of July 15 the Low Fare Company connected its East Fourteenth street line with the Euclid avenue line of the Cleveland Electric Railway. Acting under the orders of Mayor Johnson, policemen compelled the Cleveland Electric Company cars to use the Prospect avenue route until the connection had been made.

The Cleveland Electric Railway has applied for an injunction to restrain the Low Fare Company from operating its cars on Euclid avenue, between the public square and East Fourteenth street. In its application the company makes the charge that there is a conspiracy between Mayor Johnson and the railway companies in which he is interested to use the city's power to obtain franchises for individual interest. The action of the city and the traction companies is characterized as an abuse of corporate power of the city, and the court is asked to enjoin any and all action authorized by any ordinances passed in the entire history of the city's attack for the Forest City Railway, the Municipal Traction Company or the Low Fare Railway.

W. B. Colver, president of the Low Fare Company, has made a tender to the Cleveland Electric Railway of parts of the amount fixed by the council, \$63,100, for the joint use of

the tracks on Euclid avenue. President H. E. Andrews of the Cleveland Electric Railway says that he is confident that the franchise granting the Low Fare Company joint use of the tracks owned by the Cleveland company on Euclid avenue is unconstitutional.

Information Regarding Insurance.

The committee on insurance of the American Street and Interurban Railway Association has addressed its data sheet No. 17 to the managers of electric railway properties asking for the following information:

"A—Data covering the years 1901 to 1907, inclusive, relative to the cost of fire insurance, showing the amount of insurance carried, the amount of premiums paid, the average rate per \$100 of insurance, the amount of losses sustained and the amount recovered from insurance companies. In future years the data will be collected annually, so that such information will hereafter be available at all times by applying to the office of the secretary of the association.

"B—A standard form for the use of member companies in making contracts for insurance. By 'form' we do not mean the ordinary printed form of policy, such as the 'standard policy of the state of New York,' but a written, typewritten or printed description of the particular property insured. In order to enable the committee to prepare such a form you are respectfully requested to send to the secretary of the association, as soon as possible, copies of the various forms now used by your company. All such forms received will be given careful consideration by the committee in the preparation of the standard form.

"C—Statistics showing origins of fires, causes of fires in various years, physical conditions of the properties at the time of fire and at present, whether or not insurance is carried on all properties, precautions against fires in the way of protective devices and instructions to employees, and the advantages and disadvantages incident to the use of automatic sprinklers."

To the end that the committee may be in a position to render a complete and valuable report covering these various questions members are requested to have the data sheet submitted with the circular carefully filled out and to return it promptly to Bernard V. Swenson, secretary of the association.

Commission to Investigate Interborough-Metropolitan and Brooklyn Rapid Transit Companies.

A resolution providing for an investigation of the Interborough-Metropolitan Company and the Brooklyn Rapid Transit Company was passed by the public service commission, first district, on July 18. It is intended to consider the financial position of the companies, the service, the relations with the underlying roads and the question of monopoly.

The public service commission of the first district, New York, will hold a hearing on July 23, at which suggestions will be received for the improvement of traffic conditions on the Brooklyn bridge. Commissioner Edward Bassett, who was one of the committee which investigated the congestion at the bridge, announced that there was no need of any testimony as to the existence of the crush.

He also wanted to make it clear that the commission has no authority over the bridge, which, with its approaches and terminals, is city property.

"The commission," said Mr. Bassett, "has certain powers regarding the movement of cars, and may, possibly, act with the city authorities in a certain advisory capacity. But there is no possible use in extending the scope of the hearing beyond matters which are clearly within the commission's powers."

When the committee investigated the congestion at the bridge on July 11 Commissioner John E. Eustis declared that more policemen should be delegated to that point to prevent accidents, and Mr. Bassett expressed the opinion that greater use should be made of the Williamsburg bridge.

Eight engineers, under the direction of George F. Simpson, were stationed at the approaches to the Brooklyn and Williamsburg bridges at rush hours for several days to keep records of the time of arrival and departure of cars and the number of passengers carried.

Commissioner William McCarroll, chairman of the committee on the Fourth avenue (Brooklyn) subway, reported that the forms of contract for five of the 14 sections of this route were completed and ready for distribution. The sections are as follows: Sackett to Tenth street, Tenth street to Twenty-seventh street, Twenty-seventh street to Forty-first street, Flatbush avenue extension, Nassau to Willoughby street, Willoughby street to Ashland place. A hearing on this form of contract will be held on July 30, instead of on July 25, the date fixed by the old rapid transit board. This route will extend from Chrystie street in Manhattan, across the Manhattan bridge, now being built, and under Fourth avenue and other streets in Brooklyn, with four tracks, to Fortieth street and Fourth avenue. From this point a branch

with two tracks is to be run to Ft. Hamilton, and another with two tracks to Coney Island. The total cost is estimated at \$23,000,000.

A communication was received from Louis Arnold, secretary of the Atlantic Avenue and Brooklyn Improvement Association, protesting against the erection of a monorail railroad through Atlantic avenue.

A letter from Bridge Commissioner Stevenson relating to the traffic problems over the East river bridges has been presented to the commission.

In discussing the question of a double fare to Coney Island Commissioner Bassett said that the commission has the power to deal with the problem. He said:

"If citizens are legally and legitimately entitled to a trip to the island for one fare they should certainly have it. If, on the other hand, the one fare rate would work a hardship on the road and would not be a fair remuneration, the people should know this and learn definitely what they can count upon."

W. T. Hornaday, director of the zoological garden in Bronx park, sent a protest against the proposed terminal station at One Hundred and Eighty-second street on the West Farms extension of the elevated structure of the subway. The station is now at One Hundred and Eightieth street.

Chief Engineer Rice made a favorable report on the request of the Taxpayers' Alliance of the Bronx for either an elevator or an escalator at the One Hundred and Seventy-seventh street station of the subway. He said the change would not cost more than \$30,000.

The Allied Boards of Trade and Taxpayers' Associations of Brooklyn sent a letter to the board urging the members to hasten the construction of the subway loops in Manhattan and Brooklyn. The letter also asked the commission to give early attention to the elevated loops of the Williamsburg and Brooklyn bridges.

Secretary Whitney of the commission has written to the New York City Railway, asking about the reported cutting off of the Seventh avenue line service to the Brooklyn bridge. Oren Root, Jr., general manager of the company, said that the service was discontinued because the line had failed to relieve the conditions for which it was established. By abolishing it, Mr. Root said, the company would be able to operate more cars on the Sixth and Amsterdam avenue line and on the Twenty-third street crosstown line.

The Citizens' Union has sent a letter to the commission outlining its suggestions as to future subways.

In compliance with the request of the commission, the Long Island Railroad has submitted forms of its accounts, and has requested further information as to what is desired. Other companies have informed the commission that they will forward the data asked for within a few days.

Chairman Frank W. Stevens of the public service commission of the second district states that under Section 33 of the new public service law, municipalities may obtain free transportation for policemen and firemen while on duty.

Wisconsin Bill Signed.—Governor Davidson of Wisconsin has signed the bill providing for indeterminate franchises for street railways.

City Club on Subway Trains.—Experts of the City Club, New York, have reported that the subway is not being used to its full capacity in rush hours.

Indianapolis Crawfordsville & Western Line Opened.—The first cars were operated over this new line between Indianapolis and Crawfordsville, Ind., on July 4 and regular service has since been instituted.

Increase in Fare.—The New Jersey & Pennsylvania Traction Company has increased the fare from Trenton to Taylorsville from 10 to 15 cents. Charles M. Bates, the president, said that the increase is due to the general advance in the cost of operation and maintenance.

Colorado Light Power and Railway Association.—We are advised by J. F. Dostal, secretary and treasurer, that the fifth annual convention of the Colorado Light Power and Railway Association will be held at the Savoy hotel, Denver, Colo., on September 18, 19 and 20.

Michigan Electrical Association to Meet.—The annual convention of the Michigan Electrical Association will be held at Battle Creek, Mich., on August 21, 22 and 23. The headquarters will be at Post Tavern, and the meetings will be held in the rooms of the Business Men's Association.

Accident on the New York Elevated.—By the crashing of a southbound train into the rear of a train standing at the platform at One Hundred and Fourth street on the Third Avenue Elevated Railroad forty persons were seriously injured, two of whom possibly may die. Both of the trains were crowded with passengers, most of whom were Italians return-

ing home from a celebration. The windows in both trains were broken and the framework of the rear car of the standing train and the front car of the southbound train were badly damaged.

Asks T-Rails in Detroit.—The Detroit United Railway has proposed to the city of Detroit that it be permitted to use T-rails on Jefferson avenue instead of grooved rails, on condition that if the new rails prove unsatisfactory to the public after a trial of 30 days the company will take them out.

Beaver Park.—The Interurban Railway Company of Des Moines, Ia., is building an amusement resort at Beaver Park and has let a contract for an artificial lagoon and a dam 120 feet long by 8 feet high. The lagoon will be four feet deep and will extend around a wooded tract comprising about five acres. Facilities for boating and bathing will be provided.

Anti-Pass Law in Texas.—An opinion has been rendered by William E. Hawkins, assistant attorney-general of Texas, that chartered street railway companies are included in the provisions of the anti-pass law which went into effect on July 11, but that firemen and policemen are exempt from its application in cities where the city government has made legal provision for free rides for employees of those classes.

Parades Not to Stop Toronto Cars.—R. J. Fleming, manager of the Toronto Railway Company, has issued an order notifying motormen and conductors that they must bear in mind at all times that cars have the right of way over other traffic. If obstruction is offered by any one in connection with a parade or procession the employees are instructed to secure the name of the person and of witnesses and to make a full report to the office.

Attacks Interborough-Metropolitan Merger.—On July 11 Attorney-General Jackson obtained from Justice Platzeck in the supreme court at New York an order directing the Interborough-Metropolitan company to show cause why a suit should not be brought by the state to vacate the company's charter, annul the merger and enjoin the company's officers and directors from doing anything that will contribute to the maintenance of a monopoly.

Illinois Traction System Buys Coal Lands.—The properties of the Kerens-Donnewald Coal Company at Warden, Ill., have been purchased in the interest of the Illinois Traction System. The coal company owns 1,200 acres of coal land near Edwardsville. The land is crossed by the Illinois Traction Company. The traction company will secure its coal from this land, and the output of the mine will be increased to meet the requirements of the various power plants.

Proposed Interchangeable Mileage Agreement in Iowa.—It is stated that the interurban railway companies of Iowa have practically perfected an agreement to issue interchangeable mileage books good on all electric lines in the state. The details of the agreement have not been announced, but it is understood that an organization will be conducted similar to the Western Passenger Association, which acts as a clearing house for the interchangeable credential books that have been issued for years by western steam roads. Traveling men who cover the entire state would thus be enabled to buy a mileage book and get a rate of 1½ cents per mile over electric lines at many points, instead of paying 2 cents on the steam roads.

New Company Takes Over Trolley Express Business in Massachusetts.—The new company incorporated two weeks ago to take over the express business of the Massachusetts electric railways controlled by the New York New Haven & Hartford interests, began operation on the Springfield lines on July 15. It is announced that as soon as the business is well established on this division, the service later will be extended over the lines in the Worcester and Berkshire districts. The Electric Express Company is the name of the new company and its officers are practically the same as those of the New England Investment & Securities Company, which is the holding corporation for the New Haven's Massachusetts electric lines.

Court Review of Tax Assessment of Brooklyn Companies.—Justice Platzeck of the supreme court of New York has issued writs of certiorari directing the state board of tax commissioners to show cause on August 25 why the tax assessment against the companies comprising the Brooklyn Rapid Transit system should not be reduced. A statement to the board of tax commissioners made by Col. T. S. Williams, vice-president, was published in the Electric Railway Review of March 30, 1907. This statement showed an increase in the assessment over last year of \$20,905,000, or 54.26 per cent. At last year's rate the total burden of taxation would be \$3,632,356, or 18.69 per cent of the gross earnings of the company. This, as stated by Mr. Williams, would amount to 61.09 of the net earnings, including in expenses only the taxes paid and charged.

Construction News

FRANCHISES.

Annapolis, Md.—The Washington Baltimore & Annapolis Electric Railway has agreed to accept the ordinance passed by the council.

Anniston, Ala.—An ordinance is now pending before the city council granting a franchise to the Anniston & Columbus Railway Company for the building and operation of its line in and through Anniston.

Ashland, N. Y.—The Elmira Corning & Waverly Railroad Company, Waverly, N. Y., has applied for a franchise to operate its interurban line through this village. It is stated that with the granting of this permit practically all of the necessary franchises have been secured by this company for the operation of its line in Steuben, Tioga and Greene counties.

Centralia, Wash.—The city council has granted a 50-year franchise to the Centralia-Chehalis Electric Railway & Power Company, which will build a line between Centralia and Chehalis, Wash. Work is to be commenced within three months and be completed within one year. The acceptance of the franchise is contingent upon the action of the Chehalis council, before which a similar franchise is pending.

Chico, Cal.—The Northern Electric Company's recent application for the sale of a franchise to build an extension to the present city and suburban lines in Chico, has been received by the board of supervisors. The franchise will be sold on August 10.

Chicopee, Mass.—The Springfield Street Railway Company has petitioned for permission to double-track Center street, in order to facilitate handling the passenger traffic now served by a single-track line.

Frederick, Md.—The Brunswick & Middletown Railway Company has been granted a franchise to operate its line through this city. The road will be built from Brunswick to Middletown, intersecting the Frederick & Middletown line at the latter point.

Greeley, Colo.—J. Granger, representing California interests, has applied to the county commissioners for permission to build an electric line from Greeley to Denver and into the farming country near Estes park.

Lorain, O.—The South Lorain & Eastern Traction Company, recently organized, has applied to the commissioners of Lorain county, Ohio, for a franchise for an electric railway from the Lorain-Cuyahoga county line to Cleveland, using the tracks of the Cleveland Southwestern & Columbus Railway to enter the city. The company has already secured a franchise in Lorain, conditional upon the consent of the county commissioners. Rev. A. B. Stuber of Avon is president and D. T. Miller of Cleveland is secretary.

Mayfield, Ky.—The Paducah Southern Electric Railroad, incorporated last spring to build an electric railroad from Paducah to Hickman, Ky., by way of Mayfield and Fulton, Ky., and Union, Tenn., has secured a franchise for operating its interurban line in Mayfield. A line from Paducah to Cairo, Ill., which will haul freight in connection with its passenger trains, is also contemplated. W. A. Martin, president; H. H. Loving, secretary, Paducah, Ky.

Omaha, Neb.—Application has been made by Shimer & Chase of this city for a franchise to build an electric railway from the end of the West Q street line to Seymour park, which this company proposes to develop. The line will be single-track with the power house at the west terminal. It is planned later to double-track the line and possibly build other electric roads into the city. It is announced that preliminary work will be started this fall.

Richmond, Ind.—An ordinance has been introduced in the city council attacking the franchise of the Richmond Traction Company on the ground that it has not made certain changes desired by the city authorities.

Saltillo, Mexico.—A concession has been granted to Guillermo Velasco and Rodolfo Garza of Saltillo for the construction and operation of an electric street railway in this city. Since abolishing the mule-car service several years ago, Saltillo's passenger traffic has been cared for entirely by public coaches.

San Diego, Cal.—The Point Loma Electric Railway Company has secured a franchise for the operation of a loop line from Roseville to Ocean Beach.

Terre Haute, Ind.—The 50-year franchise recently applied for by the Terre Haute & Merom Traction Company to operate its interurban line in Vigo county, has been granted by the county commissioners. Any motive power except steam may be used. Work must begin by May, 1908, and the line must be completed and in operation between Terre Haute and the south line of the county not later than January 1, 1909.

Toledo, O.—The city council committee on railways and telegraphs will grant a perpetual franchise to the Lima & Toledo Traction Company, which wishes to enter Toledo from the south near where its right of way parallels the Toledo St. Louis & Western Railroad, provided it will agree not to cross the streets of Toledo at grade. A subcommittee will be appointed to draft a new franchise providing for an elevated or subway line and stations at South street, Western avenue and the boulevard.

Waynesburg, Pa.—Application for a franchise to operate a line through this city has been made to the town council by the Brownsville Carmichael & Waynesburg Street Railway.

Winfield, Kan.—C. L. Brisner of Harrisburg, Pa., has applied for a franchise to operate an electric street railway in this city. This will be part of an electric interurban railway between Winfield and Arkansas City, which it is understood is financed by D. H. Siggins, Warren, Pa., and other eastern capitalists.

RECENT INCORPORATIONS.

Interurban Electric Railroad, Reno, Nev.—Incorporated in Nevada with a capital stock of \$100,000. Of this amount \$7,000 has been subscribed by Walter Wright, Louis Berrun, J. L. Robinson, O. M. Clifford, George W. Perkins, John Guilding and W. F. Webster.

Madison County Interurban Belt Railway, Highland, Ill.—Incorporated in Illinois to build an interurban line from Staunton, Macoupin county, to New Douglas, south to Grand Fork and Highland, west to St. Jacob's, southwesterly to Troy, and west to Collinsville, Madison county. Capital stock, \$25,000. Incorporators: W. P. Wall, John Bardilla, John Gehrig, John Wildi and J. L. Rhein.

Milner & North Side Electric Railway, Milner, Idaho.—Incorporated in Idaho to build a 50-mile electric line from Milner to Jerome, and later to Gooding, Idaho, on the main line of the Oregon Short Line. The steel has been contracted for and grading is to be begun in about two weeks. The steel bridge across the Snake river has arrived and will be placed in position a short distance below the traffic bridge. Power will be secured from Shoshone Falls.

Tennessee-Georgia Interurban Railway, Chattanooga, Tenn.—Incorporated in Georgia to build an interurban electric railway from Rossville to Catoosa Springs, Ga. This will be the first step in an important interurban system to connect Chattanooga with Atlanta, Knoxville, Nashville and other cities in this section. Franchises for the operation of the line through various streets in Chattanooga have been applied for which, if granted, will afford connection with the east and west sides, give a north and south line through the city and connect practically every suburb with the city. It is stated that a line will be built later to the foot of Missionary Ridge, where the proposed Missionary Ridge tunnel will be utilized, provided a franchise can be secured from the county commissioners. Capital stock, \$500,000. Incorporators: James C. Bryan, James Jones, Walter E. Biggers, J. T. Robinson, J. W. Clark, W. E. Mann, M. W. Murphy of Catoosa county; S. W. Divine of Walker county; and W. H. Payne of Chattanooga, Tenn.

TRACK AND ROADWAY.

Albia Interurban Railway, Albia, Ia.—J. P. Reese, president of this company, writes that surveys have been made and that grading is now in progress on its 4¼-mile interurban electric line between Albia and Hocking, Ia. Power for the operation of the line will be furnished by the Albia Electric Light & Power Company at 500 volts pressure. The Engineering Construction & Securities Company, Chicago, Ill., is building the road. J. P. Reese, president; C. A. Ross, vice-president; Calvin Manning, secretary and treasurer, Albia, Ia.

Americus (Ga.) Street Railway.—Philadelphia capitalists are reported to have agreed to furnish funds for construction of this road, for which a franchise was obtained recently.

American Motor Car Interurban Railway, Marion, Ia.—This company will use the E. J. Christie system of self-propelled motor cars on its proposed interurban line from Waterloo to Muscatine, Ia., as well as on the intersecting

line to be built from Independence through Urbana, Vinton and Keystone to Belle Plaine, a total of 210 miles. E. J. Christie, Marion, Ia., is president of the company, which was incorporated recently with \$5,000,000 capital stock.

Amarillo (Tex.) Street Railway.—This company, as announced in a previous issue, will build a 7-mile electric line in Amarillo. Sixty-pound rails will be used. The rolling stock equipment has been purchased from the Danville (Ill.) Car Company. The General Electric Company will supply all the electrical machinery and overhead work. Hamilton-Corliss engines and boilers have been ordered. H. C. Noble, president, Amarillo; S. D. Wharton, vice-president; John K. Shireman, secretary; J. C. Pane, treasurer. W. R. Hall, Decatur, Ala., is the chief engineer.

Atlanta & Carolina Construction Company, Atlanta, Ga.—It is announced that surveys for an electric line to connect Atlanta and Augusta, Ga., are now under way and that work on the construction of the line will be started on October 1. The route as announced by Matthew Mason, engineer in charge of the surveys, is as follows: From Atlanta through Lithonia, Conyers, Monroe, Athens and Washington to Augusta. The company already has secured a franchise on Confederate avenue, a portion of Boulevard and Glenwood avenue, and also on Alabama and Broad streets. It is the intention to have the entire line completed within the next two years. The company is said to have a capital stock of \$5,000,000, a large part of which has been subscribed in Atlanta. James W. English, Sr., president; Matthew Mason, vice-president and general manager; M. Y. Edgerton, secretary.

Auburn & Northern Electric Railroad, Syracuse, N. Y.—This company is stated to have filed certificates of extension of its line, to begin at the intersection of State and West Genesee streets, in Auburn, and continue westward to the city limits, thence through the towns of Aurelius to the Cayuga county line, a distance of approximately nine miles. The road is then to cross the Cayuga and Seneca canal and Cayuga lake and go westerly to the village of Seneca Falls, a distance of 2.44 miles. T. H. Mather, chief engineer.

Bakersfield & Ventura Railway, Bakersfield, Cal.—It is reported that this company will let contracts for the grading and bridges on its proposed extensions early this fall. One branch will extend from Bakersfield to Sunset, one from Santicoy south to Hueneme on the coast, and one from Santa Paula to Santa Monica and east to Los Angeles, a total of 420 miles. H. M. Russell, general manager, Los Angeles, Cal.

Baltimore Halethorpe & Elk Ridge Electric Railway.—A right of way from a connection with the United Railways & Electric Company of Baltimore to Halethorpe is reported to have been secured.

Bridgeport & Danbury Electric Railway, Bridgeport, Conn.—We are officially advised that this company, recently granted a charter by the Connecticut legislature, proposes to build an electric railway from Bridgeport to Danbury, Conn., 22 miles, via Trumbull, Long Hill, Botsford, Newtown, Sandy Hook, Stepney and Bethel. The company's charter also provides for an extension to New Milford and allows the company to engage in electric lighting. It is proposed to build a high-speed road for freight and passenger service. Bridgeport has a population of over 100,000, Danbury about 30,000 and the territory between about 15,000. President, John T. King, Bridgeport; chief engineer, R. M. Sperry, New Haven.

Bristol & Plainville Tramway Company, Bristol, Conn.—Plans for an extension from Terryville have been approved by the railroad commission.

Buffalo & Lake Erie Traction Company.—The route of this company's line from Silver Creek to Dunkirk, N. Y., has been decided upon, and it is stated that work on the construction of the road will be started at once. Just after entering Dunkirk the main line will connect with the belt line and through the city operate its cars over the belt line and the Dunkirk & Fredonia lines. It is understood that building operations for a continuous electric road from Buffalo to Erie will be begun shortly.

Canyon City Pueblo & La Junta Railway & Power Company, Pueblo, Colo.—The work of making preliminary surveys for this proposed road, the incorporation of which was announced in our issue of last week, will be started within the next few days. Andrew J. Behymer, general manager, Pueblo.

Capital Circuit Traction Company.—This company, which is preparing to commence the construction of a belt traction line around Indianapolis, running through the county seats of the seven adjacent counties, announced that it has arranged for the financing of the road and that the work of grading will begin at once.

Charleston Westfield Marshall & Terre Haute Interurban

Railroad, Marshall, Ill.—We are officially advised that this company, recently incorporated to build from Charleston, Ill., to the Indiana state line, via Westfield, has elected the following officers: President, W. R. Patten; vice-president, James Dawson; secretary, Seymour Hurst; treasurer, W. L. Biggs.

Chattanooga Railways Company.—It is reported that a new extension may be built to Hill City.

Chicago Lake Shore & South Bend Electric Railroad.—President J. B. Hanna, Peter Meyn of Hammond and others went over the line between Crown Point and Cedar Lake on an inspection tour on July 13. The construction of a road between these points seems to be no longer in doubt. Mr. Hanna says that \$500,000 will be spent in the establishment of a pleasure park at Cedar Lake.

Cincinnati (O.) Traction Company.—This company is planning to change the route of its Highland avenue line by laying tracks over McGregor avenue, from its present route to Reading road, and switching from there to the present Avondale car route reaching the city. The change is contingent only upon the consent of McGregor property owners, members of the board of public service having signified their approval.

Consolidated Railway Company.—Additional double-track has been completed at Norwich, Conn. Heavier rails have been laid near Taftville, Conn.

Defiance Paulding & Ft. Wayne Railway.—It is reported that this company has been organized to build an electric railway from Defiance, O., to Ft. Wayne, Ind., and that it has secured an 8-mile section of the old Wabash & Erie canal as right of way. A branch is to be built from Tate's Landing to Paulding, O.

Edmonton (Alberta) Electric Railway.—City authorities estimate that this municipal road will be completed by September, 1908. The total cost is estimated at \$340,000.

Evansville Princeton & Vincennes Interurban Railway, Princeton, Ind.—The new cut-off at Maidlow has been finished. Grading on the new line from Bauer to Evansville has been completed and tracklaying is under way.

Ft. Scott (Kan.) Gas & Electric Company.—This company will build several blocks of additional track south of Fern Lake park in order to form a loop for the line to that point.

Ft. Wayne & Wabash Valley Traction Company.—It has been decided to establish an amusement park at Falling Springs, a few miles north of Delphi.

Ft. Worth, Tex.—Gid R. Turner is quoted at Ft. Worth as saying that arrangements are being perfected rapidly for construction of a road from that city to Mineral Wells, Tex.

Franklin, Ia.—A meeting was held on July 6 to consider the projected electric railway from Columbus Junction to Keokuk, and to take steps to have the route pass through Franklin. George Vogt was chairman of the meeting.

Hattiesburg (Miss.) Traction Company.—It is announced that cars and poles have been ordered and that five miles of road will be in operation within 60 days.

Huntsville (Ala.) Railway Light & Power Company.—The Business Men's Club has requested this company to build an extension to the fair grounds.

Illinois Traction Company, Champaign, Ill.—L. E. Fischer, general manager, writes that there is no truth in the report that this company proposes to build an electric railway from St. Louis east to Effingham and Vandalia, Ill.

Indianapolis Columbus & Southern Traction Company, Columbus, Ind.—Ballasting is under way between Columbus and Seymour. About one mile of the distance between these two points is still to be graded.

Interborough-Metropolitan Company, New York.—The electrification of the First avenue surface line was begun on July 10. An official statement says: "Work was begun on the electrification of the First avenue line from the Harlem river to Fifty-ninth street."

Joliet, Ill.—A new high-speed electric line connecting Joliet with Chicago is a project reported to be under consideration by Chicago capitalists and interests identified with the Joliet Plainfield & Aurora Railroad. Right of way is being secured for the continuation of the line from New Lenox to Chicago, where it is announced it will enter the business district over the tracks of the South Side Elevated Railroad. It is said that business interests of Aurora, Ill., also are now endeavoring to secure entrance of the new line into that city.

Kenosha (Wis.) Electric Railway.—Suits have been filed in the district court against A. C. Frost and the Kenosha Electric Railway by property owners in Kenosha, to stop the

further extensions of the line in that city. The complaint states that the city council had no authority to grant the franchise under which the company is making the extensions and that the tracks are being laid in such a way as to interfere with the rights of the property owners.

Lehigh Valley Transit Company.—It is announced that a 5-year agreement has been reached between this company and the Philadelphia Rapid Transit Company, whereby cars of the Lehigh Valley from Allentown and Bethlehem will have their terminal at the Philadelphia Rapid Transit station at Chestnut Hill, instead of in front of the Wheel Pump hotel, as at present. By this arrangement the transfer of passengers will be greatly facilitated.

Lockeford, Cal.—The chamber of commerce is urging the construction of an electric railway. A public meeting was held recently to discuss the project and many citizens of Lodi and other near-by places were present.

Lorraine (Md.) Electric Railway.—This company is building a road $1\frac{1}{2}$ miles long from a connection with the United Railways & Electric Company at Dickeyville to Lorraine cemetery. It is controlled by the cemetery interests and will be operated by the United company.

Mankato Electric Traction Company, Mankato, Minn.—We are officially advised that the grading on this company's local 5-mile line in Mankato will be started on July 15. The interurban extensions will be begun next year. The trolley wire will be supported by span construction, and power will be purchased. The Knox Engineering Company, Fisher building, Chicago, has the contract for the work. W. L. Hixon, Mankato, is president; W. D. Willard, secretary and treasurer.

Metropolitan Street Railway Company, Kansas City, Mo.—The Columbia Construction Company of Milwaukee, Wis., has received a contract for the construction of about two miles of single track for this company for the extension of the Prospect avenue line from Thirty-first street to Thirty-ninth street, this being one of the series of contracts which this company has had from the Metropolitan during the past nine years. This spring the company completed the construction of the Twelfth street cable line and the reconstruction of the west end of the Minnesota avenue cable line, both into electric lines. All of the track construction of the Metropolitan Street Railway is now being built with 100-pound A. S. C. E. rail, in 60-foot lengths, as standard, spiked to white oak ties, laid on a foundation of six inches of crushed rock. Wherever the streets are paved the tracks and right of way are also paved with the same paving as is used in the street. In the case of Prospect avenue the paving foundation consists of 6 $\frac{3}{4}$ inches of Portland cement concrete, on top of which is placed 3 inches of asphalt, with brick toothing block laid next to the rail as headers.

Michigan United Railways, Lansing, Mich.—T. W. Atwood of the Northern Construction Company, organized to build the new line from Lansing to Jackson for the Michigan United Railways, is quoted as saying that if satisfactory arrangements can be made at Mason the road will be built and in operation by December 1.

Middle Georgia Interurban Railway.—It is proposed to form this company with \$200,000 capital stock in the beginning to build an electric railway connecting Griffin, Jackson, Mansfield, Flovilla and Social Circle, Ga. The following have applied for a charter: Charles F. Howe, Milledgeville; William F. Smith, Flovilla; Charles F. Preston, Lawrence W. Roberts, Ralph E. Watson, James W. Preston, Charles F. Robert, Atlanta; Robert V. Smith, Samuel P. Smith, Flovilla; and Stephen J. Smith, Jackson.

Milwaukee Electric Railway & Light Company.—In the decision of the Wisconsin railroad commission it is suggested that the Milwaukee city authorities take whatever action may be necessary for the immediate execution of the plans for construction of the new lines recommended by President John I. Beggs during the hearings on the Milwaukee service cases in February and March last. Mr. Beggs outlined at that time the extensions which he considers necessary to complete an ideal street railway system in Milwaukee. Eighteen new lines are recommended.

Milwaukee Northern Railway, Port Washington, Wis.—W. A. Comstock, the president, announces that a lease, extending for three years if desired, has been secured on a building for terminal purposes at Fifth and Wells streets, Milwaukee, but that, owing to delays, the road will not be finished to Milwaukee, as expected, by August 1. It is reported that eventually the company may use the Milwaukee terminal of the Chicago & Milwaukee Electric Railroad. Practically all of the grading south of Port Washington is completed, and work will soon be started between Port Washington and Sheboygan. Track has been laid from a point about two miles north of

Milwaukee to Grafton, and the equipment of the power house at Port Washington is being installed by the Allis-Chalmers Company.

Mitchell, S. D.—D. B. Miller of this city and others have returned from a trip to Marshall, Minn., which was taken for the purpose of investigating the territory through which an electric railway is planned.

Mobile, Ala.—An electric road between this city and Pascagoula, Miss., 40 miles distant, is discussed. The road would pass through St. Elmo, Theodore, Grand Bay and Orange Grove, and would parallel the Louisville & Nashville Railroad. M. J. McDermott, C. D. Willoughby and Sidney Lowenstein of Mobile are said to be interested.

Mt. Desert Transit Company, Bar Harbor, Me.—A contract for power for a term of years has been closed with the Bar Harbor & Union River Water Company. The company will build an electric railway from Bar Harbor to Ellsworth, with a branch to Southwest Harbor, Me. John S. Kennedy of New York, president.

New York Auburn & Lansing Railroad, Auburn, N. Y.—H. A. Clarke, chief engineer, writes that eight miles of track has been laid this year from Myers to North Lansing, N. Y. The road is under construction from Auburn to Ithaca, N. Y., and track has been laid as far as North Lansing, leaving 12 miles, from North Lansing to Ithaca, yet to be laid. The part now completed is being operated by steam, but the entire line is to be operated later by the third-rail electric system.

Northern Texas Traction Company, Ft. Worth, Tex.—Preliminary surveys for the construction of the Ft. Worth-Cleburne interurban line of this company have been completed and a large portion of the right of way secured. It is stated that as soon as Stone & Webster of Boston, Mass., signify approval of the plans for the route work will be started and the line completed probably within a year from the time orders are received to begin work.

Ocean Shore Railway.—J. Downey Harvey, president, San Francisco, Cal., is quoted as saying that the operation of cars will be begun in August.

Ohio & Southern Michigan Interurban Railway, Kalamazoo, Mich.—It is reported that a franchise has been secured in Camden, and that citizens of Frontier, Mich., have been asked for a bonus of \$4,000 and right of way for a distance of 12 miles.

Oklahoma City, Okla.—George Silsby of Saginaw, Mich., is said to have completed plans for financing an electric railway between Oklahoma City and Norman, Okla.

Oshkosh, Wis.—By the purchase of the Winnebago Traction Company's interest in the 14-mile line between Neenah and Oshkosh, the Wisconsin Light Heat & Power Company has secured a through line from Kaukauna to Oshkosh. It is said that \$250,000 was paid for the property.

Oswego (N. Y.) Traction Company.—A petition has been filed with the city authorities for approval of some changes in track.

Paducah (Ky.) Traction Company.—Construction of the new line to Gregory Heights is actively under way.

Philadelphia & Westchester Traction Company.—The new line of this company extending from the union station at Sixty-ninth and Market streets to Collingdale, where connection is made with the Darby and Chester division of the Philadelphia Rapid Transit Company, was opened for traffic on July 15. Connection also is made at Clifton with the Delaware County & Philadelphia Electric Railway for all points between Angora and Media.

Redondo, Cal.—It is stated that H. E. Huntington has secured right of way through government land and other property between Redondo and San Pedro, which it is believed is a preliminary step toward the construction of a coast line connecting these two ports and the Crescent Bay district with the Wilmington and Alamitos Bay.

Sacramento (Cal.) Electric Gas & Railway Company.—Reconstruction of the G street line will be finished soon, and work will be begun then on the P street line. Heavier rails will be laid.

St. Johns Light & Power Company, St. Augustine, Fla.—Plans for an extension are under way.

St. Louis Terre Haute & Quincy Traction Company, Pittsfield, Ill.—Edward Yates, president, writes that a survey from Taylorville to Quincy, Ill., has been completed and that rapid progress is being made in securing franchises and the right of way. It is expected that funds for construction will be available on or before September 1, 1907.

Salisbury, N. C.—It is reported that plans are being made for an electric railway from Salisbury, N. C., to South River, nine miles, and to Buckville and to Pooleemee, N. C. A park is to be built at South River, and the road is to handle freight and passenger traffic.

Sapulpa, I. T.—The Business Men's League is said to have made arrangements with E. C. Reynolds and others for the construction of an electric railway to the oil fields southeast of the city.

Sioux City (Ia.) Traction Company.—Sixty-pound steel rails are being laid on the Riverside line, replacing 40-pound rails.

Springfield & Southeastern Traction Company.—C. F. Terhune, chief engineer, is quoted at Decatur, Ill., as saying that grading has been begun. The road is projected from Taylorville to Springfield. J. D. Beardsley is the contractor.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis.—Improvements, including a new passenger and freight station, will be made at Newcastle, Ind.

Texas Midland Railroad, Terrell, Tex.—It is reported that the Texas Midland is considering the installation of a protected third rail for the operation of its 125-mile railway. This company now has 17 steam locomotives and 397 cars. E. H. R. Green, president, general manager and purchasing agent, will take charge of the electrification work.

Toledo Railways & Light Company, Toledo, O.—This company will lay double tracks in the center of lower Summit street, between Ohio and Michigan streets, some time this summer. This will give it practically a double-track line to the Casino and result in an improvement in its present schedules between Toledo and Toledo Beach and Point Place.

Trenton (N. J.) Street Railway.—This company will build a line to Allentown, N. J. P. E. Hurley, general manager, is quoted as saying that work will be begun as soon as estimates for construction and material are received.

United Railways of St. Louis.—It is reported that a new bridge will be built at Kirkwood by this company and the Missouri Pacific Railroad jointly.

Utah Light & Railway Company.—As an experiment, this company has laid steel ties for one mile in Salt Lake City.

Vallejo Benicia & Napa Valley Railroad, Napa, Cal.—L. J. Perry, general manager, is quoted at Vallejo as saying that a line will be built to Sacramento. It is reported that this company and its subsidiary road, the San Francisco Vallejo & Napa Valley Railway, will build one or more steamers to carry passengers between Vallejo and San Francisco.

Waco, Tex.—Dr. T. M. Barnes of Ft. Worth is quoted as saying that active steps toward construction of the proposed road from Waco to Temple and Marlin will probably be taken soon.

Walla Walla, Wash.—It is announced that the directors of the Walla Walla County Fair Association will apply for a franchise to build an electric railway from some connecting point on the city line to the fair grounds. The object is to have the line in readiness for the fall fair business. A temporary organization, with the following officers, has been effected: Judge Brents of the superior court, president; A. C. Van de Water, secretary; Grant Copeland, vice-president; directors, Frank Singleton, Eugene Tausick, Robert H. Johnson, Samuel Drumheller, W. A. Ritz and M. Toner.

Youngstown & Ohio River Railroad.—It is reported that grading and tracklaying in Leetonia have been finished. Construction of the station building has been begun.

POWER HOUSES AND SUBSTATIONS.

Cleveland Southwestern & Columbus Railway Company.—This company will spend about \$40,000 in the construction of a power house, to be located at a point between Lorain and Elyria, O.

Illinois Traction System, Champaign, Ill.—This company began construction of its new power house at Peoria on July 4, 1907. The Peoria plant will develop about 5,400 horsepower. The installation consists of two 2,000-kilowatt steam turbo-generators. A new substation, which is under construction at White Heath, will contain a 300-kilowatt electrical installation. It is expected that this substation will be completed by September 1.

Kansas City (Kan.) Western Railway Company.—It is announced that this company will spend between \$300,000 and \$400,000 for the construction of a new power house, which will be located in Kansas City, Walcott or Leavenworth.

Personal Mention

Mr. J. L. Adams, manager of the central district of the Indiana Columbus & Eastern Traction Company, has changed his headquarters from Dayton to Springfield, O.

Mr. John F. Pulliam has resigned his position as train-master of the Grand Rapids Grand Haven & Muskegon Railway at Fruitport, Mich., to become connected with an electric interurban line in Wisconsin.

Mr. T. W. Atwood, counsel for the Michigan United Railways, has been elected president of the Northern Construction Company, an allied corporation, which it is announced will complete the Jackson-Lansing division of this railway.

Mr. Perry A. Randall, Ft. Wayne, Ind., has been elected to succeed Mr. G. A. Wulkup as president of the Ft. Wayne & South Bend Railway. Mr. J. H. Grisamer of Churubusco, Ind., will act as temporary secretary in place of Mr. W. F. Dinnen, resigned.

Mr. William J. Wilgus, vice-president of the New York Central, who has been in charge of the work in the electric zone and the terminal improvements at the Grand Central station, New York, has resigned, his resignation to take effect on October 1.

Mr. W. S. Mendon has been appointed chief engineer of the Brooklyn Rapid Transit system, succeeding Mr. Dow S. Smith, who resigned recently. Mr. Mendon formerly was general superintendent of the Metropolitan West Side Elevated Railway of Chicago, resigning in November, 1905, to become chief engineer of the Brooklyn Rapid Transit Company.

Mr. John S. Kennedy of Corning was on July 16 appointed secretary to the public service commission for the second district. Mr. Kennedy was the secretary of the former railroad commission. He is a native of Corning, and served in various capacities in the city government until 1899, when he was appointed postmaster of Corning.

Mr. F. K. Parke, who for some time past has served the board of supervising engineers of Chicago as auditor and expert accountant, has been appointed secretary of the board. Mr. L. R. Acton, formerly western manager for Gunn, Richards & Co., public accountants of New York City, will succeed Mr. Parke as auditor and will also act as assistant secretary.

Mr. Henry G. Pagel, for the past two years superintendent of the Sheboygan (Wis.) Light Power & Railway Company's local lines in Sheboygan and Plymouth, will, in addition to his present duties, act as superintendent of the Milwaukee Northern Railway, with headquarters at Cedarburg, Wis. The appointment is effective on August 15 under the arrangement for consolidated management of these companies effected several weeks ago.

With the approach of the opening of traffic on the electrical section of the New York division of the New York New Haven & Hartford Railroad from Woodlawn, N. Y., to Stamford, Conn., announcement is made by Vice-President Henry of the following appointments: Mr. H. Gilliam will be electrical superintendent, with headquarters at Stamford. His jurisdiction will extend over the lines, power houses and electric locomotives on the New York division. Mr. C. L. Peterson will be chief engineer at the power station at Cos Cob; Mr. J. C. Welch will have charge of the maintenance of electric locomotives, and D. E. Tyree will be electrical inspector.

Mr. Raymond H. Smith, general superintendent of the Connecticut Railway & Lighting Company, Bridgeport, Conn., as announced in the Electric Railway Review of July 13, has been appointed general manager of the Albany & Hudson Railroad, succeeding Mr. William Darbee, who, on September 1 will become assistant general manager of the Consolidated Gas Electric Light & Power Company of Baltimore, Md. Mr. Smith was born in Providence, R. I., in 1879. In January, 1898, he entered the service of the Waterbury Traction Company as clerk and later was transferred to the electric and railway departments, where he remained until July, 1901, when he was appointed purchasing agent and private secretary to the general manager, with headquarters at Bridgeport. In October, 1902, he became superintendent of transportation and three years later was appointed superintendent of the entire Bridgeport division of the Connecticut Railway & Lighting Company. During the period of Mr. Smith's connection with this company it has undergone several changes in name. It formerly was known as the Waterbury Traction Company, which, with the Bridgeport Traction Com-

pany, was absorbed by the Connecticut Lighting & Power Company. This in turn was taken over by the Connecticut Railway & Lighting Company, which later was merged into the Consolidated Railway Company, and recently has been known as the Connecticut Company. In his new position as general manager of the Albany & Hudson Railroad, effective on August 1, Mr. Smith will have charge of 40 miles of interurban third-rail line operating between Hudson and Albany, as well as the city lines in Hudson and gas and electric lighting plants which furnish lights to eight large towns between Albany and Hudson. Mr. Smith recently was presented with a diamond stud as a mark of esteem from the employees of the road which he is leaving.

Mr. Dow S. Smith, whose resignation as general superintendent of the Brooklyn Rapid Transit Company was noted last week, was born in June, 1867, and is a graduate of the University of Minnesota. After completing the mechanical and engineering course of that university in 1888, he became superintendent of construction of the West Superior Iron & Steel Company, and in 1893 went to the St. Paul City Railway, where he held various positions until made superintendent of that line, since merged with the Minneapolis city lines into the Twin City Rapid Transit Company. In 1902 he resigned to accept service with the Brooklyn Rapid Transit Company, and during the past five years has been the operating head of the lines comprising that extensive system.



Dow S. Smith.

Mr. Smith, although admittedly having one of the most difficult operating problems of its kind in America, has made a record that is quite exceptional. Under his operation the cost of mileage was very materially reduced, and during this period the gross receipts increased in five years from \$12,000,000 to \$19,000,000. Under his guidance as president the Brooklyn Rapid Transit Employees' Benefit Association has been built up until it has now 7,000 members and \$40,000 in its treasury. Mr. Smith will be succeeded by Mr. W. S. Menden, formerly of Chicago, and for the past two years chief engineer of the Brooklyn Rapid Transit system.

Mr. Howard C. Fritsch has recently resigned as division superintendent of the Eastern Pennsylvania Railways Company and manager of Manila Grove Park, at Lansford, Pa., to engage in the suburban real estate business at Narberth, Pa. Mr. Fritsch was assistant superintendent of the Tamaqua & Lansford Street Railway at Lansford for two years previous to July 1, 1906, when that road was consolidated with the Pottsville Union Traction Company and various light companies in Schuylkill county by J. G. White & Co. of New York, under the name of the Eastern Pennsylvania Railways Company, and Mr. Fritsch was appointed division superintendent.

Mr. William L. Derr, superintendent of the Chicago & Alton Railroad at Bloomington, Ill., has resigned to become general superintendent of the New York City Railway, with headquarters at 761 Seventh avenue, New York City, effective on July 1 as announced in the Electric Railway Review of July 6, 1907. He was educated in the private and public schools of Havre de Grace, Md., and at Polytechnic College at Philadelphia, Pa. He entered railway service in 1876 and since that time has held the following positions: From 1876 to 1878, assistant engineer Susquehanna bridge, Philadelphia Wilmington & Baltimore Railroad; 1878 to 1880, in maintenance of way department Pittsburg Cincinnati & St. Louis Railway; 1880 to 1883, assistant engineer maintenance of way New York & New England Railroad, in charge of relocation of the line between Boston and Newburg; 1883 to 1884, roadmaster Woonsocket & Valley Falls division, and 1884 to 1886, assistant superintendent Woonsocket division of this road; 1886, roadmaster Buffalo division New York Lake Erie & Western Railroad, and from 1886 to 1888, roadmaster of its Delaware division; 1888 to 1889, assistant superintendent Susquehanna division; 1889 to 1890, superintendent Jefferson division, and 1890 to March, 1899, superintendent Delaware division Erie Railroad at Port Jervis, N. Y.; March, 1899, to August, 1901, super-

intendent Susquehanna division at Elmira, N. Y.; August, 1901, to May, 1903, superintendent New York division; May, 1903, to March, 1905, chief engineer of this road; March, 1905, to February 15, 1907, superintendent Hartford division New York New Haven & Hartford Railroad at Hartford, Conn. On February 15, 1907, he was appointed superintendent of the Chicago & Alton Railroad at Bloomington, Ill., where he has remained until the present time. The following heads of departments will report to Mr. Derr: Superintendent of transportation, general master mechanic, engineer of maintenance of way, superintendent of buildings, superintendent of electrical car houses and the master mechanic of the One Hundred and Forty-sixth street shop of the company. Mr. Derr will report to Mr. Oren Root, Jr., vice-president and general manager.

Mr. John Z. Murphy, chief engineer and electrician of the Chicago Union Traction Company, has been appointed a member of the board of supervising engineers, in charge of the rehabilitation of the Chicago traction properties. Mr. Murphy, who represents the Union Traction company on the board, was made chief engineer and electrician of the West Chicago Street Railroad in 1889, and when the Union Traction company was formed to acquire the west and north side lines he was promoted to the position which he now holds. The appointment of Mr. Murphy completes the organization of the board, the other members of which are Mr. Bion J. Arnold, Mr. Harvey B. Fleming and Mr. Charles V. Weston.

Mr. Edward B. Kirk, who, as announced in the Electric Railway Review of July 6, 1907, has been appointed general manager of the Sterling Dixon & Eastern Electric Railway and the Lee County Lighting Company, with headquarters at Dixon Ill., is a graduate in electrical engineering of Purdue University, class of 1897. For several years he was superintendent of the Jacksonville (Ill.) Railway, and was later electrical engineer and master mechanic of the Grand Rapids Grand Haven & Muskegon Railway at Grand Haven, Mich. To accept the new position he resigned as vice-president and general manager of the Winnebago Traction Company, of Oshkosh, Wis. He succeeds Mr. Henry C. Higgins, who has resigned to become connected with a gas and electric company at Gadsden, Ala., and expects to assume his duties at Dixon as soon as his successor on the Winnebago Traction Company has been appointed.

Dr. William Freeman Myrick Goss has resigned as dean of the schools of engineering and director of the engineering laboratory, Purdue University, Lafayette, Ind., to become dean of the college of engineering, University of Illinois, Champaign, Ill. Dr. Goss was born at Barnstable, Mass., on October 7, 1859. After a course at the Massachusetts Institute of Technology, he went to Purdue in the fall of 1879 and organized the department of practical mechanics, of which he ever since has been the head. Dr. Goss is very widely known in the railway field by reason of the extended investigations of locomotive performance which he has conducted at the Purdue laboratories during the last 16 years. The principal results of Dr. Goss' work on the locomotive were published recently in his "Locomotive Performance."



Dr. William Freeman Myrick Goss.

Other valuable contributions to the science of railway mechanical engineering have been made through committee reports, discussions and papers, presented before the Master Car Builders' and Master Mechanics' associations and various railway clubs. More than any other man who has been engaged primarily in university educational work, Dr. Goss has been identified with the practical affairs of railways and is recognized as an authority of the highest standing in matters pertaining to the mechanical department.

Obituary.

R. F. Gottschalk, president of the Columbus (Ind.) Street Railway & Light Company, was killed by a live wire on July 11, in an attempt to splice a broken trolley wire in the street near his home. He was about 45 years of age and had been president of the street railway company for 15 years.

Financial News

Barre & Montpelier Traction & Power Company, Barre, Vt.—At the annual meeting of stockholders on July 11 the following directors were elected: F. M. Corry, E. H. Deavitt, I. M. Frost and T. J. Deavitt of Montpelier, and H. K. Bush and D. M. Miles of Barre. The following officers have been elected: President, F. M. Corry; vice-president, H. K. Bush; treasurer, clerk and secretary, E. H. Deavitt; general manager, I. M. Frost; superintendent, F. H. Andrus.

Birmingham (Ala.) Railway Light & Power Company.—On account of the expense of the strike, the semi-annual dividend on the common stock was not declared. The previous dividend, payable in January, was 2½ per cent. The usual semi-annual dividend of 3 per cent on the preferred stock was declared.

Chicago Electric Traction Company.—The date set for sale of the property under the foreclosure proceedings is July 29.

De Kalb Sycamore & Interurban Traction Company, De Kalb, Ill.—A certificate of an increase in stock from \$100,000 to \$1,500,000 has been filed with the secretary of state.

Fort Dodge Des Moines & Southern Railway, Boone, Ia.—This company has increased its capital stock from \$2,500,000, comprising \$1,500,000 common stock and \$1,000,000 preferred, to \$6,700,000, of which \$1,200,000 is preferred and is outstanding and \$5,500,000 is common stock, of which \$2,000,000 is outstanding. A first mortgage to secure an issue of \$3,500,000 of 5 per cent bonds, issuable at \$14,000 per mile, of which \$2,200,000 bonds are outstanding, has been authorized. There have also been issued \$2,800,000 refunding mortgage 5 per cent 30-year bonds, issuable at \$17,000 per mile. The refunding mortgage bonds are limited to \$6,500,000, of which \$3,500,000 bonds are available only upon retirement of the first mortgage bonds of an equal amount. The Newton & Northwestern Railroad is controlled by the Ft. Dodge Des Moines & Southern road through the ownership of \$2,000,000 common stock, \$500,000 preferred stock, \$600,000 funding mortgage bonds, and over 75 per cent of the \$2,460,000 first mortgage bonds. A description of this property was published in the Electric Railway Review of May 25, 1907, page 672.

Glasgow Corporation Tramways.—The annual report for the year ended May 31, 1907, gives the following summary of results: Single miles of line open for traffic (average during year), 168½; total borrowing powers, £3,100,000; borrowing powers exercised, £2,227,352; unexhausted borrowing powers, £872,647; capital expenditure, £3,104,060; population served, £1,050,000; traffic revenue, £887,380; total revenue, £895,841; working expenses, £485,256; interest on capital, £63,769; sinking fund, £49,776; net balance, £70,279. The net balance was disposed of as follows: Special depreciation, £45,000; general reserve fund, £25,279. The percentage of working expenses to total receipts was 54.17 per cent. The total mileage was 20,350,367, car hours amounted to 2,779,720, and there were 224,063,098 passengers carried. The average traffic revenue per mile of single track was £5.035, and per capita it was 16s., 11d. Other statistics were as follows: Average total revenue per car mile, 10.565d.; average car miles per day per car, 101.20; average car hours per day, 7,615.67; average working expenses per car mile (including power works cost), 5.721d.; total amount of sinking fund, £547,378; amount of sinking fund applied in reduction of debt, £547,378; amount of general reserve fund, £42,851; amount of depreciation and permanent way renewals fund, £1,079,252. To the depreciation and permanent way renewals fund there was devoted 18.73 per cent of the total receipts.

Hattiesburg (Miss.) Traction Company.—This company has absorbed the Hattiesburg Light & Power Company and the Hattiesburg Gas Company. The capital stock of the enlarged company will be \$500,000.

Illinois Traction Company.—Julius Christensen & Co. of Philadelphia are offering for sale a block of the first mortgage 5 per cent sinking fund bonds of the St. Louis & Springfield Railway Company, guaranteed, principal and interest, by the Illinois Traction Company. The bonds are a first lien on 60 miles of road built on private right of way, at the rate of \$25,000 a mile, forming part of the through line from Springfield, Ill., to St. Louis, Mo. St. Louis & Springfield earnings for the year to June 30, 1907, were as follows: Gross earnings \$275,107; operating expenses, \$160,626; net earnings, \$114,481; interest on outstanding bonds, \$76,000.

Interurban Railway & Terminal Company, Cincinnati.—It is rumored that this company will be combined with the Cincinnati & Columbus Traction Company and the Cincinnati Georgetown & Portsmouth Railroad. The three companies operate a total of about 208 miles of road.

Meridian (Miss.) Light & Railway Company.—An amendment to the charter has been filed, providing for an increase in the capital stock to \$2,000,000.

Milwaukee Electric Railway & Light Company.—The common stock of this company has been increased from \$15,000,000 to \$20,000,000. The capital stock of the Milwaukee Light Heat & Traction Company, the controlled line, has been increased from \$1,000,000 to \$30,000,000.

New York Auburn & Lansing Railroad.—A hearing was held on July 16 before the public service commission on the application of this company for consent to issue a mortgage for \$2,000,000. It was explained that the company desired to apply one-half of this amount to the refunding of outstanding bonds and the proceeds of the balance to the work of double-tracking the 37 miles of its road from Auburn to Ithaca, and to change the motive power from steam to electricity under the third-rail system. The decision of the commission was reserved.

New York City Railway.—An additional \$617,000 first consolidated mortgage 4 per cent bonds of the Third Avenue Railroad Company, a subsidiary road, have been listed on the New York stock exchange, making a total of \$7,560,000. The \$617,000 bonds were issued against an equal amount of the second mortgage income bonds of the Forty-second Street Manhattanville & St. Nicholas Avenue Railway, which have been deposited with the trustee under the consolidated mortgage.

Pittsburg (Kan.) Railway & Light Company.—Control of this company has been acquired by the Joplin & Pittsburg Street Railroad of Joplin, Mo. It is reported that a new company may be organized to take over the combined interests.

Public Service Corporation of New Jersey.—The property and franchises of the United Electric Company of New Jersey have been leased for 999 years. The lease provides for the division of \$400,000, estimated to be the surplus cash assets of the United Electric Company, and then a rental of 3 per cent for two years, 4 per cent for the next two years and 5 per cent annually thereafter. The Public Service Corporation owns approximately 98 per cent of the United Electric stock, and President Thomas N. McCarter of the former corporation says that the rentals were agreed upon with special regard for the "rights of the 2 per cent of stock of the United Electric Company not owned by the Public Service. Every precaution was taken to see that all stockholders should share equitably in the present surplus and anticipated earnings for years to come. The leasing of the United Electric Company to the Public Service Corporation will result in great advantage to both companies from operating, accounting and practical standpoints."

Rutland (Vt.) Railway Light & Power Company.—Gross earnings for all departments of this company in the fiscal year ended June 30, 1907, were \$229,392, or \$42,130 above the previous year. The total expenses were \$132,930, an increase of \$14,710, and the net earnings amounted to \$96,462, or \$27,420 above the record for the previous fiscal year. The Rutland Railway showed net earnings last year of \$49,997, an increase of \$9,034.

United Railroads of San Francisco.—The proceeds of the notes which are to be issued by the United Railways Investment Company, controlling this company, will be used to provide funds for the payment of cars and for other liabilities contracted by the United Railroads of San Francisco in reconstruction of the property and for other corporate purposes.

Dividends Declared.

Brooklyn City Railroad, quarterly, 2½ per cent.
Columbus Railway, preferred, quarterly, 1¼ per cent.
Grand Rapids (Mich.) Railway, preferred, quarterly, 1¼ per cent.
Houston (Tex.) Electric Company, preferred, semi-annual, 3 per cent.
Jacksonville (Fla.) Electric Company, common and preferred, semi-annual, 3 per cent.
Milwaukee Electric Railway & Light Company, preferred, quarterly, 1½ per cent.
Montreal Street Railway, quarterly, 2½ per cent.
New Orleans City Railroad, common, annual, three-fourths of 1 per cent; preferred, semi-annual, 2½ per cent.
United Traction Company, Pittsburg, preferred, semi-annual, 2½ per cent.

Manufactures and Supplies

ROLLING STOCK.

Milford & Uxbridge Street Railway, Milford, Mass., officially denies that it is in the market for two 30-foot closed car bodies, as reported.

La Crosse City Railway, La Crosse, Wis., has ordered four double-truck cars from the St. Louis Car Company. Delivery is to be made by August 1.

Illinois Tunnel Company, Chicago, has placed an order with the Jeffrey Manufacturing Company, Columbus, O., for 25 electric locomotives. Delivery is to begin next winter.

Bristol Belt Line Railway, Bristol, Tenn.-Va., officially advises us that it will be in the market within the next 10 days for one open and one closed car, 18 to 22 feet long.

Utah Light & Railway Company, Salt Lake City, Utah, which was reported to have placed an order for 62 cars with the St. Louis Car Company, officially states that the contract has not yet been awarded.

Toledo Railways & Light Company, Toledo, O., has just finished building a large semi-convertible car at its own shops. The company, it is reported, is contemplating putting in a woodworking plant in its Central avenue shops and making all its own rolling stock hereafter.

San Jose & Santa Clara County Railroad, San Jose, Cal., which was reported to have ordered 12 cars, in the Electric Railway Review of June 22, officially advises us that the St. Louis Car Company received the contract. The cars are to be semi-convertible pattern, California type, 50 feet long over all, 9 feet wide and 8½ feet from floor to ceiling. They will be mounted on double trucks made by the St. Louis Car Company, with 6-foot 4-inch wheel base and 36-inch wheels. The cars will be equipped with 4GE motors of 100 horsepower each.

SHOPS AND BUILDINGS.

Washington Water Power Company, Spokane, Wash.—This company has secured property in Cheney, Wash., and is making arrangements to build a station, 26 by 89 feet, with a freight platform 28 feet long.

Chicago South Bend & Northern Indiana, South Bend, Ind.—This company, it is reported, has prepared plans for a 1-story brick and stone passenger station at Michigan City, Ind. It is to be 160 by 25 feet, and will cost about \$8,000.

Cleveland Southwestern & Columbus, Cleveland, O.—This company's new shops at Elyria, O., have been opened for operation and the machinery from the old shops installed. The new shops cost about \$80,000 and are modern in every particular.

Schoepf Syndicate, Cincinnati, O.—This company, which operates the Lima (O.) city lines and several interurban roads, has asked for permission to build a central interurban station there in the public square at a cost of \$50,000. The city is to get an annual rental of \$3,000.

Charlotte Consolidated Construction Company, Charlotte, N. C.—This company has had plans prepared for the erection of an office building and interurban station, two stories high and basement, 40 by 125 feet. It will be of steel and reinforced concrete construction, with front of enameled brick.

Oregon Electric Railway, Portland, Ore.—This company has purchased a triangular piece of the block bounded by Front, Water, Jefferson and Columbia streets, and will erect on it a 1-story station which will have frontage on three sides. Plans have not yet been completed, but are being hurried and bids will be asked shortly. The station is to be constructed of brick, supported by iron columns. The remaining portion of the block will be utilized for freight houses.

TRADE NOTES.

Colonial Sign & Insulating Company, Akron, O., reports that it is making 10,000 third-rail insulators for the New York Central Railroad.

Charles S. Powell, general agent of the Westinghouse Electric & Manufacturing Company, with headquarters in New York, has resigned and the office has been abolished.

New York Car Wheel Company, Buffalo, N. Y., has elected Solomon Ginsburg president to succeed the late Joseph H.

Berry. W. G. Smith has been elected vice-president and J. A. Venable secretary and treasurer.

A. S. Blanchard has been appointed assistant to the president of the Atha Steel Casting Company, Newark, N. J. Mr. Blanchard was formerly manager of the steel casting department of the Wellman-Seaver-Morgan Company, Cleveland.

Central Inspection Bureau, 17 State street, New York, has just completed the inspection of a number of freight and passenger cars for the Pacific & Idaho Northern Railroad at the Jeffersonville plant of the American Car & Foundry Company.

Union Switch & Signal Company, Swissdale, Pa., is progressing rapidly on the addition to its works. The grading of the site of the new building is completed and the foundations are now under way. It is expected that work on the steel structural part will be commenced within 10 days.

Southern Indiana Electric Company, New Albany, Ind., has been organized to engage in the manufacture of electrical appliances. Capital stock, \$5,000. The incorporators are Charles D. Knoefel and Frank Beaucond of New Albany; Robert S. Donaldson and Philip S. Pogue of Louisville.

H. Milliken, who is a recent addition to the engineering staff of W. S. Barstow & Co., 50 Pine street, New York, has gone to the Portland, Ore., office of the company, where he will be resident electrical engineer. For two years past Mr. Milliken has been connected with the operating department of the New York Edison Company.

American Engineering Company, Indianapolis, Ind., has compiled an interesting map of the interurban electric railways in Indiana, Ohio and Michigan. The map, which is a blueprint 32 inches square, shows the roads in operation and under construction to date, and is valuable as a reference regarding the electric railways of this section.

Yetman Typewriter Transmitter Company of New York, formed to manufacture typewriters, telegraph transmitters, automatic telegraph machines, etc., was incorporated in New York on July 12. The capital stock is \$1,500,000, one-third of which is preferred stock bearing 6 per cent dividends. The directors are Samuel Johnston, Charles E. Yetman, William L. Williams and Gabriel Morton of New York, and James J. Stevenson of Oshkosh, Wis.

B. F. Sturtevant Company, Boston, Mass., reports the following recent sales of electric generating sets: Electric Construction Company, Richmond, Va.; McCann Ice Plant, Philadelphia, Pa.; Bethlehem Brewing Company, New Bethlehem, Pa.; Smith & Hammond Lumber Steamers; Eberhard Faber Pencil Company, Brooklyn, N. Y.; Metric Metal Works, Erie, Pa.; Hanover National Bank building, New York City; Sedalia Ice Light & Fuel Company, Sedalia, Mo.; H. J. Kunzlg, Philadelphia, Pa.; and board of water supply, New York City.

R. E. Fox, Jr., has resigned the management of the New York office of the Platt Iron Works Company to become secretary and manager of the sales department of The Engineer Company, 111 Broadway, New York. Mr. Fox is a graduate of Cornell University, and was prominent as manager of the southern territory of the Platt Iron Works, which position he held for three years, with headquarters at Atlanta, Ga. He is a member of the American Society of Mechanical Engineers. The Engineer Company manufactures and installs the balanced draft system of furnace regulation.

Stotts Signal Company, Omaha, Neb., has recently arranged with the Stroud Machine Works of Omaha to commence at once the erection of a new plant for the manufacture of the Stotts automatic railroad signal, a device operating for the protection of trains on both single and double tracks. The officers of the company are: A. H. Lindley, Chicago, president; T. J. Mahoney, Omaha, vice-president; H. C. Stotts, Omaha, secretary-treasurer; E. S. Stotts, Omaha, general manager; F. H. Liscom, Omaha, superintendent of construction; L. O. Dickey, Omaha, chief electrician; R. A. Street, Omaha, mechanical engineer.

Bellamy Vestlette Manufacturing Company of Cleveland, O., announces that it has established a plant at Toronto, Ont., for manufacturing its well and favorably known conductors' vestlettes. Hereafter all Canadian orders will be filled at the Toronto office, 265 Young street. By this arrangement the excessive customs duty, which is 70 cents per garment, will be avoided, and the company will be able to supply the vestlette to Canadian conductors at the same price paid by employees of railroads in the United States. As a result of the opening of the new plant it is expected this company's product will become as popular in Canada as it is in the States. The manufacturing of goods at Toronto will be in charge of A. F. Jury.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., is pushing the erection of its new 8-story steel structure with the utmost vigor. The contractors have given an assured guarantee that the building will be ready for occupancy by August 1. This will provide an additional 250,000 square feet of floor space, to be utilized for the construction of details and supplies, and should greatly relieve the congested conditions which at present exist in most of the departments at the East Pittsburgh works, where every square foot of available space is now occupied. Most of the other Westinghouse companies are now making considerable additions to their works in order to increase their manufacturing facilities.

Garford Company of Elyria, O., general agent for the Shelby trolley poles, reports that the demands for its products are gradually increasing and that it is enjoying a commendable trade with the leading electric railroads. While the merits of such a small part of a car equipment as the trolley pole have not usually heretofore been carefully considered by the designers of cars it is now stated that because of the demonstrated long life of the Shelby pole more attention is being given to this small but very essential part. The Shelby pole, as is well known, is the only pole made from cold drawn seamless steel tubing. Because of its physical composition it is strong and durable and will not easily kink, break or get out of shape. These poles are made to fit any standard harp and base.

ADVERTISING LITERATURE.

Interstate Engineering Company, Cleveland, O.—Circular No. 101, comprising advanced sheets of Bulletin No. 8, presents a birdseye view of the plant of this company at Bedford, O., and views of structures, the steel for which has been furnished by this company.

Fox Machine Company, Grand Rapids, Mich.—Catalogue No. 70 is devoted to Fox universal trimmers. The publication is well printed and describes in detail the important features of the machine, many of which have been added since the publication of the last catalogue.

General Electric Company, Schenectady, N. Y.—This company's catalogue of supplies for the year 1907 has just made its appearance. It supersedes the 1904 supply catalogue and is intended to be used to the exclusion of that catalogue in the placing of all supply orders. The catalogue is 8½ by 11 inches, comprises 430 pages, and contains a full list of General Electric supplies, and is profusely illustrated. Announcement is made to the effect that Catalogue No. 7601 contains a complete list of General Electric railway supplies.

Hicks Locomotive & Car Works.—This company has issued a 100-page book, 9½ by 12½ inches, which describes its plant and product. The book gives a brief account of the history of F. M. Hicks & Co. and their successor, the Hicks Locomotive & Car Works, and a short description of the company's plant at Chicago. The text is short and reliance is placed upon the illustrations to convey information as to the resources and products of the company. The publication is admirably executed from the typographical standpoint, and the large number of halftone engravings from photographs gives a comprehensive idea of the work.

Westinghouse Lamp Company.—The new catalogue of Westinghouse incandescent lamps, which has just been issued by this company, is the first to appear since the Sawyer-Mann Electric Company became the present company. The Westinghouse Lamp Company builds incandescent lamps in all candle-powers, voltages and efficiencies, and manufactures as standard, lamps of the characteristics mentioned in the catalogue. All the various styles of lamps are splendidly illustrated and mention and illustration is also made of Edison, Thompson-Houston and Westinghouse bases and the T. H. Edison and Westinghouse-Edison adapters, manufactured by the company.

Warren (Ariz.) Electric Railway.—Construction work on this company's 4-mile electric line from Warren to Bisbee, Ariz., by way of Bakerville and Lowell, is in progress. The grading and tracklaying between these points, which were commenced last spring, are now completed, and one mile of overhead work has been finished between Warren and Baker-ville. The power house and substations are under construction and work on the car barns will be started on August 15. The bridges are of concrete and timber construction and the tracks are laid with 80-pound rails. The rolling stock equipment will consist of 10 cars. Haggott, Girrand, Smith Company, Prescott, Ariz., is the principal contractor. E. G. Minder, chief engineer, Bisbee, Ariz. The headquarters of the company are at Warren. L. W. Powell of Bisbee is president.

HANDLING A STRIKE.

BY L. E. DRUMMOND.

When threatened with a strike the most effective method of meeting it is preparedness. This includes being in touch with a professional strike-breaker, arranging with him to have under immediate orders the required number of men to run the road and making proper preparations for a first-class commissary and adequate, sanitary sleeping accommodations.

The modern strike-breaker is a development, an outgrowth of the struggle between capital and labor fomented by professional labor agitators. In former days detective agencies were called on at infrequent intervals to furnish men as guards to protect workmen who were willing to keep their positions. Later to this was added the task of furnishing men who were skilled workmen, but the infrequency of these calls made it unnecessary to compile lists of names of available strike-breakers. Nowadays hardly a week goes by that a first-class agency is not called on to help break a strike. This has compelled these concerns to keep live lists of men in all trades who are willing to undertake work which has been given up by men on strike.

These men are recruited in various ways. An agency with a reputation for strike-breaking is constantly besieged by applicants for work of this nature, and the men whose names are put on the lists keep in touch with the agencies, giving their changes of address as they occur. A large card index is kept of these names, filed under trades and cities, and where a man is qualified in several trades his name is indexed under each trade. In addition to this method of getting names, advertisements frequently are put in daily papers for men desirous of open shop work in a particular trade. These men are sent for, are questioned and if acceptable their names are put on the list.

At considerable cost these lists are kept up to date. The name of a man who fails to make good is cut out of the list and he can never again receive employment from the particular agency blacklisting him. There is no end to the variety of trades represented in these names and any first-class strike-breaking concern has a complete equipment of men for kitchen, dining room and sleeping room work.

A word in this connection will not be amiss. It is a truism that "An army travels on its stomach." This applies with especial force to strike-breakers. If the kitchen and dining room forces are not thoroughly trustworthy, all sorts of trouble is likely to come to the men breaking the strike. The food may be "doctored"; or poorly cooked; it sometimes is slowly served until there is open dissatisfaction among the strike-breakers; in other words, there is an incipient strike among the strike-breakers. The wise manager turns the commissary department over to the professional strike-breaker along with the other work of breaking the strike.

A very serious problem in itself where large numbers of men are to be sheltered is the compliance with the sanitary law, and managers should familiarize themselves with all requirements of this kind. If they do not, they will surely find the local authorities after them in the most determined manner, and this cannot always be interpreted as sympathy with the striking workmen. The public health is often the first consideration, because an epidemic among a large body of men of this class, who are constantly spreading out among the inhabitants of the city, is likely to work serious trouble to the community at large.

With sleeping quarters in good sanitary condition and a first-class commissary department in good working order, the strike-breakers are brought in, and the experience of the professional strike-breaker should be consulted as to how this can best be done. Such forces are best handled by representatives of the professional strike-breaker. The representatives should receive full instructions from the company and should see that such orders are strictly carried out by the men. As soon as practicable a schedule of cars to be run should be made and the strike-breakers should man the cars and run them.

It is customary for the representative of the professional strike-breaker who is in charge of the barn to keep the time of all strike-breakers; that is, he should check up each day at the end of the day all of those men who have been ready and willing to work if called upon. A representative of the company should be present when this checking is done. Daily time sheets should be made with indelible pencil and should be signed by the representative of the company and the representative of the professional strike-breaker. It saves no end of confusion and trouble when the time for final settlement comes.

At the end of each week a check large enough to cover the payroll of the strike-breakers should be given to the professional strike-breaker, who settles with his men weekly, usually holding back half a week. The reasons are twofold first, bookkeeping, and second, for discipline.

A strike may be likened to a state of siege and when

strike-breakers are employed a contract is carefully drawn up with this in view and signed by both parties to it. All the conditions of the employment are carefully recited, and the pay which is given is not alone for the mere work which is done, but it is also for the faithful performance and the continuing in the employment so long as the services are desired. The form of contract which has been used successfully for many years by Drummond's Detective Agency has been thoroughly tested in the courts and has been sustained by the supreme court of the state of New York.

We will pass over the further details of handling the strike and come to the time when the company has decided that for its purposes the strike-breakers are no longer needed. Herein comes the advantage of having the strike-breakers in the employ of the professional strike-breaker. He receives his orders to quit, and immediately proceeds to take away the men. This leaves the company free to deal with its old men should it see fit to do so. It is not hampered by a great body of men who have faithfully served it during its time of trouble and whom it feels it is under obligations to for future employing. Instead, it is in the position of discharging one man at the end of his contract. The wear and tear of the constant strife between defeated strikers working side by side with the men who have caused their defeat is avoided, and only such men as the company desires for its future employees need be considered.

THE ROOKE AUTOMATIC REGISTER AND FARE COLLECTOR.

A system of collecting fares and registration in which the conductor has nothing to do with the registration or the money until the fare is registered is something of a novelty. This is, in a word, a description of the Rooke automatic



The Rooke Register—Collecting Fares on a Crowded Car.

register and fare collector, manufactured by the Rooke Automatic Register Company of Providence, R. I., and which is illustrated in the accompanying engravings.

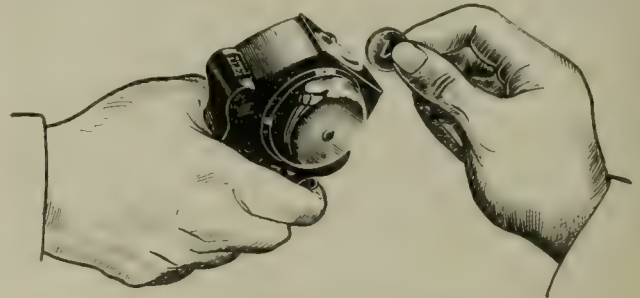
The system is based upon the theory that the ideal system should provide for perfect freedom in handling collections, but should at the same time secure registration of all fares independent of the conductor. It should also guarantee the turning in of all fares collected and thus absolve the conductor from any suspicion of dishonesty, not only on the part of the company, but on the part of the passenger, and in securing this should impose no added or unreasonable duty upon either passenger or conductor.

These points appear to be secured in the system under consideration, which is now in use upon the lines of the Rhode Island Company of Providence.

As indicated in the illustrations, the device is simple, consisting only of a compact registering apparatus through which a chute runs from top to bottom. It fits comfortably into the hand when in use for collecting, the lower end of the chute resting in the palm of the hand. The passenger deposits his fare in the opening at the top. When the fare has entered the releasing mechanism is operated by the coin, and at the same time the entrance of the coin closes the passage. By the same action the lower end of the chute is opened to allow the coin to pass into the hand in which the register is held. During the same operation the fare is recorded and a bell is rung. When the coin has once entered the slot it cannot be removed, but must pass through the chute to the conductor's hand, while the closing of the entrance to the coin passage or chute after the receipt of the coin prevents another coin entering until the mechanism is reset by the conductor.

This act of resetting is simply done by the conductor pressing a trigger with his index finger, and this act puts the register in position for recording the succeeding fare. At the same time it opens the entrance ready for the receipt of the next fare. The machine is so constructed that it cannot be tampered with in any manner without detection, a seal being attached to the inner mechanism.

The totalizing register is fastened directly to the mechanism, the figures showing through openings on the side of the case, which openings are covered by a heavy crystal. The mechanism is interlocked in such a way that the device cannot be used without turning the counters, and the connections are positive in action, not depending upon springs or ratchets. The totalizer numbers consecutively up to 100,000



The Rooke Register—Presenting the Register for the Fare.

and sets back automatically when that figure is reached. The totalizing counter is therefore never interfered with, the securing of the trip record being accomplished by merely recording the last number.

It is the intention of the system to secure as fully as possible the use of nickels in paying fares and to discourage the practice on the part of the passenger of requiring the conductor to make change for coins or bills of larger denomination. It is, however, possible for a conductor to make change without difficulty and to make use of both hands in doing so, since the register is retained in the hand by means of a ring through which the conductor passes his middle finger, and when both hands are required the register is allowed to turn upon the finger and drop, in much the same manner as the ordinary conductor's punch. The register may also be conveniently used with metal tickets which many roads use instead of paper tickets. The register will record the receipt of all such tickets in exactly the same manner as described in the case of nickels, but in addition the manufacturers are prepared to supply a register with a separate recording device for metal tickets sold at a discount or of coins of other denominations than a nickel by a separate recording device which will show exactly the number of fares collected.

The manufacturer claims that by its use the entire difficulty attendant upon the use of transfers is obviated. No actual value attaches to the transfers as such, but they are valuable solely by reason of their connection with cash fares for which they were issued, being lost to the company when the fare was paid. If the original fare is registered, and the company has absolute certainty that this is so, there is no further consideration necessary as to the registration of transfers except merely as an incidental matter; in other words, they form no part of the actual receipts of the company, and a registration of transfers is useful only as determining for the company's purposes the extent to which transfers may be used. For this reason ordinarily under this system transfers will be collected and given without registration. The number received may be reported at the end of each trip or in any manner desired.

In addition to insuring a complete registration of all fares



The Rooke Register—Conductor's Strap and Bracket for Holding Register When Not in Use.

collected the company calls special attention to the fact that by the use of this system the annoyance attendant upon the use of the register cord or bar is obviated. In a crowded car considerable time is occupied by the conductor reaching for the register cord, and the tendency is for him to collect as many fares as he can conveniently hold in one hand before operating the register. This of itself seems to have a tendency to defeat one of the purposes for which the register is introduced. Besides this, considerable discomfort is occasioned to passengers in a crowded car by the spasmodic jumps of a short conductor to reach the register cord, and this is a prolific source of ill temper among passengers, owing to injury to head gear and the general discomfort occasioned. Another difficulty which has been experienced with the use of the register cord is the fact that passengers frequently operate the register when desiring to ring the bell for stopping the car.

It is said that on account of the simple operation of this register the conductor is enabled to make collections in considerably less time than otherwise would be the case. As before stated, he is not required to operate the register cord; with the register in hand the extent of his reach is greater than it would be otherwise and the demands upon his mental powers are greatly lessened.

It appears to have been demonstrated by the use of the register upon the lines of the Rhode Island Company that its use has a tendency to induce passengers to exercise more care in offering the exact fare instead of the first coin which comes to hand. This fact of itself should save the conductor considerable time, and so fully is the importance of this feature recognized that in the cars upon which these registers are used the company has posted a notice to passengers requesting them to have the exact fare ready and present nickels only for insertion into the automatic collector. It is, of course, provided that in cases of necessity the conductor will make the required change, returning, however, the full amount to the passenger, who then inserts a nickel in the register without passing it through the hands of the conductor.

About 100 of these registers are in use on the lines of the Rhode Island Company and on lines of exceptionally heavy service. It is stated that fares to the number of 140 to 150 have been taken on 13-bench cars with aisles and running boards filled with passengers, as shown in the accompanying illustration, without difficulty on the part of the conductor, with little discomfort to the passengers and without the loss of fares. In the use of the registers conductors assigned to regular runs retain the same register during the day; in the case of conductors who have light runs and who have more than three hours lay-off during the afternoon they will turn their registers in at the completion of the noon period. Conductors who are assigned to single trips also turn in their registers upon the completion of each trip.

The total weight of the register is 21 ounces. When not in use for collecting fares it is suspended from a leather bracket carried upon the breast of the conductor, thus giving him free use of both hands. This bracket is shown in one of the accompanying illustrations.

Railway Chemical Sprayer Company, Owensboro, Ky., the incorporation of which was mentioned in the Electric Railway Review of July 13, 1907, page 56, advises that its method of spraying chemical for the killing of vegetation along tracks comprehends the placing on board an ordinary flat car of two large tanks containing several thousand gallons of chemicals, with sprayer attachments regulated by steam and air pumps. The vegetation is sprayed with the chemical by this means and is killed within 24 hours after the spraying is done. The equipment of the first car is nearly completed, and it is expected will be in operation on the Illinois Central Railroad near Chicago within a week or 10 days. It is estimated that 50 miles of track can be worked each day by one car. It is planned to place the spraying apparatus in use on both electric and steam roads.

Block Signal and Train Control Board.—The block signal and train control board, appointed by the interstate commerce commission to supervise and conduct experimental tests of block signal systems and appliances for the automatic control of railway trains, has held its first meeting in Washington. The board will call upon all persons having devices or systems to be tested to furnish information concerning them at the earliest practicable date. A great many devices have already been brought before the board. Some of these have nothing to do with block signals or automatic control of trains, and cannot be considered under the authority granted by existing legislation. Such improvements which cannot be considered are, the board announces, car couplers, fire extinguishers, electric headlights, automatic hose connectors, rail fasteners, mail cranes and various types of non-telescoping and other safety railway cars. Improved car brakes will be considered in so far as they have to do with the automatic control of trains. The next meeting of the board will be on July 25.

CYPRESS YARDS AT CLAY ROOK, MO.

The accompanying halftone engraving is a view of the yards of the S-E. Missouri Cypress Company at Clay Rook, Mo. This company makes a specialty of cypress timber and also handles fence posts, railroad ties, round or hewn piling and round or octagonal telephone poles. In the illustration



Storage Yards for Poles.

50,000 poles and piles are shown in stock. L. E. Stutsman and Theodore Mueller, Campbell, Mo., are the managers of the company.

THE SELF-PROPELLED MOTOR CAR FOR INTERURBANS.

BY E. J. CHRISTIE, PRESIDENT AMERICAN MOTOR CAR INTERURBAN RAILWAY.

The utility of a self-propelled motor car for interurban railway use has been fully demonstrated, since it greatly reduces the first cost of a road. A railway built for motor car operation does not require a power house, substation or transmission system. Such roads also have a low cost for operation.

It is thought that many more interurban companies would gladly use motor cars if they were familiar with the highly practicable results of the system.

A practical motor car is now built to be operated by means of a 6-cylinder, double-acting gasoline engine, with the piston rod directly connected to the crankshaft on the wheel axle. This system totally discards the friction clutch and the transmission gear. In starting three of the double-acting engines are operated with compressed air until the other three cylinders take up the speed and have operated in the usual manner for two or three turns of the cranked axle. Then the compressed air is cut off and the remaining three cylinders join the first three in the usual operations. All six cylinders are then operating, but half of them may be cut off at the will of the operator, and the remaining three may be rendered single-acting by the movement of a lever, thus cutting the power to one-half or to one-quarter at any time, or the full power may be maintained as desired.

The compressed air is stored in a tank under the car and can be used for the air brakes, as well as for starting the car.

A small gas engine operates the air compressor and a small dynamo affords electricity for lighting the car and for the ignition device of the engines.

These engines are built in various sizes, from 50 up to 1,000 horsepower, and may be fitted in suitable sizes to any car. More than 20 of these engines have been in practical daily use for more than two years and their high economy has been thoroughly demonstrated. The double-acting engine was long regarded as a difficult problem, but now it is a demonstrated fact, with many practical advantages which were not anticipated.

The American Motor Car Interurban Railway Company, Marion, Ia., will operate its entire system with these motor cars. The writer is president of this company. Two large factories are now building these engines and soon a third one will be producing a 4-cylinder, double-acting engine built after the same design as the engine described above.

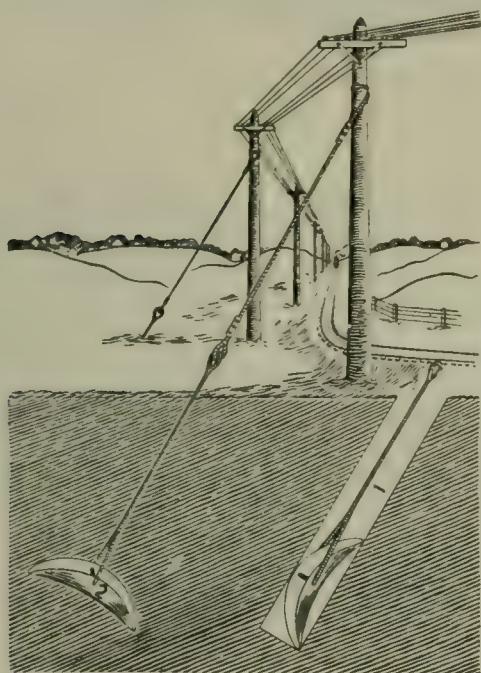
Manufacturing Equipment & Engineering Company, 239 Washington Street, Boston, Mass.—Sanitary and fireproof equipment for the shop and factory, such as individual wash bowls and metal lockers, is the subject of a small pamphlet.

MILLER GUY ANCHORS.

The tendency for the more thorough construction of transmission and trolley lines brings about a demand for improved devices that may be used for supporting the wires and guying the poles. It is a recognized fact that the guying of overhead and transmission lines plays an important part in extending their life. No matter how strong may be the cable used for guying, it cannot fulfill its duty unless its lower end is fastened to a substantial anchor. There have been many instances where overhead lines have failed for no other reason than curtailment in the first expense of placing deadmen and guys.

The accompanying illustration will serve to show the method by which the product of the Miller Anchor Company, Norwalk, O., is placed preparatory to its service as a permanent anchor for guying various structures. It will be noted that this anchor comprises an elliptical shaped saddle-like iron casting pivoted to a wrought-iron eye rod. These rods can be of any desired length to allow the anchor to be buried at the depth required by various kinds of soil.

The method of burying the anchors is simple. By means of a special auger manufactured by this company, a hole is dug at the desired angle necessary to place the anchor rod in an approximately direct line with the guy that will later be fastened to it. This hole is of a diameter sufficiently large to permit the insertion of the anchor when folded as



Application of Miller Guy Anchor.

indicated in position 1, in the illustration. After the device has been inserted in the hole the uppermost end is pushed down by means of a tamping bar until it takes the angle shown in position 2. The earth which was bored out of the hole is then replaced and tamped, the tamping being more heavily done on the side of the anchor which was uppermost in position 1. All the dirt dug from the hole, and a little more if possible, should be tamped solid without the use of water for settling. The reader's attention is called to the relatively small amount of labor required in burying one of these anchors as compared with the task of digging a trench and placing a deadman as frequently made from a railroad tie.

A test which was recently made on a No. 2 Miller anchor by Prof. R. G. Dukes of the Case School of Applied Science, Cleveland, O., shows conclusively that the holding power of these anchors considerably exceeds the strength of the rods to which they are attached. In the tests made by Professor Dukes the rods attached to the anchors broke, representing a force of 19,350 pounds for $\frac{3}{4}$ -inch rods. In selecting these anchors, therefore, it is only necessary to determine the size of wrought-iron rod required to safely stand the anticipated strain, and it will be found that if anchors are buried in accordance with the directions previously given they will be amply strong for the work required of them.

In the case of the anchor rod which broke at 19,350 pounds, the estimated weight of the earth and its adhesive attraction has been calculated to be 65,000 pounds, which shows the ample margin of safety. The great holding power

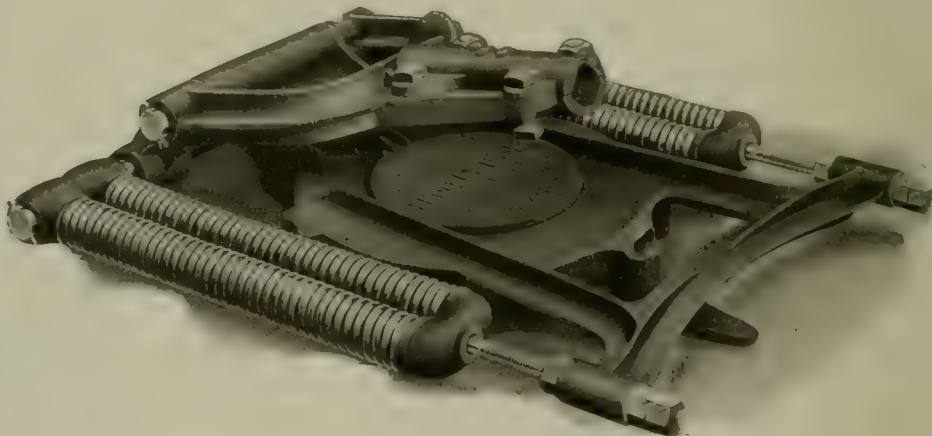
of these anchors is attributed to the fact that as the anchor unfolds it grips solid, undisturbed earth, which has a holding power much superior to that of earth which has been excavated and retamped.

These anchors are also of service for anchoring fence posts along the right of way, and the larger sizes are frequently valuable for guying tackle used in clearing wrecks.

THE MILLOY ROLLER-BEARING TROLLEY BASE.

The life of trolley wheels and the wire on which they run depends to a considerable extent upon the performance of the base and its parts in maintaining the trolley wheel against the overhead conductor. The accompanying illustration shows the general appearance of a trolley base manufactured by the Milloy Electric Company, Bucyrus, O. The moving parts of this base rest on a double set of roller bearings, thus requiring no oil or other lubricant and permitting the trolley pole to have that free lateral swinging movement which is necessary to allow the wheel to follow the wire on curved track. There is no center piece to the base, the device centering itself between its tapered roller bearings. The bearing surface is 56 inches, thus assuring a long life. Pure charcoal malleable iron is the material of which the base is made. The design and the stresses in the various parts are such that in combination with the excellent material that is used there occur very few instances in which it is necessary to make repairs.

A hook is provided for locking down the yoke. This feature is a desirable one that is realized when changing trolley poles under a low ceiling, since it saves the time often required for taking the cars out of a low barn to permit of



The Milloy Roller Bearing Trolley Base.

changing the trolley pole. The connection for the car-feeding cable is entirely under cover, so that no water or dust can come in contact with it. Cable of any size can be inserted in the connection and no tape is required for insulation. The area of contact between the moving and stationary parts is especially large and the base is so built that it can be used with alternating or direct current installations. The height of the Milloy base is 5 inches, at which height there is positive clearance. Its weight is 118 pounds.

Probably one of the most important features as regards operation is the uniform tension which this base assures in the trolley wheel against the wire. It is stated that there is just as much tension on a wire 23 feet above the track as when the pole is down on the roof of the car, there being no variation in the tension between these extreme positions. This desirable feature should result in obtaining the longest life from trolley wheels and bushings, since the uniform tension assures freedom from arcing when running under a high wire, or at high speeds.

Embury McLean has bought the interests of Henry B. Haigh, president, and John MacCormick, second vice-president of the Engineer Company, New York, and has become president of the concern. Mr. Haigh and Mr. MacCormick have resigned, and the latter will engage independently in the manufacture of his stoker, the Engineer Company having relinquished its right in his patents. Hereafter the company will devote itself exclusively to the installation of "balanced draft" in connection with any boiler furnaces, whether hand fired or operated with various mechanical stokers. The officers of the company at present are: Embury McLean, president; John C. Quinn, vice-president; North McLean, treasurer; and R. E. Fox, secretary and sales manager.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 4

CHICAGO, JULY 27, 1907

WHOLE No. 222

TABLE OF CONTENTS.

Editorial:		United States Court Restrains Passage of 3-Cent Fare Law in Detroit	108
—Electric and Steam Standards	91	News of the Week:	
—Good Service the End Desired	91	—Chicago Experts on Eastern Trip	108
—Accounting by Interstate Railways	92	—Fares on Portland (Ore.) Railway	108
—Care of Motor Brushes	92	—Hearing in Lincoln (Neb.) Case	108
—When Taxes Become Confiscation	92	—Stock Exchange Acts on Forest City Stock	108
—Schoolroom Suggestions	93	—Public Service Commission	109
Long Ride for One Fare in New York	93	—Hearing on Chicago Plan	109
Freight and Miscellaneous Equipment of the Pacific Electric Railway (Illustrated)	94	Construction News:	
Cleveland Meeting of Standardization Committee, American Street and Interurban Railway Engineering Association	97	—Franchises	110
Damage Claimant Held to Grand Jury in Louisville, Ky.	97	—Recent Incorporations	111
Report of Civic Federation Commission on British Tramways	98	—Track and Roadway	111
New Offices and Repair Shops at Lima, O. (Illustrated)	100	—Power Houses and Substations	112
American Street and Interurban Railway and Engineering Association Circulars	101	Personal Mention	114
Table for Ascertaining Speeds (Illustrated)	101	Financial News	114
Books of Standards (Illustrated)	101	Manufactures and Supplies:	
Book Table	102	—Rolling Stock	115
Los Angeles Railway Emergency Car (Illustrated)	103	—Shops and Buildings	115
Los Angeles Railway Shop Car (Illustrated)	104	—Trade Notes	116
Electrical Testing Device (Illustrated)	104	—Advertising Literature	117
Piping and Power Station Systems—XLVI. By W. L. Morris, M. E. (Illustrated)	105	Automatic Electric Signals. By John J. Ruddick	117
Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	106	Wagenhorst Automatic Electric Blue Printer (Illustrated)	118
Bonuses as Safeguards Against Accidents. By William R. Bowker	107	Shawmut Pocket Test Lamp (Illustrated)	119
		The Cole Trolley Hanger (Illustrated)	119
		Thermit Steel for Repair Welding (Illustrated)	119
		Magic Boiler Compound	120
		Ideal Trolley Wheel (Illustrated)	120
		Directory of Electric Railway Associations	120

It should be particularly gratifying to the members of the various steam railway associations who have labored for many years in the endeavor to secure a system of standards which shall be generally applicable to the steam railways of the United States, to note that their action has been extensively indorsed by committees of street and interurban railway men who have similar matters under consideration. Such action is likewise a good indication of the closeness to which the conditions of interurban service now approach those which have developed under the older system of motive power. There are numerous instances in which the requirements of practice are almost identical, and it is a happy omen that they are so recognized. Mention has previously been made in these columns of the fact that a committee of the American Street and Interurban Railway Association in formulating a code of rules for the operation of high-speed interurban roads found it desirable to confine itself very closely to the rules which have been worked out in the light of many years' experience by the American Railway Association. At a meeting of a committee of the Engineering association on "Standardization," the tendency of discussion was in almost all particulars toward the adoption of the Master Car Builders' Association's practice in the matter of wheels and brakeshoes. A meeting of a state association representing street and interurban railway interests declared itself generally in favor of the rail sections which have been largely adopted by steam roads, while at a more recent meeting of the same association preliminary steps were taken toward the adoption, in important particulars, of standard shop layouts along the lines which have been more or less completely established in steam railway practice as a result of the work of the American Railway Master Mechanics' Association. It is not to be anticipated or desired that the practice of the younger system of operation should be made to conform rigidly to the details which have been worked out as applicable to the conditions of the older system; but it is plain that the work in one line contains at least the germ of the principles upon which the action of the other must be based. By the recognition of this fact at this

period of development of electric traction systems much "lost motion" will be saved and the inevitable gradual drawing together of the two systems promoted.

Electric and Steam Standards.

The plan of having opponents and exponents of municipal ownership review the expert reports of the National Civic Federation commission is continued in the critical summaries, which are now made public of the results of the investigation of British tramways. The practical view of this subject is taken by William J. Clark, manager of the foreign department of the General Electric Company, who states that the policy of extending existing tramways only through densely populated districts, where the greatest possible revenue can be secured without adequate transportation facilities, must necessarily result in low fares; and that if American street railway systems were reduced similarly by the operation of profitable lines only, on which the traffic density is high, and the discontinuance of the lines which are unprofitable, the companies here could afford to make lower fares. Mr. Clark shows that the average American car carries only a little over one-half as many passengers as the average in the United Kingdom. All-night transportation in the larger cities, longer service generally, better wages, and shorter headway are other advantages afforded by the American lines. In the abstract which has been issued of the contribution of Prof. Frank Parsons, on this topic, in which the theory of municipal ownership is upheld, more is said of the relative condition of former private and present municipal tramways in Great Britain than of the comparative benefits of the systems of the present day in that country and in the United States. The conclusions of Professor Parsons on this important subject recall his comment in the previous report, in last week's issue, in which he declared that in most discussions of municipal ownership too much attention is given to the purely financial side of the question, and that, while "dollars and cents are not to be neglected, life, liberty, justice, virtue and intelligence—the whole character product and social product of our

institutions—are of greater moment than their money product." This is strictly a utilitarian world, where the law of survival of the fittest in enterprises involving profit or loss is pitiless. While the ideal may not have been attained by private capital, it is more nearly approached in private ownership than under public ownership. What really concerns the people in great cities, however, is the character of the service rendered, and past examples and present weakling experiments under public officials undoubtedly prove that better facilities are afforded through private investment.

In response to a letter from the Indiana railway commission Prof. Henry C. Adams, in charge of statistics and accounts for

**Accounting
by Interstate
Railways.**

the interstate commerce commission, has indicated the attitude of the federal authorities toward the accounting systems of electric railways engaged in interstate business.

During trips which Professor Adams is making about the country this subject, among others, is being discussed with members of various state railway commissions. Action, however, has practically been deferred on account of the work and time involved in formulating accounting systems for steam railways and express companies. A beginning was made in the direction of uniform accounts for steam and electric railways, but this plan was abandoned. The question affecting electric railways was brought before the interstate commerce commission because the desirability of having the state and national forms of reports as nearly alike as possible was suggested to the Indiana commission by representatives of various interurban railways. While it is clear that eventually the national authorities will prescribe a system of accounting for interstate electric railways, no action is imminent.

A properly designed railway motor should run sparklessly from a load so light as to give treble the normal speed up to a

**Care of
Motor
Brushes.**

load of double the one-hour rating. These conditions may seem severe, but are said to be fully met in the new types of railway motors that have auxiliary commutator poles interposed between the main field

coils. It may safely be stated that the most frequent source of trouble with railway motors not having interpoles is found at the commutator, the duties of the brush requiring that it shall short-circuit the coil directly under it, as the direction of current through the coil is being reversed. This necessitates the brush being of a definite width for commutator bars of a certain thickness and it also requires that the brush itself offer some internal resistance during the short-circuiting process. These duties when added to the mechanical ones which a brush must meet, call for especial care in the choice of materials and the proportioning of the shape of the brush. The severe service which a brush must meet also demands careful inspection. It is expected that the adoption of the commutating interpoles will greatly relieve the brush troubles now experienced, but as comparatively few motors of this type are yet in actual service it probably will be of interest to consider the carbon brush as it is now used, since a large number of motor troubles make their presence known at the brush holder. Weak fields, open or short circuited armature coils, wrongly spaced brush holders, commutators worn elliptical or worn down in the middle, all tend to produce sparking at the brushes, and yet the fault cannot always be correctly attributed to the brush. However, among the troubles for which the brush itself is directly responsible may be mentioned improper fitting to the commutator surface, binding in the holder and weak spring tension. If a brush is not properly fitted to the contour of the commutator when it is first installed it is quite probable that it will start burning, and no matter how long it is run will not be worn down to a good smooth surface. When brushes fit the holder too tightly they are prevented from following any irregularities that may exist in the com-

mutator surface; and sparking, with its attendant burning, results. Too light a tension on the brush spring causes chattering and its consequent sparking. In this connection might be mentioned the most frequent cause of brush troubles. A brush may be carefully fitted so that it will move freely in the holder, yet it will be found after a few trips that the carbon binds in the holder. This binding as the brush becomes heated in operation results from the boiling-out of the paraffin with which the brush may be saturated, the boiling-out being caused by the expansion of the paraffin as it becomes heated. On reaching the cooler parts of the holder or brush the paraffin hardens and tends to make the brush bind in the holder. In one instance where this trouble occurred the use of a brush one sixty-fourth inch less in thickness and the choice of a carbon in which there was less paraffin greatly reduced the commutator troubles. It is thus seen that especial care is warranted in the choice of the materials which compose the brush and in the careful fitting of the brush to the holder.

WHEN TAXES BECOME CONFISCATION.

The writs directing the New York state tax commissioners to show cause why the assessments against the Brooklyn Rapid Transit system should not be reduced as illegal and excessive are the inevitable results of continuous increases in enormous tax burdens. The plain alternative which the company faces is that of contest to the final courts or of implied consent to the virtual confiscation of the property.

In this question the public record of the company is without fault of omission or commission. It desires to make a "proper contribution to the support of government." The practice of the company "is not to resist the payment of any tax which is lawful and not excessive and unequal." Following these statements T. S. Williams, vice-president of the company, adds the significant fact that "with one exception we have not contested any tax during the last 12 years where the courts have not fully sustained our position in whole or in part."

The intolerable state of affairs which makes an appeal to the courts imperative for preservation of the property is best shown by the figures submitted by the company. These figures were presented to the New York state tax commission, as stated in the Electric Railway Review of March 30, 1907, but as the appeal to that body was ineffectual, they are now submitted to the court. The total assessments for special franchises of the companies constituting the system amount for this year to \$59,436,000, an increase of 54.26 per cent over the previous year. The net surplus of the company, Mr. Williams says, increased last year but 4.45 per cent over the previous year. The extent of the preceding increases in special franchise assessments is also stated by Mr. Williams. The 1906 assessment was 30.35 per cent over that for 1905, which was 15.55 per cent above that for 1904. Since the first assessment made in 1900 by the commission named under the new franchise tax law by Theodore Roosevelt, as governor of New York state, the increase in assessments has been steady, making the figure for last year 149 per cent greater than the total for the first year. By paying all taxes and accumulated penalties the company complied with the provisions of the law as soon as its validity was established. But since 1904 the large increases have compelled it to resist payment except on the value of tangible property.

In 1907 the total direct assessment, state and local, against the properties of the system is \$163,410,355, representing, at the tax rate for last year, a tax of \$2,512,744. Large as this total is, it does not represent nearly the sum of the tribute levied against the company, which must pay also state taxes on gross revenues and on the right to exist as a corporation, local taxes on revenues and cars, and license fees for carrying passengers over two bridges in New York.

Add to these the cost of city inspectors, of new paving, the expense of carrying policemen and firemen free, the proportional expense of maintaining the public service commission, and "many other impositions," and the aggregate of all would be, if computed at not more than the amounts actually paid last year in each instance, \$1,119,612, making, with the direct taxes stated in the foregoing, a total of \$3,632,356.

The burden thus heavily laid on the company is equivalent to 18.69 per cent of the gross revenue from all sources in the calendar year 1906, and 61.09 of the net revenue, after deducting taxes paid and charged, not those assessed, and excluding charges for capital expenditures. This total, at the 1906 tax rate, represents property of a total value of \$236,000,000, or \$97,000,000 above the par value of the outstanding bonds and stocks of the companies which comprise the system. These companies, as Mr. Williams adds, represent "54 years of railroad financing, failures, reorganizations and reconstructions."

From the standpoint of law or public policy no assessments of this disproportionate size are just or right. They are obviously a peril to the company, and the claim for reductions has therefore a basis which no unprejudiced mind can question.

SCHOOLROOM SUGGESTIONS.

As noted in these columns from time to time many of the larger railway properties have established schools for the instruction of employes. It is to be regretted, however, that some of these schools are not so broad in their application as they should be, giving little or no instruction to any employes other than motormen. It is of the utmost importance that great care be exercised in the selection of instructors and in the choice of the location and furnishings for a school.

The schoolroom not infrequently is located in some out-of-the-way corner in a car barn, having poor sanitary features and not affording the clean, comfortable surroundings that should exist in a place of instruction. In the schoolroom men are expected to learn all that they should know about their duties—how to be clean, genteel, honest and careful, so that they may deal with the public like gentlemen, looking after the interests of the company they represent. It is a question if schools of this kind obtain the results desired unless the suggestions here made are followed. A somewhat critical examination of many of the schools for instructing electric trainmen probably would result in the careful consideration of these arguments.

It would be well to have at least two clean, well lighted, heated and ventilated rooms centrally located not far from the general offices of the company, and, if possible, built in a structure especially designed for the purpose. The rooms, if two are used, should be connecting and the possibilities of future enlargement be considered. The room to be used for instructing motormen would probably be best equipped if it were fitted with a number of controllers without casings, circuit-breakers, fuses, gongs, hand and air brake sets, each piece of apparatus being on a raised platform surrounding the center of the room, with suitable partitions to assure individuality in the work, even though several students were under the care of one instructor. Several companies find it advisable to set up skeleton cars mounted on regular trucks with motors and complete control systems placed where all the students can see them. In connection with the wiring for a control system there are a number of incandescent lamps arranged to show the steps in the resistance and the effect of the controller movements upon the armatures and fields, and also to indicate the current generated by the motors when running with the trolley disconnected. In some instances fans are used near the lamps, the rotation of the fans closely resembling the movement of the armatures.

It also has been found useful to install one of each kind of controller used by a railway, this control installation in-

cluding actual electric connections with switches, etc., so that an instructor may give a thorough demonstration.

The instructor's stand in the center of the room should be a raised platform on which are mounted a set of switches and signal bells so that he may be able to cut off the power, trip the circuit-breakers and give the usual signals that a motorman will receive in actual operation. The value of teaching a student the proper course to pursue when the power is cut off or the circuit-breaker opens, is obvious. In this way the student receives a knowledge before going on the road that gives him when in actual service more time for the cultivation of his nerve sense. In fact, in this schoolroom should be given all the practical instruction regarding the operation of a car; and, when concluding the course, the men should be well examined.

It is thought advisable to provide a second room. The essential equipment of this room would include a raised platform, blackboard, desk, chair and writing material for the instructor, and also tables, chairs and writing materials for the conductors and a signal bell and air whistle equipment. The purpose of this room would be to give instruction in writing, arithmetic, deportment and the manipulation of the signals so far as might be needed; also the company's rules, the explanation of the proper use and value of tickets and transfers, how to fill out reports, how to act under various circumstances, and, in fact, all of the details that might be necessary in teaching a conductor how to operate a public service car.

The length of time that a student should spend in the instruction department should be ample, having in mind that sometimes a seemingly stupid man will eventually make a most careful and steady trainman. On the other hand, a man who is quick to learn, with a good character well investigated, should not be kept back, but should be placed in actual service just as soon as the chief instructor certifies that he is sufficiently qualified.

The regulations governing the employment of instructors and to whom they should report, as well as many other matters of discipline, vary so greatly on different roads that this subject has not been considered; but it is suggested that inasmuch as most well-managed companies have employment departments, the selection and control of all these matters may be left to that organization. The thought to be emphasized in this discussion of schools for trainmen is that too much stress cannot be laid on the perfection of the employment and instruction department of an electric road.

Long Ride for One Fare in New York.

T. P. Shonts, president of the Interborough-Metropolitan Company, New York, has given out some statistics collected by the American Street and Interurban Railway Association, which show that a longer ride can be secured on surface lines in New York for five cents than on roads in any other city of the country. Mr. Shonts pointed out that by boarding a car at the Battery and using all of the transfer privileges, a ride could be secured to Kingsbridge, a distance of 37½ miles, for a single fare.

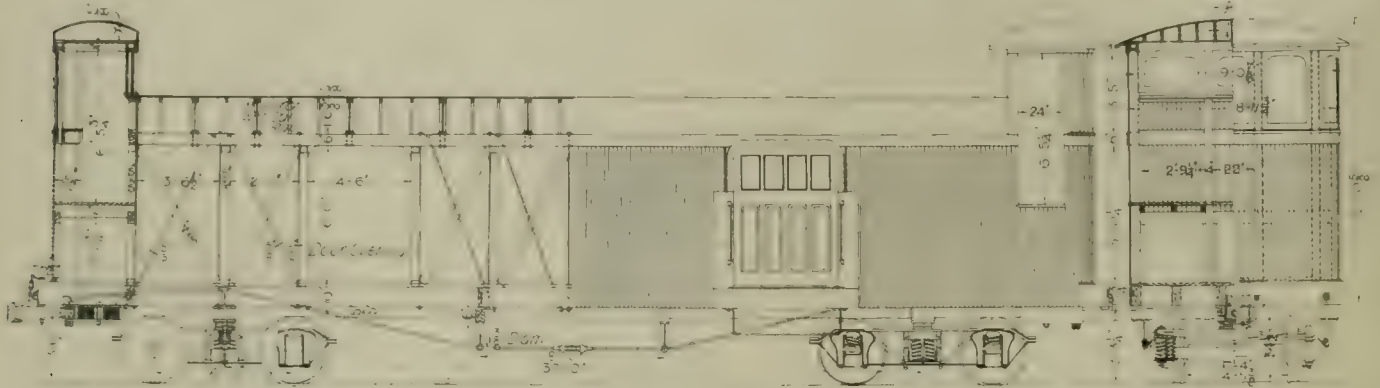
In Philadelphia a ride of over 26 miles can be secured for one fare. The average for the 10 principal cities of the country is a little over 19 miles. Mr. Shonts said:

"The figures for all of the cities show that the length of the ride, both by the lengthening of direct lines and the extension of the transfer system, has steadily increased. With this there has been a considerable increase in the cost of operation, but the cost of the ride remains the same. In other words, the statistics show that one gets more for a nickel now on the street railways of the country than ever before, and that a street car ride is the one necessity of life that does not show an increased cost in keeping with the increased cost of its production and maintenance."

FREIGHT AND MISCELLANEOUS EQUIPMENT OF THE PACIFIC ELECTRIC RAILWAY.

The more interesting features of the passenger rolling stock equipment operated by the Pacific Electric Railway, Los Angeles, Cal., were described and illustrated in the Electric Railway Review for July 20, 1907, page 64. The present article, which is a description of the freight equipment and miscellaneous rolling stock, will serve to show how well this 525-

The car framing is of the ordinary M. C. B. box car type. This car body is mounted on standard 6-foot rigid-bolster trucks, having plate-type bolsters, with cast-iron web fillers. The electrical equipment comprises four Westinghouse No. 112, 75-horsepower motors, with two master controllers and electro-pneumatic multiple-unit control. There are two brake equipments, one of the Westinghouse AMP automatic schedule for freight train operation and the other Westinghouse SWA straight-air schedule. These cars weigh complete 64,000



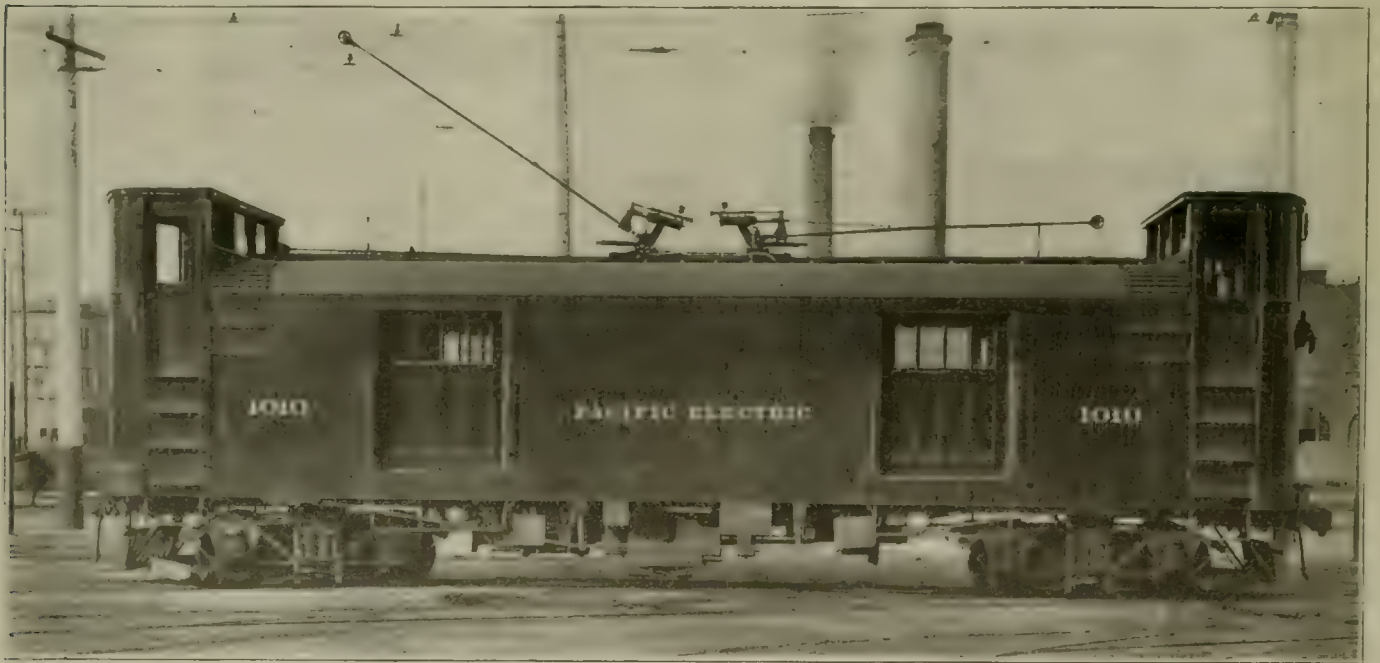
Pacific Electric Rolling Stock—Details of Express Locomotive with Elevated Cabs.

mile system is prepared to handle its large freight traffic. This company's rolling stock, other than the passenger equipment, includes 13 express locomotives, 4 tower line cars, 1 material car, 1 wrecker, 12 work motors, 1 electric freight

locomotive, 96 flat cars, 34 box cars and 25 now building, 8 oil cars, 2 double-truck cabooses and 2 portable substations.

Freight Locomotive.

The traffic of the interurban lines of the Pacific Electric



Pacific Electric Rolling Stock—Express Locomotive with Elevated Cabs.

locomotive, 96 flat cars, 34 box cars and 25 now building, 8 oil cars, 2 double-truck cabooses and 2 portable substations.

Express Car with Elevated Cabs.

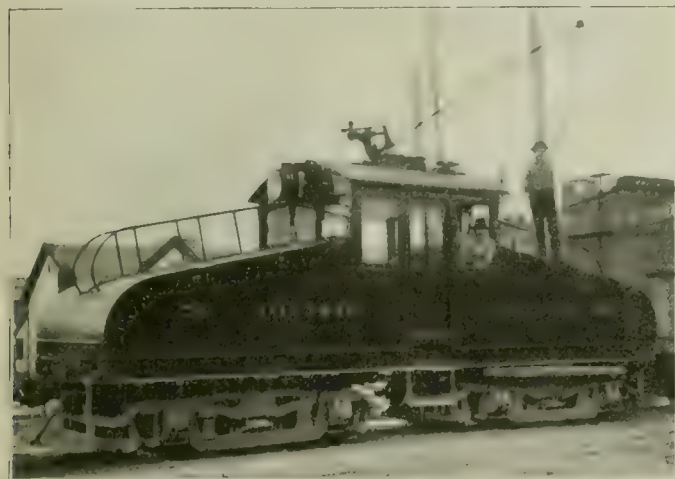
Accompanying illustrations show the general appearance and some of the construction details of a type of express car with elevated cabs that has been developed in the Pacific Electric shops. It will be noted that this car has the ordinary express car body and that the motorman's cab is placed at such an elevation that he can look over the tops of any train that this motor car may be pulling. The floor of the cab is raised about 3 feet 4 inches above the general floor level. End doors permit the loading of long material.

includes the handling of long trains of freight cars over the same lines that are used by the high-speed passenger equipments. For use in this freight handling the locomotive, as illustrated herewith, was designed and built.

It will be noted from the illustration that this unit is 30 feet long, 8 feet 6 inches wide and 12 feet high. The underframing consists of four sills, each being a 12-inch 31.5-pound I-beam. These sills are continuous throughout the length of the frame. They are tied together by riveted joints with I-beams of similar section. The cab of the locomotive and the body are of steel plate, perforated at the ends to permit ventilation, which is needed for the resistances of the electrical control apparatus that is carried inside the car body.

By reference to the photograph and halftone illustration it will be noted that hand rails are provided on either side of a runway leading over the top of the locomotive body.

Accompanying line drawings illustrate the general con-



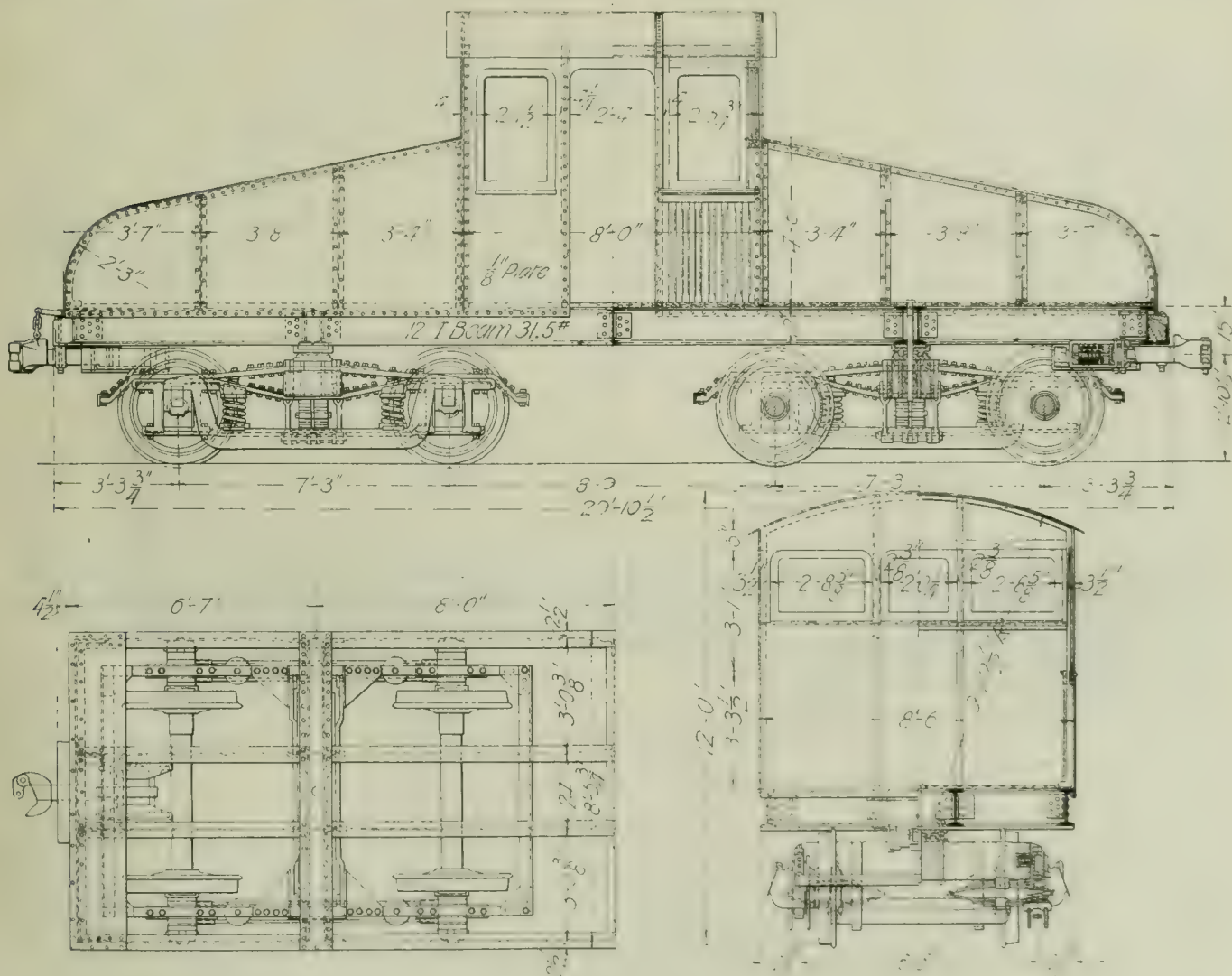
Pacific Electric Rolling Stock—Freight Locomotive.

trical equipment comprises four Westinghouse 86A, 200-horsepower direct-current motors, with a gear ratio of 65 to 17. The axles conform to M. C. B. standards and have 5½ by 10 inch journals. The wheels are 36 inches in diameter, with steel tires. The control equipment is of the Sprague-General Electric multiple-unit, with type C-18 master control. Westinghouse automatic air brakes, with a motor-driven compressor, are provided of a suitable capacity for handling trains of freight cars. The M. C. B. couplers are connected to the center sills by Miner twin draft rigging.

While this locomotive weighs 102,800 pounds and has four 200-horsepower motors, it is designed to permit of the body being loaded, and thereby increased tractive power obtained, without necessitating a change in the electrical equipment. The present loading is made by placing concrete in the floor between the car sills.

Tower Car.

An accompanying illustration reproduced from line drawings will serve to show the general construction of the body of a car used for trolley wire, emergency and construction purposes. This car body conforms in shape to that of the ordinary express car. It has, however, two openings in the roof, in which are mounted adjustable towers or platforms. It is proposed to raise and lower these towers with air cylin-



Pacific Electric Rolling Stock—Freight Locomotive, 800 Horsepower.

struction of the underframing and trucks. There are two trucks, each of the swing bolster type. The bolsters contain the only wood, with the exception of the interior finish, that is used in the construction of the locomotive. The elec-

ders. Another small opening in the car roof between the two towers is fitted with roller guides, so that when it is desired to string trolley wire a reel can be mounted inside of the car body and the copper wire payed out through the hole

in the roof and over the rear tower to the pole line. In this way the tower car will serve as its own locomotive. The space in the interior of the car is so large that two reels of trolley wire can be carried, and, as described, this wire can

and one emergency tower wagon of the automobile type, which was described and illustrated in the Electric Railway Review for May 25, 1907, page 689.

Miscellaneous Equipment.

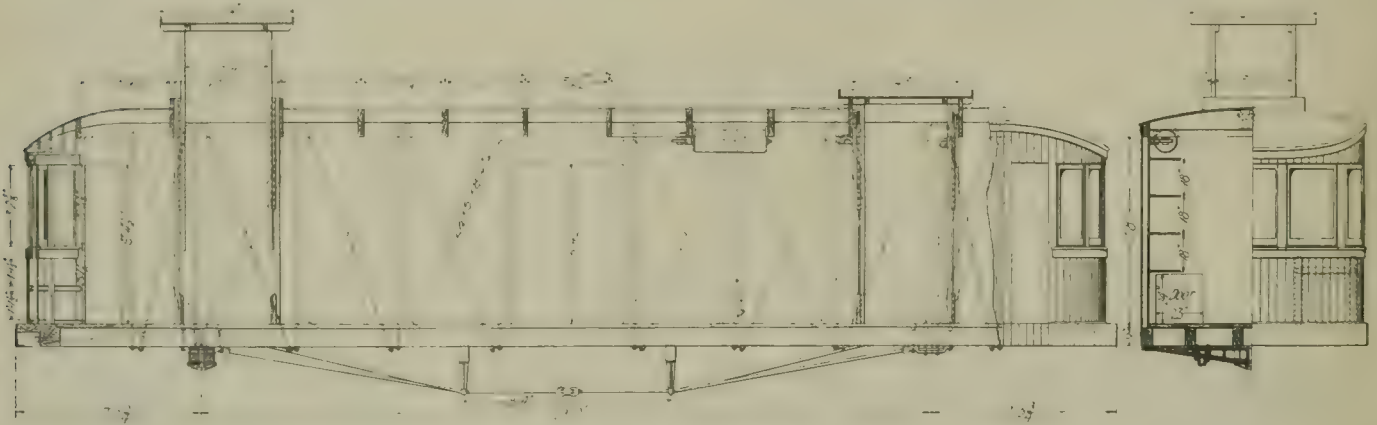
Illustrations are presented herewith of some of the miscellaneous equipment, all of which was given in the list at



Pacific Electric Rolling Stock—Standard Box Car.



Pacific Electric Rolling Stock—Oil Tank Car.



Pacific Electric Rolling Stock—Line Car.



Pacific Electric Rolling Stock—Standard Flat Car.

be strung while the current is in it. Current can then be taken off the reel for the purpose of moving the car.

Along the sides of the interior of the car shelves are provided for carrying tools and small materials. By reference to the illustration it will be noted that there are doors at both ends of the car, in the end sheathing near the bumper, thus permitting poles to be carried for use in emergency line construction. The electrical equipment comprises four Westinghouse 38B 50-horsepower motors, with a high gear ratio, so that the car may be able to get to the location of any line trouble with the least possible delay. Westinghouse straight air brakes are used. The complete equipment weighs 28 tons. The company also has five trolley wagons drawn by horses,

the beginning of this article. The box, flat and tank cars, as shown, conform to M. C. B. standards and are not equipped with motors. The parlor cars, one of which is illustrated, have the same body and motor equipment that is used for the standard passenger equipments, but are more elaborately furnished inside. The policy of the Pacific Electric Railway is to adopt the highest available types of rolling stock and to maintain these in a very thorough manner.

Following a loss of travel in consequence of increased competition from electric railways, the Philadelphia & Reading has taken off a number of passenger trains between Philadelphia and Chestnut Hill; also some from the Glenside division.

CLEVELAND MEETING OF STANDARDIZATION COMMITTEE, AMERICAN STREET AND INTERURBAN RAILWAY ENGINEERING ASSOCIATION.

A meeting of the "Standardization" committee of the American Street and Interurban Railway Engineering Association was held at the Hollenden hotel, Cleveland, O., on Friday and Saturday of this week. The sessions were open and a large attendance of representatives of manufacturers indicated how closely they are following the subject of standardization. The various subjects were considered as follows:

1. Standard axles, journals, journal bearings and journal boxes.
2. Standard brakeshoes, brakeshoe heads and keys.
3. Standard section of tread and flange of wheels.
4. Discussion of standard rail section and special work as directly affecting the wheel tread and flanges.

The meeting was called to order by Chairman W. H. Evans, master mechanic of the International Railway Company, Buffalo, N. Y. Mr. Evans was recently appointed chairman of the committee, as announced in the Electric Railway Review of July 13, 1907. The minutes of the May meeting were approved.

H. H. Adams, superintendent of shops of the United Railways & Electric Company, Baltimore, Md., president of the Engineering association, outlined the work which was accomplished at an informal meeting at Atlantic City. A programme of the work before the committee was outlined and the resignation of H. Wallerstedt as chairman was accepted.

Mr. Evans then stated that the purpose of the Cleveland meeting was to formulate the report for the fall convention. The subject of axles was considered first, the discussion being based upon the report of the "Standardization" committee of the Central Electric Railway Association. This report was published in the Electric Railway Review of May 25, 1907, page 675. The axle design designated as A (see Electric Railway Review of May 25, page 677) was considered desirable for motors up to 50 horsepower. This axle is $4\frac{1}{2}$ inches in diameter at the center, 75 inches long center to center of journals, $83\frac{1}{4}$ inches long over all, with journals $3\frac{3}{4}$ by 7 inches, wheel fits $5\frac{7}{16}$ by $7\frac{1}{2}$ inches and a gear fit $5\frac{1}{4}$ by $6\frac{3}{4}$ inches. The comparatively large gear fit, it is believed, will prevent fractures.

At the afternoon session journals, journal bearings, brake-shoes and heads and keys were freely discussed. The proceedings included the discussion of the center-to-center distance between the brake heads. F. W. Sargent and J. F. Thompson of the American Brake Shoe & Foundry Company exhibited special blue prints and full-size shoes to illustrate their suggestion regarding a standard shoe that would be interchangeable with Master Car Builders' shoes.

Through the courtesy of the supply men in Cleveland those who attended the meeting were entertained on a special car ride with a "shirt sleeve" dinner at White's "two minute villa."

The proceedings of the Saturday session will be reported in a later issue.

At this meeting the subject of standard rail sections and special track work will be taken up in connection with the subject of wheel treads, particularly with reference to the effect of rail sections and special work upon the wheel tread and flange. Mr. Evans announced that the committee having this matter in hand would have the assistance of representatives of the wheel manufacturers, including P. H. Griffin, chairman of the wheel manufacturers' committee, who would submit their recommendations, with blue prints and such information as was available. Representatives of various rail and frog manufacturers will also be present; also Fred G. Simmons, chairman of the "Way" committee of the Engineering association, with Charles A. Clark, International Railway Company of Buffalo; Julian Griggs, Scioto Valley Traction Company, and E. O. Ackerman, Columbus Railway & Light Company, members of this committee.

A partial list of those present follows:

- H. H. Adams, United Railways & Electric Company, Baltimore, Md.
- W. H. Evans, International Railway Company, Buffalo, N. Y.
- C. B. Fairchild, Jr., Electric Traction Weekly.
- H. W. Blake, Street Railway Journal.
- L. E. Gould, Electric Railway Review.
- F. W. Sargent and J. F. Thompson, American Brake Shoe & Foundry Company.
- E. S. Lewis, Standard Steel Works.
- Julian Griggs, Scioto Valley Traction Company.
- E. O. Ackerman, Columbus Railway & Light Company.
- Victor Angerer, William Wharton, Jr., & Co., Incorporated.
- William C. Cuntz, Pennsylvania Steel Company.
- Gilbert S. Vickey, Pennsylvania Steel Company.
- N. B. Trist, Schoen Steel Wheel Company.
- G. B. Dusinger, formerly with Westinghouse Electric & Manufacturing Company.
- H. J. Kenfield, Electric Traction Weekly.
- N. W. Storer, Westinghouse Electric & Manufacturing Company.
- Talioferre Milton and H. B. Gay, Electric Storage Battery Company.
- B. V. Swenson, American Street and Interurban Railway Association.
- Charles A. Clark, International Railway, Buffalo.
- Fred G. Simmons, Milwaukee Electric Railway & Light Company.
- E. D. Priest, General Electric Company.
- S. D. Hutchins, Westinghouse Air Brake Company.
- A. H. Weston, The T. H. Symington Company.
- Walter S. Adams, The J. G. Brill Company.
- R. C. Taylor, Indiana Union Traction Company.
- E. B. Entwisle, Lorain Steel Company.
- Randolph Clitz, Sherwin-Williams Company.
- C. N. Leet, National Brake & Electric Company.
- Fred N. Root, Kalamazoo Railway Supply Company.

DAMAGE CLAIMANT HELD TO GRAND JURY IN LOUISVILLE, KY.

We have received an account of the case of A. W. James, who has been held to the grand jury in Louisville, Ky., on the evidence gathered by public authorities of that city, and by the Louisville Railway Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind. J. T. Funk, general superintendent of the former company, and F. E. Cole, superintendent of the latter company, have furnished us with the particulars of the case.

Mr. Funk says that on June 5 James fell down in one of the Louisville Railway cars. He was visited two days after this by a representative of the company, who settled the claim for \$25. A friend of James' who was with him at the time afterward notified the manager of a private detective agency, Jacob H. Haager, who is now chief of police of Louisville, that James had previously told him that he intended to fall and wanted him for a witness. Some time before this a younger brother of James' had climbed a wire and claimed to have received a shock. The father of James at one time placed a vehicle on the track in front of a car and refused to move until after a quarrel with the motorman and conductor, one of whom pushed him away with the brush end of a broom. In this case it was claimed that a switch iron had been used and that an assault had been made, and a damage suit is now pending for alleged injury.

The report on the case which we have received from Mr. Cole states that on June 21, 1907, Mrs. A. W. James tripped over the lattice in the bottom of one of the interurban cars of the Louisville & Southern Indiana Traction Company in Louisville. After apparently being unconscious for 15 minutes she was taken to her home by her husband in a carriage. Permission to the company's physician to examine Mrs. James was refused by her husband. Investigation disclosed the cases against the Louisville Railway Company.

James was arrested in Louisville on the charge of obtaining money under false pretenses. He was tried in the police court and on July 18 was held to the grand jury, which convenes in October. The case will be pushed vigorously by the companies.

REPORT OF CIVIC FEDERATION COMMISSION ON BRITISH TRAMWAYS.

Additional reports which have been made public by the National Civic Federation municipal ownership commission relate to the operation of street railways in Great Britain by private corporations and municipalities. The expert reports on this subject were written by engineers who spent several months in the cities in which street railway conditions were investigated. With the engineers on their trips were William J. Clark of New York, general manager of the foreign department of the General Electric Company, and Prof. Frank Parsons of Boston. Mr. Clark as an opponent of municipalization and Professor Parsons as an advocate of public ownership and operation have reviewed the reports of the engineers.

Mr. Clark compares the tramways of Great Britain with the private enterprises of the United States, to the advantage of the latter. He declares that the American systems under private ownership are far more progressive than those of England, Scotland and Ireland; that they give far better suburban service, that cars are less crowded and that lines are being extended with far greater rapidity. This he attributes to the easier restrictions in the United States than in Great Britain, where private traction enterprises are given franchises only on almost prohibitive terms. The difference of fare in the two countries, Mr. Clark says, is more than offset by the greater number of free transfers given by the American systems. He says that while on the face of reports it would appear that municipal operation of lines in some of the cities of Great Britain had been a success, as a matter of fact just the opposite is true. He says also that the private companies in the United Kingdom give a superior service as compared with the municipally operated lines.

Mr. Clark says that no American street railroads were investigated by the commission and the only tramways directly investigated in Great Britain were those owned by the municipalities of Manchester, Liverpool, Glasgow and the London county council and by the following private companies: London United Tramways, Dublin United Tramways and the Norwich Electric Tramways.

Private Capital Creates Extensive Systems.

Attention is called by Mr. Clark to the fact that the entire development of street railways in the United States has been accomplished by private enterprise and that this has permitted the construction of extensive systems serving entire communities and linking them together without regard to municipal boundary lines. On the other hand, since 1894, at least, municipally controlled traction systems have been confined, to a great extent, within the narrow limits of their respective municipalities. Mr. Clark presents a statistical statement of the facilities afforded to the urban inhabitants of Great Britain as compared with the United States. In 1902 the town and city population to each mile of tramway track was 12,476, while in the United States there was a mile of track to each 1,516 of town and city population. In Great Britain there was one car for each 3,760 of population, while in the United States there was one car to 574 city residents. Thus the urban residents of the United States had six and one-half times the cars which were available for the British urban population. The British systems carried 1,394,452,983 passengers and the American 5,521,509,521, and of these 1,062,403,392, or practically 90 per cent of the entire British total, were transported on transfers.

In replying to the charge that the traction cars in the United States are overcrowded, Mr. Clark declares that these figures show that the American car averages only 93,585 passengers per year, as against 182,463 in the United Kingdom. While the resident of Great Britain paid an average of 2.26 cents against an average of 3.76 cents in the United States, Mr. Clark points out that the former's facilities for travel were from 12 to 15 per cent of those enjoyed by the American

passenger. In 1902 there were two British cities of more than 100,000 population, seven with populations of from 50,000 to 100,000, and 39 with from 25,000 to 50,000 inhabitants without street railways, but in the United States there was no city of more than 25,000 people without traction service.

From 1890 to 1902 the length of tramway line (not track) in the United Kingdom increased 536 miles, or from 948 to 1,484 miles, while in the United States in the same period there was an increase of 10,755 miles, or from 5,783 to 16,538 miles. This great extension of service in the United States resulted in a decrease in the number of passengers carried per mile of line. Mr. Clark says on this subject:

Extensions in Congested Districts Only.

These features clearly demonstrate that the British policy has been to electrify and not greatly to extend existing tramways, except through densely populated districts, which means obtaining the greatest possible revenue without affording adequate transportation facilities, whereas in the United States private enterprise has constructed lines which afford public facilities, but which in many instances do not bring an adequate return.

It is well to note in this connection that the policy pursued in the United Kingdom must necessarily result in low rates of fares. If, in such cities as New York, Philadelphia, Chicago and St. Louis we were to cut down the miles of track to correspond to the conditions prevailing in such cities as London, Glasgow, Manchester and Liverpool, we would find that there would be only about 21 per cent of the present track, and, furthermore, that this comparatively small and inadequate trackage would be, for the most part, confined to densely populated districts. If American street railway systems were cut down as indicated, the fares could be very materially reduced. The permissible length of ride would be materially reduced and the company would be operating the most profitable lines only, while those which are at present run with little profit, and in some cases even at a loss, would not be embarrassing and handicapping the company as they are today.

Mr. Clark estimates that the British municipalities and local governments have a total of possible financial benefits from tramway operations of about \$8,679,176, but that American traction enterprises and their stockholders pay a total of \$43,054,433, constituting a government revenue more than \$34,000,000 a year greater than the return in Great Britain.

Mr. Clark discusses what he calls the inaccuracies of British municipal accounting. According to the parliamentary report on tramways for 1906 the allowance for depreciation on the municipally owned tramways of the United Kingdom was 1.83 per cent. Mr. Clark states that every practical man realizes that at least 5 per cent should be allowed for depreciation, and if this had been done it would have meant a reduction of \$5,565,963 in the \$8,679,176 shown as the returns to the local and municipal governments of the United Kingdom from tramways, leaving net only \$3,113,213. Evidence that serious risks exist from municipal enterprises is found in the fact that 40 British cities, according to the parliamentary return for 1906, show a direct loss from operation of tramways, or an actual deficit when proper sinking fund payments and reserve for depreciation are considered.

The British municipalities, Mr. Clark says, omit from the capital account of their tramways large sums which should be charged thereto and cause these expenditures to be "unjustly carried into the general accounts of the cities." At a meeting of the London county council on October 16, 1906, it was ascertained that \$5,200,000 had been expended on account of tramways but that only \$1,850,000 had been charged to the tramway capital account. Mr. Clark adds:

At the discussion following this expose Captain Swinton, a prominent member, brought out the fact that, since the council had entered the tramway field, the expenses of the general office had amounted to about \$6,000,000, of which only \$40,000 had been charged to the tramway accounts, and stated that, in his opinion, on this feature alone, the councils tramway undertaking owed the people of London at least \$2,500,000. This is a larger sum than has been shown as the net earnings of the properties even by the juggled accounts of the London county council. It is almost needless to remark that if, in all of the accounts of the municipal tramways of the United Kingdom, their operating expenses have been

avored as greatly at the expense of general funds as has been shown to be the practice of the London common council, then all their boasts of economical operation must disappear and deficits appear in place of apparent profits from operation.

Service and Labor.

American street railways, Mr. Clark says, are operated on the average 18 hours per day, with all-night service in the larger cities, while in Great Britain the average is 15 hours and there is no all-night service. Better service generally is given by the British private companies than by the municipalities. The average headway between cars on the municipal lines, on a 24-hour basis, was 8.1 minutes, while on the company lines it was but 6.3 minutes.

A comparison of wages per hour paid by the municipal traction systems and by certain companies in New York state is made by Mr. Clark, showing a range of from 7.2 to 15 cents per hour for conductors and from 8.4 to 15 cents per hour for motormen in Great Britain against 20 to 25 cents per hour for these conductors and motormen in the state of New York. "So it is seen," Mr. Clark continues, "that American street railways pay practically double the salaries and wages that are paid in the United Kingdom. In the state of New York a decrease of wages to the British standard would reduce the operating expenses of local transportation lines about \$14,000,000 per annum, equivalent to about 38 per cent of their gross receipts."

Mr. Clark says that few Americans realize the obstacles which British private companies meet in attempting to obtain franchise rights. The fact that the consent of local authorities is required is used by the local authorities to force the companies to make excessive payments, and even when a franchise is obtained, it is for a brief term of years, scarcely long enough to warrant the heavy expenditures required for modern electric railway construction. Against this the municipalities, at comparatively slight expense, obtain their parliamentary rights to perpetual and monopolistic franchises. A city which desires a franchise for itself or which opposes a private company has at its command a more powerful political influence than any that exists in the United States. This influence is obtained through an Association of Municipalities, which is dominated by the town clerks of the various cities. When a town clerk makes a request of a member of the house of commons, "the usual result is not unlike what occurs in America when a political boss makes a similar request of some public official whose election he has made possible."

Reasons for Municipalization.

Professor Parsons, in directing attention to the increase in municipal operation in Great Britain from 1894 to 1906, says that the principal reasons for the municipalization of British tramways have been poor service by the companies; their ill-treatment of employees; their refusal to assent to the adoption of electric traction, extension to suburban districts and other vital improvements; the constant difficulty experienced by the cities, amounting to practical impossibility of securing a reasonable regard to the public interest, or even the fulfilment of actual contracts; the growing belief on the part of the public that the streets and all monopoly uses of them are public property which should not be handed over to private parties, and the desire that the profits of the undertaking should inure to the benefit of the public.

When the commission was in London, Professor Parsons adds, a visit was paid to Sir Clifton Robinson, president of the London United Tramway. Mr. Ingalls, chairman of the commission, asked: "Why was it the companies did not develop electric traction and give the people a thoroughly good service? We understand that the service under the old companies was very bad; why was it?" Sir Clifton replied:

It was ignorance more than anything else; they put in some nephew or relative or friend of an owner to be manager or director—men who knew nothing of transportation. They

paid all their profits in dividends, kept nothing for renewals or reserve, did not think ahead or foresee that the cities might take over the plant; and then when it came near to the end of the 21-year terms and there was a prospect that the cities would buy, the companies did not pay any dividends at all in many cases, so that when the term was up almost the whole community was down on the companies, and all the cities had to do was to shake the tree and the rotten fruit fell into their mouths.

Next to the wish to obtain a better service at lower fares, Professor Parsons says, the predominant motive in the municipalization of British tramways has been the desire to improve the condition of labor. Under the companies men worked from 11 to 14 hours a day for seven days, while the cities have made the hours from 9 to 10 per day, with one day's rest in seven. Increases in wages were made also, amounting to 50 per cent in Liverpool, from 43 to 63 per cent in Manchester and to 42 per cent in London. Notwithstanding these benefits to labor the reductions in fares were considerable.

In British cities a penny (two cents), Professor Parsons says, is the fare the mass of the people pay. All the cities have a 1-cent fare for short distances, from one-half to three-quarters of a mile, except Liverpool, but none of the private companies has a lower fare than two cents for the ordinary passenger traffic. For the municipalities as a group the average distance for two cents is about 2.2 miles, against 1.6 miles for the companies as a group. It is found also that the people like the graded plan of charging fares according to the distance traveled.

The speed of British cars is low as compared with American systems, but the speed limits are fixed by the board of trade. The narrow streets, together with British caution and regard for safety, Professor Parsons states, make it impossible for the street cars to equal the American speed. Thus the tramway lines, public and private, are not to blame, he thinks, for the fact that they are not allowed to exceed 8 miles an hour in city streets, or from 12 to 16 miles in country districts.

W. L. Fisher and Professor Goodnow.

Walter L. Fisher of Chicago, a member of the commission, has furnished a review of the municipal ownership situation, in which he says:

It is in the regulation of public utility corporations that American municipalities have, as a rule, been most conspicuously unsuccessful. The attempt to control and regulate street railways, gas, electric light and telephone companies has, on the whole, been unsuccessful because of the powerful special interests which have either controlled or strongly influenced the governing partisan power in the community.

Prof. Frank J. Goodnow of Columbia University, New York, concludes that the government of British cities is far more favorable to the success of municipal ownership than is the government of cities in this country. It is his opinion that the government of American cities is too complex and that there is too much politics. He believes that a considerable change must be made in the conditions of city governments in America before the municipal ownership policy can be successfully applied in this country.

Vice-President Byrnes of the New York New Haven & Hartford Railroad is quoted as follows: "Boston will have an electric suburban service over the New Haven as soon as it is physically and mechanically possible. To that end we are abolishing grade crossings faster than required by the state. This process must be completed over the area to be electrified before the new motive power is installed, for the overhead wiring is too expensive to be put up twice at any point. Mechanically, also, we must first be sure that the New York experiment is on the right lines for heavy traction. If speed is to be increased, undoubtedly it can be accomplished electrically with less discomfort to the passenger. Each electric locomotive can haul under the severest conditions a 200-ton train running 26 miles an hour, with stops averaging about two miles apart. This average allows for maximum speed of 45 miles. On through service one locomotive can haul a 250-ton train. For heavier service two locomotives can be operated tandem."

NEW OFFICES AND REPAIR SHOPS AT LIMA, O.

The Lima & Toledo Traction Company has recently completed a building at the corner of North Main street and Grand avenue, Lima, O., which is designed to furnish ample office and shop room for the present needs of the company. The operating offices of the company, which controls the Lima city railway and the railways radiating from Lima to Ft.

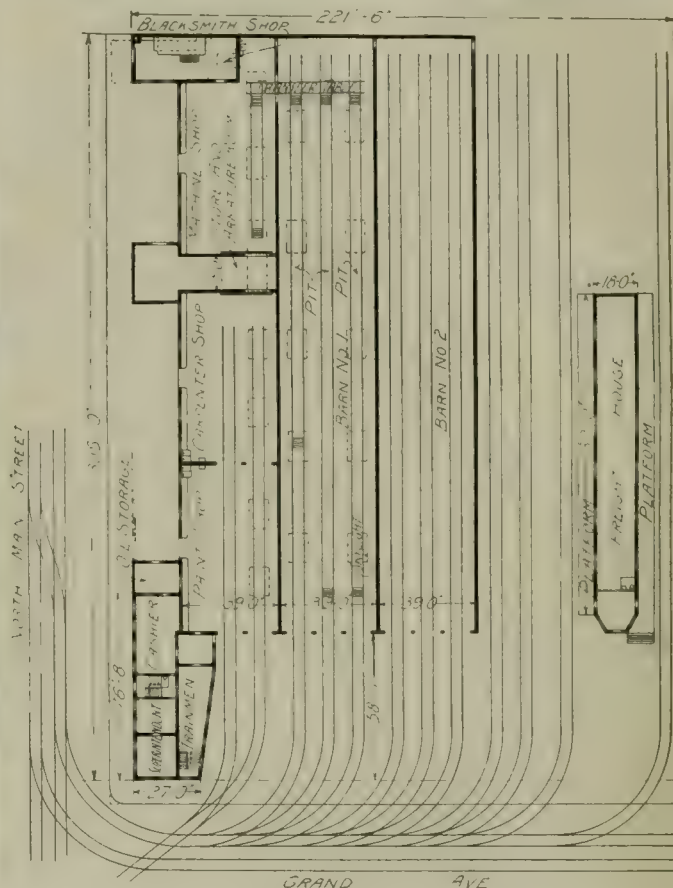
third floor, which is in the form of a cupola, 12 feet wide by 27 feet long, is occupied as a train dispatcher's office. On both the first and the second floors a room 14 by 43 feet



New Shops at Lima—Interior of Bay, Showing Pit Tracks.

Wayne, Ind., Defiance and Leipsic, O., are located here. About 50 electric cars operated on the various divisions are repaired at the Lima shops.

The plat of ground occupied by the building and the car storage tracks is 221 feet wide by 305 feet long. The office building, which occupies a floor space 27 and 33 feet



New Shops at Lima—Floor Plan.

is provided with lockers, toilets, etc., for the use of trainmen. The offices are finished in pine and the walls and ceiling are plastered. The floors are laid with maple. Double stairs lead from the main entrance to the offices on the second floor.

The shop and car house section of the building is 117



New Shops at Lima—Office, Car House and Shops, Showing First Car Built in Shops.

by 76 feet, is located at the northeast corner of the plat of ground. This section of the building is 39.5 feet high and has a tile roof.

The main office rooms on the first floor of the building are designed for the use of the operating superintendent and the cashier; the offices on the second floor are planned for the general manager and the engineers and their clerks, and the

by 244 feet in floor area and is one story high. The building is divided into three bays, each 39 feet wide, by longitudinal brick walls. The first bay is subdivided into a paint shop 69 feet long, a carpenter shop 69 feet long, an armature room 15 feet long and a machine shop. Each one of these rooms is equipped with the tools, overhead cranes and air hoists necessary for caring for the car equipments. At the

BOOK TABLE.

Electric Railway Engineering. By H. F. Parshall, M. Inst. C. E., and H. M. Hobart, M. I. E. E., New York, 1907. D. Van Nostrand Company, 23 Murray Street. Cloth, 474 pp., 437 illustrations, 123 tables, 7½ by 11 in. Price, \$10.

The book on the design of motors and generators by Parshall and Hobart is no doubt so well known to many of our readers that it is sufficient to say that their latest work, *Electric Railway Engineering*, is equally complete and filled with valuable information resulting from their wide experience in electrical and railway engineering.

The resistance of trains, the force required to accelerate a train and the determination of the corresponding characteristics of railway motors are among the most important problems to be solved in the design of successful electric railways. The most complete and satisfactory method of solving these problems is by the use of speed-time curves. A considerable portion of *Electric Railway Engineering* is devoted to these subjects. Here are shown the methods of applying speed-time and speed-distance-time curves to the calculation of the horsepower of the motors and the starting torque required to obtain any predetermined rate of acceleration. A large number of hypothetical problems are solved, illustrating the practical application of speed-time curves. Information on the characteristics of railway motors and their curves and advice helpful in the selection of motors is given. This information is drawn from the wide experience and observation of the authors. Many convenient and simple rules are given to guide the engineer, such as their well-known rule that an acceleration of one mile per hour per second requires a force of 100 pounds per ton.

The second part of the work treats of the electric power house, and in it are given not only valuable information on the method of predetermining the capacity of the generating plant required, suggestions on the selection of boilers, engines and generators, but also hints on the proper design of the plant and information for calculating the size of condensers and feed pumps, air pumps, cooling towers, etc. The operation and management and cost of generating power are ably discussed and a large number of tables are presented showing the comparative costs of generating electricity and the thermal efficiency of a number of representative plants. Cross sections, plans and elevations of typical power stations in Europe and America are presented which show the arrangement of machinery, the designs of the buildings and the methods of construction.

The chapters on substations and high-tension transmission are unusually complete, photographs and plans of typical substations, rotary converters, motor-generators, transformers, etc., being shown to illustrate the standard methods of construction. The chapter on high-tension transmission systems contains valuable information on methods of estimating the cost of high-tension transmission cables, and curves are presented showing the insulating qualities of various dielectric materials and the effect of the transmission voltage upon the cost of high-tension cables. This information is as complete as it is unusual. Data and formulæ for calculating the permissible current density corresponding to a given temperature rise are given, and duct systems and the results of tests on such installations are given to assist the engineer in designing duct systems and determining the size of the cables required.

The chapters on the distributing system include information on overhead and third-rail systems, tables and curves showing the effect of carbon and manganese on the conductivity of contact rails, typical cross sections of contact rails in common use and the various methods employed for installing overhead and contact rail systems. The catenary overhead system is described and its advantages set forth and illustrations of the most important installations of this nature are given. Rail bonds are described and thoroughly discussed and tables are given showing the results of conductivity tests and the cost of installation.

Locomotives and motor carriages and their electrical equipments are described in an exhaustive manner, though most of the attention on this subject has been given to the larger and heavier type of railway equipments such as would be employed in the electrification of steam railways. The General Electric, New York Central and Baltimore & Ohio locomotives, the Siemens & Halske Berlin-Zossen motor cars and other similar locomotives are illustrated and described in detail. The results of a large number of tests on locomotives are given and comparisons are drawn between high and low voltage, direct-current, single-phase and polyphase railway motors. The remaining portion of the book is devoted to trucks, brake rigging, etc. Standard types of trucks, journal boxes, car wheels and axles are given, showing typical constructions used in both Europe and America.

Modern Steam Engineering. By Gardner D. Hiscox, M. E., and Newton Harrison, E. E. Norman W. Henley Publishing Company. Cloth, 400 illustrations. Price, \$3.00.

This volume is written especially for the practicing engineer and those wishing to pass examinations for higher positions. With this object in view the author has incorporated many problems which are worked out in full and a series of questions and answers selected from those given by the board of licensing examiners of steam engineers.

Following a brief historical introduction the author has presented the elements of steam engineering, including the properties of air, steam and ammonia. The greater part of the volume is, however, devoted to descriptions of standard apparatus found in the boiler and engine rooms, including mechanical stokers, mechanical draught, liquid-fuel burners, details of construction and operation of the various boilers and engines, etc. The theory of the various elements forming a complete power plant is given as far as practicable without the use of higher mathematics and the relation and application of the theory to practice is excellently presented. The author has in a few instances become slightly involved through attempting to treat by simple arithmetic mathematical problems requiring the use of the calculus. Considerable space is devoted to the indicator, indicator cards and their interpretation.

The author has in one chapter given a mass of data and formulæ on the design of steam engines and the proportioning of the various parts of steam engines, and it is unfortunate, since many of the formulæ for determining a given engine proportion lead to widely different results, that he has not introduced notes to guide those not well versed on the subject of engine design. One of the most complete chapters in the book deals with the Corliss engine, the types and operation of the various forms of valve gear, as well as their adjustment and setting. Numerous cuts are presented to illustrate the difference between the long-range and short-range cutoff and the reason why it is necessary, generally, to employ two eccentrics for long-range cutoff engines. A chapter on the steam turbine is included, but gives little more than the elements of construction and operation presented in the catalogues of the various manufacturers.

The average engineer is seldom versed in the operation of ammonia and other refrigerating machines or caring for elevators of various types, therefore information on these subjects which he may have obtained by reading is of especial value to him, as he is likely to be called upon at any time to take charge of such machinery. This treatment will be much appreciated by the practicing engineer, as these subjects generally receive very little attention in text books. Though, as stated by the author as not being complete or presenting many of the details which might be desirable, they will be found most interesting and instructive. A chapter on the cost of operation and power economy has been introduced and suggestions for the operation and maintenance of steam plants are also given. The electrical section of the book contains the theory of the electric generator and motor.

presented in a very simple manner. Many illustrations and diagrams are used to show the various electrical connections and types of switchboard instruments. Chapters on the electric light and storage battery are also included.

Steam Turbines. By Lester G. French, S. B. Brattleboro, Vt. 1907. Illustrated. Cloth. Price, \$3.00.

Within the past few years such a large number of books on steam turbines have been published that it would seem as if very little new material could be presented. As, however, most of the books which have been published on steam turbines have attempted to give the design and theory, rather than a statement of the general principles upon which the design of steam turbines is based, and as none of the works previously published have contained any information of use to the actual operating engineer, the little book by Mr. French should supply a much needed want. As the author states in his preface: "No attempt has been made in writing the book to present the complete theory of steam turbines, nor is it intended to enable one to design steam turbines." The general principles involved in the construction and designs of successful steam turbines are, however, excellently presented, and chapters including notes on the operation and care of steam turbines and steam turbine condensing apparatus are given, which should make it a book of great value to all operating engineers, consulting engineers and managers of power plants.

The first chapter contains the elementary principles of operation of steam turbines and explains the use and construction of velocity diagrams which are so essential to the clear understanding of the principles involved. The essential features of steam turbines are then treated, showing the development of the Parsons, Rateau, Curtis and De Laval turbines. The following chapter is a review of early turbine patents in which the basic patents of importance in the development of the successful steam turbines of today are given, with discussions of the value, feasibility and faults in the designs as presented in the original patents. In this chapter the author has included "A Word with Inventors," in which he exposes a few of the fallacies involved in the greater part of all the patents relating to steam turbines which are applied for, and also shows by mathematical deduction why the momentum turbines, in which an attempt is made to reduce the velocity of the jet by causing it to put some other fluid in motion, are worthless. The author's advice to would-be inventors is to thoroughly grasp the theory of steam turbines, the flow and action of steam in turbine nozzles and blading, and to thoroughly familiarize themselves with patents which have been issued, before an attempt to invent and patent turbines or improvements to turbines is undertaken.

The next few chapters treat in detail of the De Laval, Riedler-Stumpf, Rateau, Richards, Zoelly, Kerr, Levin, Holzworth, Curtis, Parsons, Crocker, Sulzer and Lindmark turbines. The details of the construction of various turbines are given with criticisms by the author of the designs of the various parts and principles upon which they operate, though the illustrations are for the most part reproduced or taken from patent drawings, catalogues and from illustrated articles which have appeared in various engineering journals. The Rateau accumulator is illustrated and explained and calculations for an accumulator are given, as are also the results of tests of Rateau turbines and accumulators.

A large number of tests on the various makes of steam turbines are given as well as comparative tests with steam engines operating under the same conditions. These tests include curves showing the effect of superheat and the degree of vacuum upon the efficiency of the turbine. While some of the tests are the usual shop tests carried out by the manufacturers, the results of a large number of tests are presented, giving the steam consumption of turbines in actual operation.

Experiments on the flow of steam are treated in a few short chapters and many interesting results are given. One of the chapters includes a short discussion of the properties of steam, introducing the temperature-entropy diagram and its application to the calculations involved in the design of steam turbines. The formulæ for the adiabatic flow of steam neglecting losses are given and numerous examples are worked out to show the methods of using the formulæ. A chapter is given on velocity diagrams and the experiments made by Mr. Kneass on the pressures exerted by steam jets and the frictional losses in turbine buckets.

A chapter on balancing bodies rotating at high speeds is given, but it contains little which is of practical value. The final chapters in the book treat of the commercial aspect of the steam turbine, its care and management, condensing apparatus for high vacuums, and the status of the marine steam turbine. Those chapters touching on the care and management of steam turbines and condensing apparatus for high vacuums form the most valuable part of the book and would alone well repay any engineer for purchasing it. The literary treatment of the book and the care with which the illustrations have been prepared show the years of experience which Mr. French has had as editor of *Machinery*, and make the volume not only one of interest, but one of great value to engineers.

LOS ANGELES RAILWAY EMERGENCY CAR.

The car shown in the accompanying engraving has recently been completed in the Los Angeles Railway shops and will be used for emergency purposes. In the design of this equipment, E. L. Stephens, master car builder, has included several unique details.

It will be noted that along the side of the car are three openings which are closed by double swinging doors. There



Los Angeles Railway—Emergency Car with Side and End Doors.

are also similar doors at the ends of the car. The interior of the car has a double floor in the middle portion, so that a large amount of additional storage space is obtained. Side doors afford an easy method of access to the interior of the car, thus rendering the space between the two floors readily available for use in storing tools. The doors through the ends of the car permit a pole or long timber to be carried through the city streets and otherwise handled with facility. This car has the trucks and electrical equipment which are standard for the Los Angeles Railway Company's passenger rolling stock.

It is reported that the suburban lines about Melbourne, Australia, will be electrified, for which purpose the government is prepared to spend \$15,000,000. The system to be adopted is now under discussion.

LOS ANGELES RAILWAY SHOP CAR.

We present herewith an illustration of a locomotive or shop car used by the Los Angeles Railway Company at its shops in Los Angeles, Cal., which is equipped to provide for handling unassembled parts between the various shops, and has been found to be especially valuable. It will be noted that this car is provided with a jib crane with a chain block

tached the leads used in testing the electrical apparatus.

In testing a given piece of electrical apparatus the slides are adjusted on the busbar and on the resistance wire until, when the connection is made at H, the flow of the current from the battery through a perfect specimen of the apparatus to be tested and through the resistance wire and the field is equal, and the needle at A remains in its normal position. If the circuit being tested at E is open, the current will be



Los Angeles Railway Shops—Shop Utility Car with Jib Crane for Handling Heavy Pieces.

mounted on its boom. Thus armatures or similar parts can quickly be lifted from the floor of the shop to the platform of the transfer car. This car also is found to be useful as a yard locomotive in shifting other equipments.

ELECTRICAL TESTING DEVICE.

A novel device for testing the insulation and for locating open circuits in motors is in use at the Racine avenue car barns of the Chicago Union Traction Company.

The component parts of the testing apparatus, a sketch of which is herewith reproduced, consist of a small battery,

forced to take its course entirely through the resistance wire to the point, O, thence through the field to the busbar, thence back to the battery. In this case the needle of the galvanometer is deflected.

If the object at E has a short circuit less current will flow through the resistance than through the busbar and the galvanometer coil. In the latter case the needle is deflected in the direction opposite to that in the case of the open circuit.

The device has been in use several months and has proved very efficient, often showing short circuits not disclosed by other testing methods used.

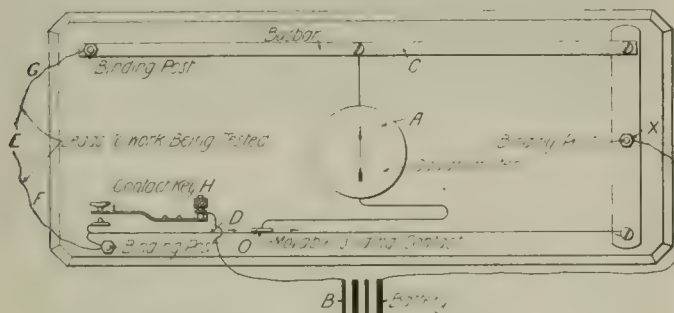


Diagram of Electrical Testing Device.

B, a galvanometer, A, an 18-inch copper busbar, C, an 18-inch German silver resistance wire, D, a contact key, H, and two testing leads, F and G. The ends of the galvanometer coil are connected to the busbar, C, and to the resistance wire, D, by adjustable clamps. The positive and negative poles of the battery are connected respectively to a contact key, H, and a binding post, X, the latter being direct connected to the busbar and the resistance wire. To the free ends of the resistance wire and the busbar are at-

The Cost of Street Car Fares.

The amount received from passengers by the Cleveland Electric Railway Company during 1905 was 3.58 cents, on the basis of dividing the earnings by the number of passengers carried, including those riding on transfers. If the operating expenses averaged 60 per cent of the present rate of fare, and the rate of fare for the year 1905 was 4.7 cents, it is evident that, in order to pay operating expenses where the service is of the same character and kind as was given by the railway company in 1905, the company must collect a fare of 2.82 cents in order to cover the bare cost of operating, the fare of 2.82 cents being 60 per cent of 4.7 cents.

During the year 1905 the railway company paid interest on bonds and floating debt in the sum of \$445,793.26. In order to pay this on the basis of carrying 110,000,000 passengers, the fare would have to be increased 0.45 cent, making the fare 3.27 cents to cover operating expenses and interest charges.—Report of the Street Railway Franchise Committee of the Cleveland (O.) Chamber of Commerce.

The United Railroads of San Francisco has given out figures regarding its recent strike showing that 1,460 platform men are now at work on the cars. The total number of men who struck was 1,600, and 171 of these have returned to their places, leaving 1,429 still out. New recruits have been secured to take the places of most of the men who struck and there were available on July 17 only 140 places for platform men.

PIPING AND POWER STATION SYSTEMS.—XLVI.

BY W. L. MORRIS, M. E.

Air Lift for Artesian Water.—Class L 7.

An air outfit consists of an air compressor, a pipe for conveying the air to the bottom of the well and a device for atomizing the water by air and forcing the water upward, together with the air used for atomizing. The water is raised in the same manner as a hat or piece of paper is by a high wind, the ability of the air to support or carry the water in reality depending simply upon the skin friction of the air on the exposed surfaces of the finely divided water. By reducing the size of a globule of water by one-half, its area becomes one-fourth the original, but its weight only one-eighth of what it was previously. It is therefore evident that, the smaller each particle of water is, the greater will be its frictional resistance in proportion to its weight. Consequently, with finely divided water in an air lift a smaller volume of air of lower velocity is required to create a lifting friction greater than the weight of the particles of water.

The air lift can be constructed in many different forms, but the principle of any design depends upon the high frictional resistance of the air on the surfaces of the particles of

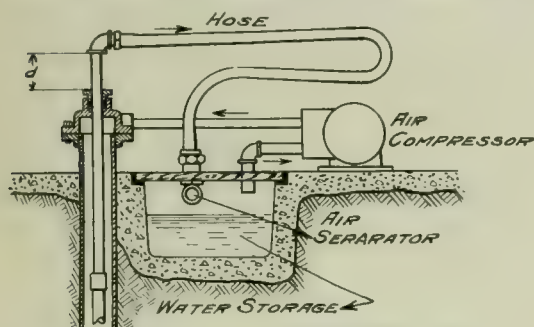


Figure 294 (L 7-1).

water. The heavier the particles of water may be, the greater will be the air velocity required to give the necessary lifting power. Hence, the capacity of the air compressor serving the lift will depend upon how effectively the atomizer operates. Further, as the skin friction of air increases approximately as the square of the velocity, the higher the velocity of the air required the greater will be the frictional losses in the pipe; and for this reason few air lifts show even a fair efficiency.

Obviously, the size of the air discharge or water lift pipe must be made sufficiently small to secure the velocity necessary to support the water. An air compressor having a

capacity of 30 cubic feet of free air per minute would give a velocity of 5,000 feet per minute if the air were discharged at atmospheric pressure through a 1-inch lift pipe, or a velocity of 2,500 feet per minute if the air is at a pressure of 15 pounds per square inch.

There are two different methods of delivering air to a well. It may be discharged through the drop pipe or it may be discharged through the annular space surrounding this pipe. Figure 294 (L 7-1) shows the air discharge taken from the large drop pipe. This generally is the better construction, since it enables the use of a small pipe through which to discharge the water and a large cross section to furnish the air to the lower end of this pipe. By using the drop pipe for the discharge a clear straight bore is obtained, thus maintaining more uniform conditions during the discharge of the water.

It is necessary to overcome the resistance of the piping and the ejector, if 15 pounds air pressure is to be carried, the distance, *b*, in Figure 294 should be made not less than 35 feet, since the air pressure in the casing will lower the water level by that amount. The level, *c*, is the working level of the water with the pressure removed. This will be somewhat lower while the water is being pumped than while it is standing at rest. The distance, *a*, may be small or it may be found better if the ejector is dropped below the standing water level. By using a hose connection at the upper end of the drop pipe, and making the distance, *a*, a few inches, *b*, about 35 feet, and *d*, the length of a pipe, the best position for the ejector is readily ascertained while the compressor is in operation. This can be done by moving the drop pipe up and down until the most satisfactory results are obtained. The most efficient pressure at which to operate the lift can then be easily determined.

The ejector shown in Figure 294 is one commonly used for draining cisterns, etc., and to further reduce the frictional resistance of the air flowing into it holes may be drilled in it. To obtain the best results from air lifts, the ejector should be ordered from a firm which makes a specialty of such devices, and in ordering, the exact use to which it is to be put should be stated, as the application of the ejector for this service is different from that for which ejectors are commonly employed. The air in this case enters around the nozzle instead of passing through the nozzle, as in regular service.

If air is available in the plant for water lifting and a special compressor is not needed for this service the air lift presents some very desirable features, the most important of which is that there is no mechanism whatever in the well, and, further, it is possible to handle very large quantities of water with it. These advantages, however, are not ordinarily sufficient to warrant the installation of an air compressor especially for this work, because a higher efficiency is obtainable if the common form of deep-well pump is employed.

Artesian Water for High Buildings.—Class L 8.

In large hotels and office buildings there is ordinarily a large enough quantity of water used to make it profitable to sink a well. Buildings of this class are especially well

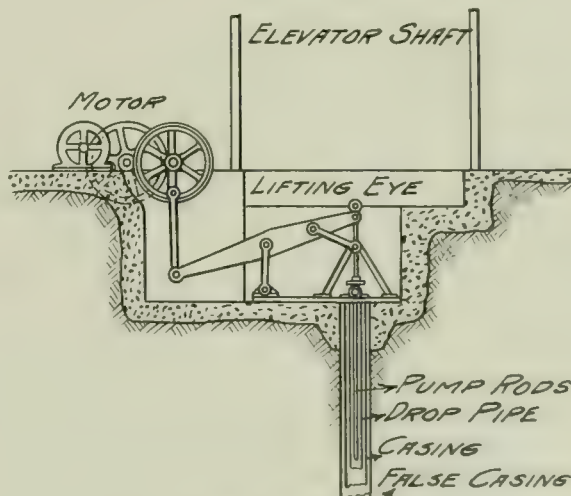


Figure 295 (L 8-1).

adapted to artesian well work, because they have high open elevator shafts which permit of raising pump rods and drop pipes. With an elevator in the shaft no other apparatus is necessary to lift the parts out of the well. Figure 295 (L 8-1) shows such a well with the driving machinery set to one side of the well. In this case it would be better to sink a false casing, say 20 feet long and of large diameter, to secure the soil under the elevator shaft footings. The regular well casing should be driven inside of the false casing after the

latter has been sunk. The end of the walking beam can be formed in the shape of a Y, with a cross-head pin passing through the upper section of the pump-rod head. The removal of this pin and stuffing-box cap only are required to draw out the sucker rod.

Fire-Service Mains.—Class M 1.

There are two distinctly different systems of fire protection, one being an installation conforming to the rules of the fire insurance underwriters, so that no difficulty will be experienced in collecting insurance, and the other an arrangement especially adapted to putting out fires which might start in the particular building considered, no attention being paid to the underwriters' rules. Which of the two systems is to be installed depends upon whether insurance is to be carried.

A power station contains a large amount of valuable machinery and invariably the building walls and floors are built of masonry. The roof is usually constructed of steel trusses covered with a wooden sheathing. Unfortunately there is no other material that is so well suited for power-station roofs as wood. Considerable moisture is found in a steam plant, because of the ability of heated air to carry it. The moment the warm saturated air strikes the cold surface of the roof the vapor condenses on its surface. The roof material that is best suited for power stations is one that is the poorest conductor of heat. It must be such that it can be walked on and have sufficient strength to carry the roof load between purlins and its under surface must remain intact, though it be continually wet.

These are extreme requirements, and are met satisfactorily by wood, except for the painted under surface, which becomes discolored in time because of the constant exposure to heat and moisture. Corrugated iron roofs are the most unsatisfactory, owing to their high thermal con-

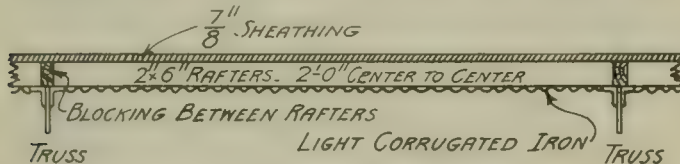


Figure 296 (M 1-1).

ductivity, and other roofs, such as concrete, tile and slate, are better than iron only to the extent that they are not such good conductors of heat. If the dripping type of roof covering had small drip gutters attached to it to conduct the drip to some common drain which would carry it to the sewer, it is possible that no difficulty would be experienced. It would then be necessary, however, to keep the drips off the machinery, more particularly the electrical apparatus. In plants which have dripping roofs it is necessary to place water sheds over the electrical machinery and other parts which are easily damaged by water.

Masonry roofs are more expensive than wooden roofs, both on account of their greater cost per square foot and because of the fact that the roof trusses must be made heavier in order to carry the increased load. There are various modifications of wooden roof coverings that are extremely slow burning, if not strictly fireproof. One of the best forms of the latter is shown in Figure 296 (M 1-1). The roof sheathing and rafters are both of wood protected on the under side by a light corrugated iron ceiling nailed to the rafters. The blocking between the rafters over the trusses is to shut off communication from one bay to another to prevent the circulation of air and to prevent fire from spreading. The less the air circulates the less heat it conducts.

It is reported that the United States Express Company will surrender its contract on the Lake Erie & Western Railroad on August 1, and will make a contract with the Ft. Wayne & Wabash Valley Traction Company to handle express between Ft. Wayne and Lafayette.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Injury to Laborer Riding in Special Car.

Kilduff v. Boston Elevated Railway Company, 81 North-eastern Reporter, 191.—The supreme judicial court of Massachusetts holds that where a laborer employed in the construction of tracks not open to the public at the end of his day's work took a special car in which only the laborers who were working on that particular job were allowed to ride, which was furnished for the mutual accommodation of the company and the laborers, he paying no fare, the relation between him and the company was that of master and servant, not that of carrier and passenger, so that negligence of the motorman causing a collision with a cart was that of a fellow servant, and no damages could be recovered for injuries therefrom.

Closing Gate with Passenger Attempting to Leave Car.

McGarry v. Boston Elevated Railway Company, 81 North-eastern Reporter, 194.—The supreme judicial court of Massachusetts says that it thinks there was evidence in this case of due care on the part of the plaintiff and of negligence on the part of the brakeman. It was the brakeman's duty to know whether passengers were attempting to leave the car when he closed the gate and to govern himself accordingly. It could not be ruled as matter of law that the plaintiff was not in the exercise of due care if while moving rapidly to alight from the car she ran into the gate without observing it or the brakeman. The jury might properly find that she had a right to assume that the platform of the car would be unobstructed and that those managing the car would exercise proper care in rendering it safe for her to alight, and it was for the jury to say whether under the circumstances she exercised due care or not.

Place of Taking Transfer Cars—Tickets as Evidence—Rules at Barn—Damages for Ejection.

De Board v. Camden Interstate Railway Company, 57 Southeastern Reporter, 279.—The supreme court of appeals of West Virginia holds that a street railway ticket or transfer check, in the hands of a purchaser thereof for use on the car lines of the company issuing it, constitutes the complete evidence of the contract between the purchaser and the company, and the privileges evidenced by its terms are not subject to limitation by a mere rule of the company, knowledge of which the purchaser did not have, and could not conveniently have ascertained.

In this case the plaintiff, having a transfer, started for a car which he saw standing some distance away. Before he arrived the car moved on, and he walked on after it until another car came down, which he boarded, and handed the conductor the transfer. He was informed by the conductor that the transfer was not good for a passage on the car because it was tendered below a place known as "Johnson's Lane." On the face of the transfer but one limitation appeared, namely, that it should be used within one hour after the issuance thereof. It did not disclose any such limitation as to the place at which it must be used as was enforced by the conductor. But it appeared from the testimony of a witness for the defendant that there was a rule forbidding its acceptance below Johnson's Lane, posted, among others, in the defendant company's barn, to which the public was not admitted. There was no evidence tending in the slightest degree to show that the plaintiff had any knowledge of any limitation upon the right which the transfer on its face gave him. The court holds that, under these circumstances, the rule mentioned constituted no part of the contract.

According to all the authorities, the court says, a paper so handed to the plaintiff, without any explanation, or any knowledge on his part of any limitation, constituted the contract between him and the company. Unlike steam railroads, street railways do not have a certain fare for passage be-

tween given points. The nature of their business is such as to compel them, for the most part, to charge a certain fare for a passage without reference to the distance; this, at least, was the method of the defendant company. The paper, on its face, therefore, entitled the plaintiff to carriage, and knowledge of a secret limitation embodied in some rule which he had never seen could not be imputed to him.

Ejection of the holder of such ticket or transfer, by a conductor or other officer, from a car of the company by which it was issued, contrary to the terms thereof, and refusal to carry him, on his failure and refusal to pay an additional fare, is actionable, and the measure of damages is such sum as the jury believe the plaintiff entitled to recover, provided the amount be not so large or small that the action of the jury in awarding it must be attributed to passion, partiality, corruption, prejudice or some mistaken view of the case.

Rights and Duties Between Cars and Pedestrians.

Saylor v. Union Traction Company, 81 Northeastern Reporter, 94.—The appellate court of Indiana, Division No. 1, says that the rights of a street railway and pedestrians to a street are equal. Neither has a superior right over the other, except to the extent that since a street car runs on a track, and cannot turn out of the way, and by its momentum is more difficult for it to stop than a foot passenger, it is the duty of a pedestrian to turn out or stop to avoid a collision. But the duty to observe and use all reasonable precaution to avoid a collision rests upon the street car company the same as it does upon the foot passenger. Neither must interfere with the passage of the other to any greater extent than the necessity of the case requires. And the pedestrian has the right to presume that a street car in a populous city in passing a much frequented crossing will exercise due care and caution with reference to the time and place and surrounding conditions. And the care and caution that are required of the pedestrian at a particular crossing can only be properly measured by taking into consideration that the care he has a right to expect will be exercised by those managing a street car along the street he is about to cross. Whether he has a right to expect the cars will be going at a slow rate of speed, that they may be under control, that they would give the proper signals of alarm to warn him of their approach, all should be considered in determining what is reasonably required of him in making such crossing.

To affirm as an absolute rule of law that a person when about to cross a street railway track in a populous city, at a much frequented crossing, must listen and look up and down the track before attempting to cross is, under the modern decisions of this state, and a number of other states, too strict. A man under such conditions must use his senses of observation with due care, but to what extent or in what manner to constitute such due care must be governed by all of the facts and conditions surrounding him at the time. Mere inattention or mental abstraction will not excuse the exercise of ordinary care, and such care requires that a man shall be reasonably observant of his condition and surroundings.

Where a motorman of an electric car, running at a high rate of speed in a populous part of a city, sees an old man 140 feet away, crossing the street diagonally, with his back towards the approaching car, his vision turned away therefrom, with cars on another track passing in front of him, and with nothing to indicate to the motorman that he is aware of the approaching danger, it is no time to indulge in presumptions. It at once becomes the duty of the driver of the car to exercise all the reasonable care and watchfulness that under the conditions prudence demands. He must put into motion every reasonable means at his command to warn the pedestrian, and, if necessary, put his car under control until he has good reason to believe the pedestrian is aware of his approach, and should stop, if possible and necessary to avoid a collision.

BONUSES AS SAFEGUARDS AGAINST ACCIDENTS.

BY WILLIAM R. BOWKER.

A financial drain, with which electric railways have to contend, is that resulting from claims for damages when accidents occur. In addition to the compensation payments there are heavy legal expenses and the cost of the claim department.

The excessive and exorbitant demands for compensation that are frequently made on the slightest pretext are well known to street railway officials generally, and there is not the slightest doubt that many thousands of dollars have been given as compensation that never should have been paid. No enterprise of any magnitude is entirely immune from such claims.

Reasoning that prevention is better than cure, the question forcibly suggests itself: "Can the circumstances which lead to compensation claims be prevented?" If there were no accidents there could be no legitimate claims for compensation, and that suggests the prevention of accidents. It is, of course, too much to expect that they can be entirely eliminated, for, in the practical every-day conditions of life, many unforeseen circumstances may arise to cause accidents of more or less serious moment.

Offering a Bonus.

In the writer's opinion there is not the least doubt that accidents can be reduced in number, and the logical means of bringing this about is by offering financial inducements to motormen and others in the form of a "bonus" payment.

In some instances enterprising and broad-minded street railway managers are adopting some bonus system for their employes. This is for the financial benefit of all concerned. The great advantages of a bonus system are: It indirectly gives to the employe a financial interest in the undertaking by which he shares some of the profits. He is working for more than his week's wages, and has an object beyond finishing the work as quickly and lightly as possible and waiting for pay day to arrive. The system fosters a personal interest in the success of the undertaking and promotes harmonious working between employer and employe. It tends to mitigate certain elements of dissatisfaction, based on either imaginary or real grievances, and induces more efficient work, which increases the stability of the undertaking.

For these reasons the writer has always been an advocate of some form of bonus for motormen and conductors. One of my ideas is to give a yearly bonus at Christmas or New Year's day in the form of double pay to all motormen who each year perform their duties satisfactorily without accidents of any kind due to their fault, and to give a similar bonus to conductors who perform their duties satisfactorily and against whom no legitimate complaints are made.

The financial advantages result from the fact that one single car accident of a serious nature might very readily cost for claims, legal expenses, etc., many thousands of dollars, whereas by distributing several hundreds or thousands of dollars among the motormen to encourage them to exercise care to prevent accidents, such undesirable consequences and financial liabilities may be minimized to an appreciable extent. The majority of accidents happen through the neglect to exercise due care, although some are due to defective apparatus. It is safe to say that any company will receive good returns from the money distributed in bonus payments.

Bases of Bonus Payments.

There are other bases on which bonus payments may be made. Some of the conditions which the writer considers applicable for motormen are: (1) Prevention of accidents. (2) Payment on a sliding scale for low consumption of power. (3) Payment in case the life of the uniforms is extended and they are kept in good condition beyond a certain specified length of time. For conductors the following conditions could be applied: (1) Freedom from complaints. (2) A per-

centage on the fares collected over and above a certain minimum average receipt per car mile or per day aggregated throughout 3, 6 or 12 months. (3) Payment for a good record in the care of uniforms.

The bonus payments for conditions 1 and 2 could conveniently be made quarterly or half-yearly, and for condition 3 could be made say 6 or 12 months after the prescribed length of time had elapsed. A suggested basis of payment for condition 1 for motormen and conductors would be the payment of a quarterly bonus of say \$5.00 to \$10.00 or half-yearly payments pro rata, and for condition 3 say \$3.00 to \$5.00 for extending the life of the uniform 12 months. For condition 2 no hard and fast rules could be suggested to meet every case, for many circumstances in various localities are widely divergent. In the case of the motormen this would be determined by the cost of power, and for the conductors it would be determined by apportioning the receipts above a certain well-defined minimum on a suitable percentage scale.

Railway bookkeeping is somewhat increased by these schemes, but the advantages are not to be lightly cast aside, and no obstacle should be allowed to stand in the way of their adoption. In the event of a "strike" all claims are forfeited. The bonus principle is practical and commercial.

UNITED STATES COURT RESTRAINS PASSAGE OF 3-CENT FARE LAW IN DETROIT.

The Guaranty Trust Company of New York, as trustee under the deed securing the first consolidated mortgage $4\frac{1}{2}$ per cent bonds of the Detroit United Railway, secured an order from Judge Swan in the United States circuit court on July 23 restraining the mayor, aldermen and corporation counsel of Detroit from taking any steps in the enactment of the so-called Hally ordinance. This ordinance was designed to force 3-cent fares on some of the lines, a larger tax rate than is now paid, paving between the tracks and other hardships. It was also provided that franchises should be revocable and that the action of the council should be final.

The bill says that the effect of the ordinance would be to produce a belief in the minds of the citizens generally that the entire 13 routes of the company were affected by the new measure. Assuming that passengers would be guided by this impression and refuse to pay fares of more than three cents, the bill states that "such refusal made by a great body of citizens acting under an honest although a mistaken belief, will create a condition of affairs which cannot be overcome by any means at the command" of the company and that it would place the railway in a state of duress and coercion.

In 1906 the net earnings of the railways in the system, including those outside of the city, after making allowance for depreciation, were, the bill says, about \$1,779,409, or about \$4,875 per day. The interest on underlying bonds having priority over the consolidated mortgage bonds amounts to \$443,340 a year or more than \$1,214 a day. The interest on the consolidated mortgage bonds is \$511,519 or \$1,400 a day. The net effect of the ordinance would therefore be to impair the revenues to such an extent that the company would not only be unable to pay dividends, but would be unable to meet the interest on the consolidated mortgage bonds. The ordinance would also compel the company to pay \$100,000 more annually in taxes.

The bill says that the question of franchise relations is not one that can be taken care of by legislative enactment, that the right of the city is limited to granting or refusing a franchise and that franchises must be a matter of agreement between a company and the city.

Judge Swan has made permanent the injunction restraining the enforcement of the service ordinance. A temporary injunction was granted on April 24, as reported in the Electric Railway Review of April 27, 1907, page 560.

News of the Week

Chicago Experts on Eastern Trip.

Bion J. Arnold, Charles V. Weston and H. B. Fleming, members of the board of supervising engineers, Chicago traction companies, and George Weston, assistant chief engineer, have returned from an eastern trip. They visited the plant of the Pennsylvania Steel Company at Steelton, Pa., and the plants of William Wharton, Jr., & Co. and The J. G. Brill Company at Philadelphia. The latter company is building 300 cars for the Chicago City Railway Company. The Philadelphia Rapid Transit Company's tunnel and elevated lines were also inspected. Before the party returned New York was visited.

Mr. Arnold commended highly the new Philadelphia construction.

Fares on Portland (Ore.) Railway.

F. I. Fuller, vice-president of the Portland (Ore.) Railway Light & Power Company, has sent a letter to the Oregon railroad commission regarding the agitation for a 5-cent fare between Portland and Milwaukie. Mr. Fuller says:

"On the whole Oregon city division, the charges from the center of the city to points outside the city limits are under two cents per mile, which, to those who are familiar with the cost of transporting passengers either by steam or electric railway in thinly populated districts, cannot be considered an exorbitant charge. The Southern Pacific, a parallel line, as we understand it, charges 25 cents, about 4 cents a mile, between Portland and Milwaukie, and runs only a few trains a day, while the city of Milwaukie, under the lines operated by this company, enjoys the service of a car every 15 minutes at rates from two-fifths to about one-fourth those offered by a competing line."

Hearing in Lincoln (Neb.) Case.

The Nebraska railroad commission has heard evidence in the application of the city of Lincoln to compel the Lincoln Traction Company to sell six fares for 25 cents and to make special rates of 10 fares for 25 cents for school children.

C. S. Allen, representing the company, reviewed the history of the street railway system. He referred to the receivership of the old Lincoln Street Railway from 1894 to 1897 and the sale of the property in 1898 to the organizers of the present company. Mr. Allen said that while it was true, as charged by the city, that the property had been purchased for a nominal consideration of \$60,500, the price was merely nominal and did not signify anything. He declared that the property was purchased on behalf of a syndicate of eastern stockholders and bondholders of the old company, and that it represented an original investment of nearly \$2,500,000. After the purchase Mr. Allen said new stock was issued of the face value of \$1,035,000. Mr. Allen conceded that the present plant could be replaced for a smaller sum than the total investment, but he said that the rates should not be based on a replacement value, and cited the decision of the federal court in Milwaukee to show that a corporation is entitled to earn dividends on the full amount invested, regardless of whether the property has diminished in value. Mr. Allen also declared that during the entire period of the company's operation it had earned not to exceed 2 per cent on the total investment.

F. H. Brooks, general superintendent, said that 86 cars, costing from \$400 to \$4,000 each, had been purchased by the company, and that the entire outlay for cars had been \$151,000.

Stock Exchange Acts on Forest City Stock.

The Cleveland stock exchange has ordered the stock of the Forest City Railway Company to be removed from the listed department. Hereafter this stock will be admitted to quotation in the unlisted department only. For three months the stock exchange authorities have tried to secure a satisfactory statement from the Forest City company in accordance with the agreement which is required of all companies when stock is listed to furnish such statements.

As a result of the negotiations the company submitted one statement of money expended on construction and equipment, which reached a total of \$939,985.98, of which \$24,705.84 was spent for consents, \$44,719.26 for legal services, and \$6,051.88 for injunctions. In interest there has been expended \$16,373.02.

In a petition filed in court the Cleveland Electric Railway calls the Low Fare road in East Fourteenth street, between Euclid avenue and Sumner avenue, S. E., a public nuisance. Referring to Mayor Johnson, the petition adds:

"To benefit pecuniarily said Tom L. Johnson, he in per-

son, and the officers and employes of the city, under the direction of the city council, for the pretended purpose of learning whether the people in Central and Quincy avenues desired a street railroad upon said streets, have been using the services, time and property of the city of Cleveland, and its property, in an attempt to secure from the owners of real estate fronting upon said streets consents inuring to the benefit of the Low Fare Company.

"For this purpose squads of the uniformed police of the city and salaried employes of the city have been detailed to call over and over again upon such owners of property to seek, by persuasion, by threats and by untrue declarations that the papers they were solicited to sign would not affect revocations or consents heretofore given to this plaintiff, to obtain from such property owners consents inuring to the benefit of the Low Fare Railway Company."

Three ordinances giving the Low Fare Railway franchises on separate parts of the Central-Quincy avenue routes were introduced in the Cleveland city council on July 23.

Public Service Commission.

In referring to the proposed investigation of the Brooklyn Rapid Transit and the Interborough-Metropolitan companies, Chairman Willcox of the public service commission, first district, New York, outlined the motive of the inquiry, as follows:

"It will undoubtedly be the duty of this board, at some time in the future, after proper hearings, to issue specific orders to increase the adequacy of the service now performed by these companies, but to enable the commission to take up these special lines of inquiry, and to afford hearings preparatory to the issuing of orders, I regard it as absolutely necessary that this general investigation be now made in aid of the performance by this board of practically all the duties which are imposed upon it by the rapid transit law, as well as by the public service commissions law in respect of railroads. I think that this investigation should be welcomed by the railway corporations as offering them an opportunity to disclose the facts, just as I am sure it will be welcomed by the public, which, as well as this commission, should know the facts."

Theodore P. Shonts, president of Interborough-Metropolitan Company, said regarding the inquiry: "We will give the commission all the information wanted, and all the assistance we can. We only ask that the commission study both sides of the question, for there are two sides to it. We will meet them in a spirit of co-operation. When I came to New York I said that that would be my policy, and I am more than ever convinced that only through co-operation can New York's transportation problem be solved. I believe that with real co-operation the work of the commission can be very helpful to the public and to us."

Edwin W. Winter, president of the Brooklyn Rapid Transit Company, said: "We shall welcome any sort of an investigation, and the commission will be aided in every way. We have no fear of being investigated, but on the contrary, we expect that an investigation will probably result in some improvements in the service, which is what we are all seeking."

The appointment of William M. Ivins as special counsel for the public service commission, first district, to investigate the Interborough-Metropolitan Company and the Brooklyn Rapid Transit Company has been announced. Mr. Ivins was the republican candidate in the last mayoralty election at New York City.

Abel E. Blackmar has been appointed regular counsel for the public service commission, first district.

Chairman Willcox has announced the appointment of William J. Norton as first assistant secretary and of J. O. Hammitt as second assistant secretary, and the retention of Thomas D. Hoxsey as secretary to the bureau of gas and electricity.

The public service commission of the second district has created a division of traffic with Frank Barry of Watertown as chief, and a division of tariffs with Walter E. Griggs of Jamestown as chief.

A communication was received from W. W. Niles, chairman of the committee on city streets of the Automobile Club, regarding the arrangement of trolley poles on Jerome avenue, opposite the entrance to Woodlawn cemetery. Mr. Niles said that while perhaps there was little or no danger in the daytime, the poles in the middle of the road at the bend are invisible from a short distance at night. At the suggestion of Commissioner Eustis it was determined to inform the railroad authorities of the letter, so that steps might be taken to remedy the situation.

Commissioner Bassett has submitted a letter received from City Comptroller Metz, inclosing a copy of an opinion from the corporation council that the public utilities law is valid.

The Continuous Transit & Securities Company has made an application to the commission for permission to install a

moving platform in a subway under Broadway, from Fourteenth to Forty-second streets.

The City Club has sent to the public service commission, first district, a report criticizing the Interborough-Metropolitan and the Brooklyn Rapid Transit companies for their service, and urging that a thorough investigation into all conditions causing congestion be made.

Commissioner Eustis of the New York public service commission, first district, is investigating the accident on the Third avenue elevated road, in which a number of Italians were injured.

Hearing on Chicago Plan.

The first hearing on the proposed plan for distribution of the Chicago Railways Company securities to stockholders and bondholders of the Chicago Union Traction Company and underlying roads was held on July 24 by Judge P. S. Grosscup of the United States circuit court, and Prof. John C. Gray of Harvard University. Representatives of the bondholders argued against a reduction in par values of the securities or of the income. Representatives of all the companies and of various independent owners of stocks and bonds were present.

In opening the hearing Judge Grosscup said that while the primary purpose was to consider objections against the proposed plan of reorganization, he would hear anything which the interested parties might desire to say against the transfer of the property from the receivers of the Chicago Union Traction Company to the new Chicago Railways Company. The objections will be heard first and afterwards the arbitrators will listen to replies from those who favor the plan as published. After that closing statements will be received from those representing both sides.

Henry Crawford questioned the right of the arbitrators to act. Judge Grosscup stated that the arbitrators did not act as having the power to compel the enforcement of their decisions, but as agents of the city of Chicago.

At the second hearing, on July 25, George W. Wickersham, attorney for the New York interests in the Union Traction Company, answered the objections to the plan and pointed out that the securities must be scaled. He suggested a voting trust for five years. Noble B. Judah, representing the Northern Trust Company, which holds bonds as trustee, suggested that the trust extend for 20 years. The arbitrators will consider this suggestion.

Formal answers to the amended and supplemental bill of complaint of the Guaranty Trust Company of New York against the West Chicago Street Railroad, the North Chicago Street Railroad and the Chicago Union Traction companies have been filed in the United States circuit court by the American Trust and Savings Bank and Foreman Brothers' Banking Company. They protest against any plan of reorganization of the traction companies which does not provide for the payment in cash of all receivers' certificates and notes.

Electric Railway Mail Service.—A regular United States mail service will be established on the Winona Interurban Railway between Warsaw and Goshen.

Increase in Wages.—The Toronto Railway has granted its employes an increase in wages of two cents an hour. Under the new scale motormen and conductors will receive 20 cents an hour for the first year, 22 cents the second year, and 23½ cents the third year.

Reduction in Charter Applications.—The new law in Pennsylvania, according to reports from Harrisburg, has caused a decided reduction in the applications for charters for electric railways. The consent of municipal and township authorities must now be secured before a new line can be chartered or an old road extended.

Philadelphia Ordinance Approved.—At a special meeting of stockholders of the Philadelphia Rapid Transit Company on July 18 the action of the officers and directors in ratifying the agreement with the city was approved. The by-laws of the company were changed to provide for the admission of three members to the board of directors on behalf of the city.

Prize for Photographs.—John B. Crawford, superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., has announced that a prize of \$100 will be offered soon for the best 12 photographs of views along the lines of the company. Three judges will be selected among prominent citizens in towns reached by the company's roads.

Wage Difference Settled.—Differences between the Springfield (Mo.) Traction Company and its employes have been settled. The terms offered by the company were accepted. The employes are to have wages raised one cent an hour, and will receive passes for themselves and their families over all

lines of the system. The company agrees not to discriminate against union members in the employment of new men. Outside the business sections motormen are to be allowed to use stools on the front platform of the cars. The company agrees to meet and confer with the men on any difference that may arise regarding wages. The agreement is to be binding for one year.

Cost of Subways in New York.—Before leaving for his vacation Mayor McClellan of New York said that the Brooklyn (Fourth avenue) subway and the bridge loop subway systems would be pushed forward rapidly, although the city had not sufficient money for many other needed improvements. He said that the Brooklyn (Fourth avenue) subway would cost about \$25,000,000 and the subway loop about \$12,000,000.

Answer of Pittsburg Subway Company.—The Pittsburg Subway Company has filed with the Pittsburg city clerk an answer to the request of the council for information. The amount of stock held by the various stockholders is as follows: H. F. Baker, 495 shares; F. T. F. Lovejoy, 501 shares; E. K. Morse, 1 share; M. M. Garland, 1 share; H. M. Williamson, 1 share; C. E. Andel, 1 share. H. F. Baker holds his stock for himself and for E. K. Morse, M. M. Garland and A. O. Fording. The amount paid in cash on the subscriptions is \$17,447.51, the company says.

Employees' Payments in Mobile Discontinued.—The Mobile (Ala.) Light & Railroad Company has made a payment to employees under the plan announced last year. These dividends for the first half of the current year vary from \$45 to smaller sums. It was announced, however, in connection with the payment of these amounts that as the company has never paid dividends to stockholders, and as it now has to consider excessive tax laws passed by the last legislature, the dividends to employees will be discontinued. Under the new law the tax on the franchises of the company will amount to \$44,000.

Motorman Charged with Wreck.—Paul Kelley, who was the motorman of a train wrecked on the Manhattan Elevated Railroad, New York, on September 11, 1905, has been taken to New York after his recent arrest in San Francisco on the charge of having caused the accident. Kelley charges the wreck to the switchman. At police headquarters in New York Kelley said that he remembered that his car passed the switch safely, and that the next car left the tracks, pulling the others with it. The only way that he could explain the accident was that the coupling between the first and second cars broke and allowed the car to fall into the street. Kelley said his car had white signals in front, showing the switchmen that it was a Ninth avenue car, and therefore he thought there was no excuse for the accident. He pleaded not guilty.

Proposed Change in Plans of Boston Elevated Extension.—Announcement is made of a proposed change in the plans for construction of the Boston Elevated Railway Company's extension from the North station to Lechmere square in Cambridge. The change was suggested by the company's advisory architect and involves covering the steel structure as originally planned with a layer of concrete. This would give a solid floor and undoubtedly would result in reducing the noise, as well as add considerably to the attractive appearance of the structure. The approval of the directors of the company has been secured and George A. Kimball, chief engineer of elevated construction of the Boston Elevated, is now preparing plans covering this improvement, which will mean an additional cost of approximately \$100,000. The plans later will be submitted for the approval of the Charles River Basin commission, the mayor of Boston and also the Boston & Maine Railroad, the yards of which will be crossed with a concrete structure. The state railroad commission has authority to make the final decision.

Tourist Information Bureau Established in Boston.—An information bureau, to be conducted on lines similar to bureaus maintained in New York City, Philadelphia, Washington, Baltimore and other large cities of the east and south, has been opened in Boston, where information regarding electric and steam roads, steamship lines, hotels, seashore and country resorts, etc., will be furnished tourists on application. The bureau, which will be under the management of Thomas P. Patrick and Robert H. Derrah, who have had considerable experience in the passenger traffic business of electric and steam railways, will be known as the United States Tourist Bureau. Mr. Derrah was for 10 years connected with the West End Railway, and more recently with the Boston & Northern and Old Colony Street railways as passenger agent, while Mr. Patrick has been for the past 15 years traveling passenger agent for the Southern Pacific and other roads which conduct tourist excursion parties to the Pacific coast. The office of the bureau is in the Old Corner Bookstore building, Washington and School streets, where tourists are welcome.

Construction News

FRANCHISES.

Anniston, Ala.—A franchise has been granted to the Anniston & Columbus Railway for a right of way through and across the streets and alleys of Anniston. The road will enter from the south from Oxford, between the two branches of the Southern Railway, to Eleventh street, west on Eleventh street to the plant of the United States Cast Iron Pipe & Foundry Company, with a spur track to the Woodstock furnaces. Work must be started within one year and completed within three years. W. H. Weatherly is president. Anniston, Ala.

Chrisman, Ill.—A 20-year franchise has been granted to the Paris Northern Traction Company to enter this place with its interurban line on McKinley avenue, following Illinois street to the limits. This road recently was incorporated to build an electric railway in Edgar and Vermilion counties from Paris to Ridge Farm and Brocton. I. N. Doughty, Paris, Ill., chief engineer.

Clinton, Okla.—A 50-year franchise for an electric railway has been granted by the city council to Herman Smith, Charles Goodwin and M. L. Holcomb.

Crookston, Minn.—The ordinance granting to W. A. Muren and others the right to build an electric railway in Crookston is now under consideration.

Dauphin, Pa.—The Central Pennsylvania Traction Company has secured from the borough officials permission to use three of the streets of Dauphin for its proposed branch line, which is to follow the towpath of the abandoned Pennsylvania canal from a point where the line turns to the present terminus at Rockville, and to extend through the first arch of the Rockville bridge. It is stated that as soon as right of way has been granted by property owners work on the new line will be started. Frank B. Musser, president, 12 South Second street, Harrisburg.

Decatur, Ill.—The franchise of the Decatur Sullivan & Mattoon Transit Company, granted some months ago by the city council, has expired by limitation, and the company now has petitioned for permission to enter Decatur by way of Wood street. By the terms of the original franchise entrance was to be had by way of Prairie street, but as this entailed the building by the interurban company of an expensive subway under the tracks of the Illinois Central Railroad, it refused to accept the franchise.

Joplin, Mo.—The Joplin & Pittsburg Street Railroad has filed its written acceptance of the amended franchise granted by the city council. Work on the construction of the interurban railway from Joplin to Pittsburg will be begun soon.

Memphis, Tenn.—The Clarksdale Covington & Collierville Interurban Railway Company has applied for a 30-year franchise to construct and operate its line through this city. The road recently was incorporated as a subsidiary of the Lake View Traction Company for the purpose of acquiring right of way, sites for power houses, etc., for its interurban line connecting the towns named in the title, and later may be merged with the Lake View Traction Company.

Moline, Ill.—An ordinance was presented to the Moline city council on July 16 for a franchise for the Moline Rock Island & Eastern Railroad. This company had secured an injunction restraining the city of Rock Island from interfering with the passage of the cars. As the ordinance, however, was passed by the council it is presumed that a settlement of the difficulty will be reached, although the mayor expresses dissatisfaction with the terms of the grant. Under the original ordinance it was provided that if the company should not have in operation within five years a line to Geneseo the term of the franchise should be reduced from 50 to 20 years, and the company should pay the city \$10,000. Under the ordinance as passed the company gives a bond of \$10,000 to have the line in operation within five years.

Redding, Cal.—Formal application for a franchise to build a double-track street railway in this city has been made by L. F. Evans, the line presumably being a part of the Redding & Eureka Railway.

Rock Hill, S. C.—A perpetual franchise has been applied for by the South Carolina Public Service Corporations to construct and operate its interurban line through Rock Hill. A special committee was appointed to act to investigate the matter and determine if a special election would be necessary to act on the petition.

San Mateo, Cal.—Peter Thorsen and J. Johns, residents

of San Mateo, have asked for a franchise to construct an electric railway in this city.

Sullivan, Ind.—The county commissioners have granted a franchise to the Terre Haute & Merom Traction Company for the operation of its line through Fairbanks, Staffordshire, Graysville, Merom and Merom Junction, actual construction work to be started not later than February, 1908. Much of the right of way has been secured and it is stated that work possibly may be started this fall.

Tifton, Ga.—A franchise for the construction and operation of an electric railway in this city has been granted by the city council to L. P. Thurman, I. W. Myers, W. W. Banks, O. Daniel, J. E. Cochran, E. F. Bussey and J. J. L. Phillips. The line must be in operation within 15 months.

RECENT INCORPORATIONS.

Austin & Lockhart Interurban Railway, Austin, Tex.—Incorporated in Texas to build an interurban line between the points named. Right of way is being secured and it is stated that a large tract of land will be donated to the company for a park. Capital stock, \$400,000. Incorporators: Thomas Moore, Elizabeth, N. J.; Ephraim Miller, White Plains, N. Y.; Henry N. McKay, Hempstead, L. I.

El Reno (Okla.) Railway.—Incorporated in Oklahoma to build an interurban line 60 miles westward from Oklahoma City, via El Reno, to Gary. The motive power may be either steam or electric. Capital stock, \$100,000. Incorporators: J. W. Maney, Oklahoma City; John Schaefer, Henry Schaefer, H. K. Schaefer, Herman Dittmer, El Reno, Okla.

Elyria Southern Railway Company, Cleveland, O.—Incorporated in Ohio with \$100,000 capital stock by W. E. Elliot, F. W. Carpenter, W. E. Moses, J. M. Starr and F. L. Sargent, to construct and operate an electric railway between Elyria and West Salem, O.

Gary & Eastern Traction Company, New Chicago, Ind.—Incorporated in Indiana with a capital stock of \$25,000. Abraham Fifer, John Trier and Gustav Lucas, directors.

Priest Rapids Railway Company.—Incorporated in Washington with \$1,000,000 capital stock to build an electric railway, particularly in Douglas county and from Wenatchee, Chelan county, in a southerly and southeasterly direction through the counties of Chelan, Kittitas, Yakima and Benton, to some point on the Northern Pacific Railway. The length of the proposed road is 135 miles. W. R. Rust of Tacoma, Wash., is president.

Southern Construction Company, Paducah, Ky.—Incorporated in Kentucky for the purpose of building the Paducah Southern Electric Railroad, the first link of which will be constructed between Paducah and Mayfield. Franchises have been secured for the operation of the line in Mayfield and the approaches to the city. Capital stock, \$10,000. Incorporators: B. H. Scott, H. H. Loving, John Harth, George Rush and others.

Spirit Lake Emmetsburg & Ft. Dodge Railway.—Incorporated in Iowa to build an electric railway from Spirit Lake to Ft. Dodge, by way of Okoboji, Emmetsburg, Mallard, Pocahontas, Lizard and Clare. Capital stock, \$20,000. The officers of the company are: Vice-president, M. H. Miller of Detroit, Mich.; secretary, P. O. Refsell; treasurer, D. A. Johnson; directors, E. A. Morling, John Menzies, W. I. Branagan, H. M. Miller, J. H. Allen, Will D. McEwen, John Daily and William Walsh. The last four live in Pocahontas county, Iowa.

TRACK AND ROADWAY.

Altoona Hollidaysburg & Bedford Springs Railway, Altoona, Pa.—The permanent survey for the route of this road between Altoona and Newry, Pa., has been made and surveyors are now at work on the line from Beryl to Hollidaysburg, by way of Dell Delight park. The contracts for the construction will be let in sections of two miles each, in order to carry out the plan of having the road in operation by October next. The building of the road, which has been hampered by the unwillingness of property holders to allow the company to acquire land for its right of way, will now be pushed as rapidly as possible under the recently enacted law of Pennsylvania, giving electric railways the right of eminent domain in that state. Power to operate the new line will be furnished by the Juniata Hydro-Electric Company at Petersburg. Over one-half of the tower transmission line of the railway company, which will come into Altoona by way of Sinking Valley, has been built. H. C. Givin, chief engineer, Altoona, Pa.

Atlantic Shore Line Railway, Kennebunk, Me.—This new road, extending from York beach to Kennebunk, has been

opened for travel. The road is 16½ miles long and is equipped for handling freight. The officers are: E. M. Goodall of Sanford, president; Louis B. Goodall of Sanford, treasurer; F. J. Allen of Sanford, secretary and attorney; W. G. Meloon of Kittery, general manager.

Baltimore Frederick & Hagerstown Electric Railway.—Important extensions of this company are said to be under consideration.

Boston & Providence Interurban Electric Railroad.—This company is being organized to build a standard-gauge electric line 33 miles long, between Boston, Mass., and Seekonk, R. I., passing through Hyde Park, Dedham, Westwood, Norwood, Canton, Sharon, Foxboro, Mansfield and Attleboro. The terminals will be near the New York New Haven & Hartford's railroad station at Forest Hills, Mass., and at Seekonk, R. I. Russell Robb, Concord; H. Heustis Newton, Everett; Frederic E. Snow, Boston; Frederick S. Pratt and James L. Richards, Newton, Mass., are interested.

Billings, Mont.—Yeger Brothers are asking for a special election to vote on their request for a franchise for a street railway.

Bristol Gas & Electric Company, Bristol, Tenn.—This company, which recently was granted a 30-year franchise to build and operate an electric street railway in Bristol, Va., is making rapid progress on the work and it is stated that the line will be in operation some time late in the summer or early fall. The first shipment of steel rails is on the way, the switch east of the union passenger station has been completed and a new bridge across Beaver creek, on Washington street, has been built, over which the cars of the company will operate instead of using the city bridge. The present terminus of the line will be at a point on Moore street, opposite the Virginia institute. When the present section is finished the line will be extended into the addition of the Bristol Home Company.

Buffalo & Lake Erie Traction Company.—Franchises have been granted by Dunkirk and Sheridan. The L. E. Myers Company of Chicago, which has the contract for construction, is working now between Dunkirk and Silver Creek.

Butte (Mont.) Electric Railway.—Grading for an extension of the Centerville line, three-fourths of a mile, has been finished and the extension will be completed soon. The company has double-tracked a large part of Park and Granite streets and also extended the double tracks on Excelsior avenue and in Walkerville.

Carthage, Mo.—At a meeting of the Commercial Club on July 18 the construction of an electric railway to Alba, Neck City and Purcell was discussed. W. J. Knepp of Kansas City proposes to build the road if residents of Carthage will raise \$10,000 for a bonus and subscribe for \$100,000 bonds. The club decided to raise \$1,000 for the purpose of making a survey, and the following committee was appointed by President S. B. Griswold to secure this money: A. F. Lewis, J. A. Mitchell, W. K. Caffee, A. Ramsey, G. A. Rose, J. F. Purcell and C. B. Gammon.

Charlotte Consolidated Construction Company, Charlotte, N. C.—It is reported that rapid progress is being made on the electric railway which this company is building from Charlotte to the Catawba river, 12 miles. Grading has been completed as far as Chadwick Mills, three miles, and the contract has been awarded to J. W. Hass for the construction of four large reinforced concrete bridges, which will cost about \$15,000. A park is to be built at Lakewood. The company is also making surveys for several other lines radiating from Charlotte.

Chicago & Milwaukee Electric Railroad.—It is reported that this road will build a branch to South Milwaukee from the Milwaukee line now under construction.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—Announcement is made that this company and the city of South Bend have entered into an agreement whereby the Winona Interurban Railway and other interurban lines may enter the city over the tracks of this company by paying 2½ cents for each passenger carried over its lines within the city limits. The company agrees to lay tracks to the limits whenever so ordered by the board of public works and to provide a suitable waiting station in the central part of the city for the use of passengers on interurban cars using the company's tracks.

Cleveland Alliance & Mahoning Valley Railway.—J. W. Holcomb of Cleveland is quoted as stating that arrangements for financing the property have been finished and that contracts will soon be made for the electrification of the old Baltimore & Ohio road between Ravenna and Newton Falls, and for construction of the new line from Newton Falls to Warren. The proposed line will be 80 miles long.

Cleveland Brooklyn & Elyria Railway.—E. W. Denison of Cleveland is reported to have made a survey for this proposed road. The road is projected from Cleveland to Zanesville by way of Barberton, Doylestown, Orrville, Millersburg and Coshocton.

Columbus (O.) Railway & Light Company.—The public service board has passed resolutions notifying this company to complete the construction of double track on certain streets.

Davenport, Ia.—The question of preliminary surveys for the proposed electric railway to Manchester, Ia., was discussed at a recent meeting. Among those interested are George R. Baker, Henry Vollmer and T. F. Halligan of Davenport and J. A. Voorhees of Monticello.

Du Quoin Belleville & St. Louis Electric Railway.—Surveys for this road are now being made.

Eatonton, Ga.—The board of trade has decided to aid in the construction of either an electric or a steam railway to Madison, Ga.

El Paso (Tex.) Electric Railway.—A double track will be laid on the boulevard by this company as soon as possible.

Evansville Suburban & Newburg Railway, Evansville, Ind.—It is reported that this road may be extended from its present Boonville terminus to Petersburg by way of Linnville and Winslow, opening up a fertile farming section in Pike and Warren counties.

Galena, Kan.—The Spring River Boating & Amusement Company will build a gasoline motor line from Galena to the new park on Spring river.

Gary & Interurban Railway, Gary, Ind.—This company will be incorporated in Indiana with \$400,000 capital stock, for the purpose of building an electric line connecting Gary with Hammond, Tolleston, East Chicago and Whiting. The directors are: F. N. Garet, J. A. Garet, C. B. Manbeck, M. N. Castleman and W. E. Schrage.

Geneva Phelps & Newark Railroad.—As announced previously in the Electric Railway Review a 3-mile extension of this road from Phelps to Clifton Springs and Manchester is planned and surveyors are now at work locating the route. It is reported that the franchise granted to this company about a year ago for the purpose of building and operating an electric line has been sold to J. G. White & Co., and that with the acquisition of the franchise by the White interests the work on the line from Geneva to Newark by way of Phelps will be started as soon as the Rochester Syracuse & Eastern Railway, which J. G. White & Co. is building, is completed to Clyde.

Grand Central Traction Company, Indianapolis, Ind.—Fifty or more Brown county farmers have given rights of way to this company upon which to build a line from Indianapolis to Vincennes, through the county by way of Nashville. They have also raised \$10,000 to be used in aid of the construction of the road through the county.

Hazleton, Ia.—Capitalists of this city are said to be preparing to build an interurban line to Oelwein. According to press dispatches gasoline motor cars are favored.

Henderson, Ky.—An electric railway is projected from Henderson through Cairo, Poole, Dixon, Lisman and Providence to Dawson Springs, Ky.

Hueneme Malibu & Port Los Angeles Railway, Los Angeles, Cal.—A contract for the construction of five miles of road is reported to have been let to W. K. Peasley.

Illinois Valley Railway, La Salle, Ill.—This company will apply for another franchise at Peru, Ill., and will construct a new bridge at that point.

Indiana Union Traction Company, Anderson, Ind.—Ground for a new right of way for nearly half a mile east and west of a bridge near Anderson, over the White river, has been purchased.

Indianapolis Newcastle & Toledo Electric Railway, Indianapolis, Ind.—This company has just completed the large fill across the Blue River valley over which its line will operate to Richmond. This fill was over a mile long and has taken a force of several hundred men over a year to build. It is stated that the line will be in operation late in the fall. D. M. Parry, president, Indianapolis, Ind.

International Railway, Buffalo.—This company has applied to the appellate court for permission to lay double tracks on Elmwood avenue. Three commissioners have been appointed to investigate the matter and they will hold their first hearing on July 29. Work on the Franklin street line of this com-

pany has been started. New tracks will be laid and will relieve much of the present congestion on lower Main street. The work of replacing the old rails worn out of shape by the heavy cars on that line is now under way in Rhode Island street and from Niagara square to Carolina street and beyond. At the request of the council the overhead system in some of the streets is being changed from center pole to span construction. In Tonawanda street and South Park avenue new 140-pound rails laid in concrete will replace the present tracks before fall. The cost of these improvements will be about \$400,000, besides other lesser improvements which come under the regular operating expenses of the road.

Jacksonville (Fla.) Electric Company.—Heavier rails are being laid on the East Bay street line.

Kalamazoo Elkhart & South Bend Railroad.—A meeting to consider this proposed road was held in Three Rivers, Mich., on July 17. M. H. Bumphrey was chairman. The meeting was called to order by George E. Miller and a committee of seven was appointed to ascertain what could be done to aid in the construction of the road.

Louisville & Northern Railway & Lighting Company, New Albany, Ind.—Martin J. Insull, general manager of this company, has stated that definite arrangements have been made whereby its cars operating over the Kentucky & Indiana bridge between New Albany and Louisville will be enabled to reach the heart of Louisville instead of leaving passengers at the river front as heretofore. The new terminus will be the depot of the company on Third street, between Walnut and Green. As soon as new equipment has been secured and the necessary changes made in the old, the cars will use the following route: After crossing the bridge they will operate over Thirty-first street from High to Bank street, then over the tracks of the Louisville Railway on Bank street, east to Nineteenth, out Nineteenth to Jefferson to Third and south on Third street to the depot between Green and Walnut streets, used jointly by the Louisville & Northern and the Louisville & Southern Indiana Traction Company. It is stated that new trucks to conform to the gauge of the street railway tracks will be placed on the cars. It is expected that the cars will operate over the new route within the next few months.

Madison County Interurban Railway.—The directors met in Edwardsville, Ill., on July 18 to consider plans for the construction of a road from Staunton to a point near Collinsville. Among those who attended the meeting were the following: William P. Wall, John Faulstich and D. G. Williamson, Staunton; John Gehrig and Joseph F. Long, New Douglas; John Bardill, Grantfork; John Wildi and Eugene Schott, Highland; Rufus Pike and L. J. Rhein, St. Jacob; W. W. Jarvis, Troy. The capital stock of the company is \$25,000.

Madison, Wis.—It is announced that Daniel D. Ely of New York City is interested in a proposed interurban electric railway, to be built between Madison and Janesville, Wis., at a cost of about \$900,000. Entrance to Madison will be secured over the tracks of the Madison City Railway and if built the line will be in operation within a year. It is stated that practically all of the capital has been subscribed.

Middleburg, Pa.—A survey has been made for the proposed electric railway from Middleburg to Lewisburg. The road will pass through Selinsgrove, Sunbury and Winfield.

Montgomery County Rapid Transit Company, Norristown, Pa.—This company's Trooper-Souderton extension from Trooper to Centre Point, about seven miles, was formally opened on July 22.

Muskogee (Okla.) Electric Traction Company.—Residents of the northwestern part of Muskogee are reported to have agreed to give a bonus of \$5,000 to this company if certain extensions are built.

New York Westchester & Boston Railway, New York.—This company has applied to the supreme court, New York, for permission to condemn lands for the right of way from Port Morris to Port Chester, by way of New Rochelle, with branches to White Plains and Ft. Schuyler. These proceedings are opposed by Arabella and Henry E. Huntington, who own property along the route, which the company's experts value at \$36,036. The Huntingtons declare that the company is not a properly incorporated domestic corporation, and that it does not hold any valid franchises. Justice Dayton signed an order referring the case to Charles F. Brown, who is to report whether the land should be condemned or whether the railway company's franchises have lapsed.

Northern Ohio Traction & Light Company, Akron, O.—It is announced that this company will spend approximately \$400,000 in the straightening of its line, involving a new grade throughout and the improvement of the roadbed, which will

result in a considerable reduction in the running time between Akron and Cleveland. Some of the right of way has been purchased and the remainder is being negotiated for between Cuyahoga Falls and Cleveland. Actual work on these improvements, however, is not contemplated before next spring.

Omaha Lincoln & Beatrice Railway, Lincoln, Neb.—E. C. Hurd, chief engineer, writes that this company has completed and is operating six miles of its proposed line from Lincoln to Omaha, Neb., 56 miles. The remainder of the line, which includes Bethany Heights, Waverley, Greenwood, Ashland, Springfield, Papillion and Sarpy City, is now under construction. The line will be on a private right of way. The overhead construction is of the single-pole bracket type. Harvey Musser, Akron, O., is president.

Oneida, N. Y.—It is reported on official authority that an electric railway will be built from Rome to Oneida, by the Andrews-Vanderbilt syndicate.

Oneonta & Mohawk Valley Railroad, Oneonta, N. Y.—A cut-off is being constructed across Mud Lake near Richfield Springs, N. Y.

Oregon Electric Railway, Portland, Ore.—As soon as the two remaining spans of the bridge over the Willamette river at Wilsonville have been placed work on the unfinished 19-mile section of this company's line beyond Wilsonville will be started. It is believed that by August 15 work trains may be operated over the structure.

Pacific Electric Railway, Los Angeles, Cal.—It is reported that work on a proposed line to San Diego, Cal., will be started in the near future by this company. This system already has a line reaching the eastern limits of Orange county and it is announced that contracts have been let for a line between San Diego and Del Mar, leaving about one-half of the entire distance between San Diego and Los Angeles to be constructed. The line to San Diego as planned will practically parallel the Atchison Topeka & Santa Fe Railway.

Philadelphia Rapid Transit Company.—In spite of delays from various causes, part of which have been caused by the non-delivery of construction materials, satisfactory progress has been made on the Market street subway, from Fifteenth street to the Delaware river, and President John B. Parsons is quoted as saying that by July, 1908, trains will be operated through it. The 7-foot sewer has been completed in Market street as far west from the river as Twelfth street on the south side and to Tenth street on the north side, and the sewer construction near the city hall probably will be finished by next October. The contractors announce that tracks will be laid in a very short time in that portion of the subway encircling the city hall. The roof of the subway between Front and Second streets and the steel supports for its continuation have been completed as far west as Third street and it is stated that the wall and floor between Third and Fourth streets will be concreted by the end of this week. The concrete foundations for the superstructure of the elevated road on the Arch street incline, from Front street to Delaware avenue, are being laid.

Pine Bluff, Ark.—A project for the construction of an electric railway to Little Rock is under way. Among those who are interested are J. A. Holmes and Dillard H. Saunders. A preliminary survey will be made soon, it is reported.

Pittsburg McKeesport & Westmoreland Street Railway.—Work on the construction of this line from Irwin to West Newton is progressing. A franchise has been secured in New Haven for the operation of the line through the streets of that village and an extension from West Newton to Donora and other Monongahela river points will be built next summer.

Portland & Northern Railroad, Portland, Me.—This company, which is building an electric railway from Portland to Bridgeton, Me., has increased its capital stock from \$160,000 to \$1,000,000. William M. Sturges, chief engineer and general manager, Portland, Me.

Redlands Central Railway, Redlands, Cal.—Rails and ties have arrived in Redlands for the construction of this line. As soon as the line is completed in Redlands the company expects to build to Riverside.

Riverhead, L. I.—A trust deed securing an issue of \$200,000 bonds on the property of the Suffolk Syndicate Company has been filed. John R. Wells, New York City, is president of the syndicate, and it is reported that the filing of the mortgage is preliminary to the construction of an electric railway from Patchogue west.

Rochester, N. H.—Business men in this section say it is likely that work will soon begin on the construction of the cross-country electric line between this city and Concord. The charter was obtained in 1893, and has been amended and extended from time to time since. The route surveyed passes

through Barrington, Northwood, Epsom and Chichester, with already constructed lines running from Dover and this city.

Rochester (N. Y.) Railway Company.—Application has been made to the town board of Greece for approval of a plan to lay double tracks in the Ridge Road.

Rockford & Interurban Railway Company.—This company has purchased Yost's park on Rock river.

St. Johns Light & Power Company, St. Augustine, Fla.—We are officially advised that during the summer this company will extend its line from St. Augustine to South Beach, Fla., five miles. Grading has been completed and the overhead work is now in progress. Thomas R. Osmond, general manager, St. Augustine.

Springfield (Mo.) Traction Company.—The Monroe street line will be extended to the grounds of the new state normal school.

Toledo Urban & Interurban Railway, Toledo, O.—It is reported that an extension will be built from Findlay to Larue, via Kenton, and that a traffic arrangement will be made with the Columbus Urbana & Western Electric Railway of Columbus and the Columbus Magnetic Springs & Northern Railway of Delaware, affording a through line from Toledo to Columbus. Under this arrangement the Toledo Urban & Interurban road would connect with the Columbus Magnetic Springs & Northern at Larue. The latter road connects with the Columbus Urbana & Western at Magnetic Springs.

Traverse City, Mich.—N. B. Debrin and Charles A. Deenen of Chicago and others desire to build an electric railway, including eight miles of track, in this city, and also an interurban road from Traverse City to Petoskey.

Twin City Rapid Transit Company, Minneapolis.—The Selby avenue tunnel, it is now estimated, will be completed and ready for operation by August 10.

Utah Light & Railway Company, Salt Lake City, Utah.—After a conference between representatives of the company and the joint council committees on street and municipal laws an agreement was reached which will enable the company to continue without delay the reconstruction work which is planned at a total expense of about \$3,000,000.

Walla Walla Valley Traction Company, Walla Walla, Wash.—It is reported that this company has leased for two months Meador park, on the Walla Walla river, and will make some improvements.

Waterbury & Milldale Tramway Company.—A meeting of those who are interested in the construction of this road will be held shortly to complete the organization. A representative of Sanderson & Porter of New York has been investigating the territory.

Waterloo, Ia.—The following citizens are agitating the construction of a new electric railway: M. B. Locke, J. E. Sedgwick, F. F. McElhinney, Thomas Cascaden, Jr., J. D. Easton, E. L. Johnson, Louis Frank, C. O. Lamson, C. L. Kingsley, J. K. Joder, O. J. Fullerton, W. J. French, P. J. Martin, J. M. Graham, Roy Cushman, S. L. Vale, S. J. Hall, R. N. Cowin, G. A. Doerfler, J. A. Dunham.

Willamette Valley Traction Company.—Construction work on this company's street railway line in Eugene, Ore., was begun on July 15 and it is stated that that portion between the Southern Pacific depot and the University of Oregon will be completed and in operation by fall. The line eventually will be built to Springfield.

Winnebago Traction Company, Oshkosh, Wis.—R. H. Hackett, receiver, writes that there is no truth in the reported purchase by the Wisconsin Traction Light Heat & Power Company of the 14-mile interurban line of the Winnebago Traction Company between Neenah and Oshkosh.

Winnipeg Electric Street Railway.—The company has agreed to make several extensions in accordance with an ordinance passed by the city council seven weeks ago. Some of the extensions, however, the company will not agree to make at present.

Woodbury & Waterbury Street Railway.—John Fagans' Sons of Meriden, Conn., have received the contract for building four miles of the electric road which is under construction between Waterbury and Woodbury, Conn.

POWER HOUSES AND SUBSTATIONS

Choctaw Railway & Lighting Company, McAlester, I. T.—On July 18 the power house of this company at McAlester was wrecked by a flywheel accident. The power house roof was torn off and several cars in the adjacent car house were damaged. The damage is estimated at \$15,000.

Personal Mention

Mr. John Crump, Jr., heretofore vice-president and superintendent of the Columbus (Ind.) Street Railway & Light Company, has been elected president to succeed the late Richard F. Gottschalk, whose death was announced last week.

Mr. F. W. Brown has been appointed general passenger agent of the Michigan United Railways, with headquarters at Battle Creek, Mich. Mr. Brown was, until recently, with the Pere Marquette and the Michigan Central railways at Lansing, Mich.

Mr. L. E. Holderman, formerly superintendent of the electrical department of the Eastern Wisconsin Railway & Light Company at Fond du Lac, Wis., has accepted a similar position with the Terre Haute Indianapolis & Eastern Traction Company, Terre Haute, Ind.

Mr. J. A. Jarvis has been appointed assistant superintendent of the Peoria-Bloomington branch of the Illinois Traction System, with headquarters at Peoria, Ill., reporting to H. E. Davidson, superintendent, at Bloomington. Mr. Jarvis formerly was master mechanic of the Joliet Plainfield & Aurora Railroad.

Mr. Guy W. Talbot, whose resignation as vice-president of the Corvallis & Eastern Railroad, to accept a similar position with the Oregon Electric Railway, Portland, Ore., was announced in the Electric Railway Review for July 13, was born August 12, 1873, at Centreville, Mich. He is a graduate of the public schools of Des Moines, Ia., and of the College of Emporia at Emporia, Kan. He entered railway service in 1891 as a messenger boy for the Chicago Burlington & Quincy Railroad at Des Moines, remaining with this road in various capacities until 1895, when he was appointed traveling freight and passenger agent of the Des Moines Northern & Western Railway at Des Moines. He also served in this capacity with the Chicago Milwaukee & St. Paul and the Iowa Central Railway. On November 1, 1900, he became traffic manager of the Peoria & Pekin Terminal Railway at Peoria, Ill., holding this position until January, 1904, when he was made general manager of the same road. Mr. Talbot was appointed general manager of the Corvallis & Eastern and the Astoria & Columbia River railroads in April, 1906, later resigning from the Astoria & Columbia River to become vice-president of the Corvallis & Eastern. The Oregon Electric Railway, of which he is now vice-president, is under construction between Portland and Salem, Ore., and will form, when completed, with its 53 miles of main and feeder lines, one of the important inter-urban systems of Oregon.

Mr. George G. Porter, recently superintendent of shops of the Metropolitan District Railway, London, England, has resigned his position and is now temporarily located in Chicago. Mr. Porter has been in England since 1893 and has been connected with the London Underground Electric Railway since 1904, first as chief inspector of car construction and more recently as superintendent of its Metropolitan District division. During his stay in England he also completed a course in electrical engineering at Chelsea Technical Institute.

Mr. E. J. Cook, heretofore chief engineer of power of the Cleveland Electric Railway, Cleveland, O., has been appointed general manager of the Rochester Railway Company to succeed Mr. R. E. Danforth, whose resignation to become general manager of the street railway department of the Public Service Corporation of New Jersey was announced in the Electric Railway Review for March 30. Announcement is made that for the present Mr. Cook will not go to Rochester, but will direct the management of the Rochester Railway from the Cleveland office through the general superintendent at Rochester.



Guy W. Talbot.

Financial News

American Light & Traction Company, New York.—In addition to the usual dividend on the preferred stock of this holding company a quarterly dividend of 1½ per cent has been declared on the common stock, increasing the rate from 5 per cent to 6 per cent per annum. Gross earnings from subsidiary companies in the six months ended June 30, 1907, were \$1,028,866, as compared with \$953,115 in the corresponding period of the previous year. The surplus after payment of the dividends was \$507,760, as compared with \$445,669. From this surplus there was deducted \$340,500 for a "reconstruction reserve fund."

Atlantic City & Ocean City Company.—This company, which owns the stock and bonds of the Atlantic City & Ocean Railroad, has deposited them as collateral for an issue of 5 per cent bonds, due on March 1, 1947, of which \$500,000 are authorized to \$350,000 outstanding. The Atlantic City & Ocean City Railroad is leased for 999 years to the Atlantic City & Shore Railroad for a rental of \$19,000 per annum, from which the bond interest will be paid, and an additional contingent sum equal to 33 1-3 per cent of the net earnings of the system. This contingent sum, however, is not to exceed \$25,000 per annum, and it will be applicable to the dividends on the preferred stock of the Atlantic City & Ocean City Company. The latter company has outstanding \$175,000 preferred stock and \$220,000 common stock, out of \$250,000 preferred authorized, and \$350,000 common authorized.

Atlantic City & Shore Railroad, Atlantic City, N. J.—A traffic agreement has been made between this company and the West Jersey & Seashore Railroad, whereby the Atlantic avenue line of the latter company in Atlantic City will be operated by the Atlantic City & Shore Railroad. This is a double-track line extending from the inlet, in Atlantic City, to Longport, 8½ miles.

Brooklyn Rapid Transit Company.—The Nassau Electric Railroad and the Brooklyn Union Elevated Railroad, controlled lines, have filed 10-year mortgages to the Central Trust Company of New York, trustee, to secure certificates of indebtedness amounting to \$5,000 and \$20,000,000 respectively. The South Brooklyn Railway, another subsidiary company, has filed a certificate showing an increase of capital stock from \$150,000 to \$500,000.

Cincinnati & Columbus Traction Company, Cincinnati, O.—This company has filed a trust deed to secure an issue of \$200,000 bonds in order to pay existing obligations, and to meet the cost of improvements and extensions.

Eastern New York Railroad, Ballston Spa, N. Y.—This company has applied to the public service commission, second district, for permission to issue \$840,000 bonds, and an equal amount of stock in order to secure funds for the construction of extensions. The commission has held a hearing on the application and another meeting will be held on July 31 to consider the matter.

Hudson, Pelham & Salem Electric Railway, Hudson, N. H.—The property of this company was sold at foreclosure on July 19 to the New Hampshire Electric Railways.

Kansas City (Mo.) Railway & Light Company.—At a meeting of the directors of this company Bernard Corrigan was re-elected president and Samuel McRoberts of Armour & Co., Chicago, chairman of the board of directors. W. E. Kirkpatrick and J. A. Harder were re-elected secretary-treasurer and auditor, respectively.

Lexington & Interurban Railways, Lexington, Ky.—It is proposed to consolidate the properties of two subsidiary companies, the Central Kentucky Traction Company and the Frankport & Versailles Traction Company.

London (Ont.) Street Railway.—The gross revenue of this company for the six months ended June 30, 1907, was \$107,432.36, as compared with \$91,490.08 for the corresponding period of last year, an increase of \$15,942.28, or 17.42 per cent.

Manchester Corporation Tramways.—The report for the year ended March 31, 1907, gives the following information: Total borrowing powers, £1,875,014; borrowing powers exercised, £1,558,668; unexhausted borrowing powers, £316,346; gross capital expenditure, £1,725,844; traffic revenue, £712,975; other revenue, £6,697; total, £719,673; working expenses, £454,692; balance, £264,980; bank interest, £1,910; leaving available, £266,891; interest, taxes, etc., £119,852. The balance was used as follows: Reserve, renewals and depreciation account, £87,827; contribution in aid of the rates,

£55,000; street improvements around infirmary, interest, etc., £4,211. Other statistics were: Electrical energy—total number of units used, 25,072,791; electrical energy—number of units used per car-mile, 1.61; working expenses—percentage of receipts, 63.18; average traffic revenue per car-mile, 11.02d; average traffic revenue per mile of single track (156½ miles), £4,556; average total revenue per car-mile, 11.12d; average car-miles per day per car, 100; average working expenses per car-mile, including power cost, 7.03d.

Muscatine (Ia.) Light & Traction Company.—Denison & Farnsworth of Boston, Cleveland and Philadelphia, in offering for sale a block of bonds of the Citizens' Railway & Light Company, an underlying company, report gross revenue for the year 1906 at \$124,890, and operating expenses at \$70,085, leaving available for interest, dividends, etc., \$54,805.

Pittsburg & Allegheny Valley Railway, Leechburg, Pa.—The Guarantee Title & Trust Company of Cleveland, O., has been appointed receiver upon the application of the Frick & Lindsay Company. The company has a floating debt amounting to \$273,000. The capital stock of the company is \$1,500,000 and the authorized bond issue is \$1,100,000, of which \$118,000 is outstanding.

Pittsburg McKeesport & Greensburg Railway, Greensburg, Pa.—Control of this company has been acquired by the West Penn Railways Company. The combined system will extend from Masonstown in Fayette county through the principal towns in Westmoreland county to Trafford City, Allegheny county, making track connection at the latter point with the Pittsburg Railways Company. At a meeting in Greensburg on July 22 the board of directors was reorganized. The former directors retired with the exception of Lloyd B. Huff and Richard L. Coulter, Jr. H. I. Lynne, Byron Trimble, J. H. Purdy and J. B. Van Wagener were elected new directors representing the West Penn Railways. Mr. Purdy becomes vice-president and Mr. Van Wagener treasurer. Mr. Huff retains the office of president. The Pittsburg McKeesport & Greensburg road has \$1,030,000 stock outstanding and \$1,325,000 bonds outstanding. The West Penn Company has \$4,700,000 bonds outstanding; \$2,750,000 preferred stock and \$3,250,000 common stock. The West Penn Railways Company will control 154 miles of track.

Seattle (Wash.) Electric Company.—N. W. Harris & Co., Lee, Higginson & Co. and Estabrook & Co. have purchased \$1,500,000 of 5 per cent consolidated and refunding mortgage bonds of this company and are offering the bonds for sale at 92½, at which the return is about 5.60 per cent. The bonds are dated August 1, 1907, and are due on August 1, 1929. They are convertible at any time prior to August 1, 1912, into the common stock of the company at \$110 per share.

United Railways of the Havana & Regla Warehouses, Limited.—The shareholders have approved the proposition for increasing the capital stock in order to acquire control of the Havana Central Railroad.

United Railways of St. Louis.—Gross earnings for the six months ended June 30 were \$5,287,611, as compared with \$4,949,630 for the corresponding period of the previous year. The figures compared as follows:

	January 1 to June 30— 1907.	1906.	Increase.
Gross earnings	\$5,287,611	\$4,949,630	\$337,981
Expenses and taxes	3,526,035	3,120,780	405,255
Net earnings six mos.	\$1,761,576	\$1,828,850	*\$67,274
Charges	1,386,310	1,390,763	* 4,453
Surplus	\$ 375,266	\$ 438,087	*\$62,821

*Decrease.

Washington & Cannonsburg Street Railway, Washington, Pa.—This company, which is controlled by the Philadelphia Company of Pittsburg, has authorized an issue of \$750,000 of 6 per cent bonds, the proceeds to be used for improvements and extensions.

Dividends Declared.

American Light & Traction Company, New York, preferred, quarterly, 1½ per cent; common, quarterly, 1½ per cent.

Chattanooga (Tenn.) Railways Company, preferred, quarterly, 1¼ per cent.

Helena (Mont.) Light & Railway Company, preferred, quarterly, 1¼ per cent.

Twin City Rapid Transit Company, Minneapolis, common, quarterly, 1¼ per cent.

West Penn Railways Company, Pittsburg, preferred, quarterly, 1¼ per cent.

Manufactures and Supplies

ROLLING STOCK.

Spokane & Inland Empire Railroad, Spokane, Wash., is in the market for a sweeper.

Washington Water Power Company, Spokane, Wash., is in the market for a snow plow.

Toledo Fostoria & Findlay, Fostoria, O., is reported to have purchased five interurban cars.

Compagnie de Mutuelle Tramways, Brussels, Belgium, has placed an order with The J. G. Brill Company for 20 cars.

Pittsburg Railways Company, Pittsburg, Pa., has placed an order, it is reported, with the St. Louis Car Company for 50 cars.

Lima & Toledo Traction Company, Lima, O., it is reported, will be in the market soon for a number of new cars for city service.

Joplin & Pittsburg Electric Railroad, Joplin, Mo., is reported to have placed an order with the Jewett Car Company for 12 cars.

Illinois Tunnel Company, Chicago, Ill., has placed an order with the Baldwin Locomotive Works for 25 electric locomotives.

Hanover & York Street Railway, York, Pa., is reported to have placed an order with the Niles Car & Manufacturing Company for six cars.

Savannah Electric Company, Savannah, Ga., is building four 15-bench open trailer cars in its own shops. It is also equipping its 15-bench open cars with four GE-81 motors.

Seattle Electric Company, Seattle, Wash., will add to its car equipment during the year 63 four-motor 43-foot cars, four trail cars of the same size, eight cable cars manufactured in the company's shops and eight flat cars for freight and construction purposes.

Washington Railway & Electric Company, Washington, D. C., has ordered 25 closed cars from the St. Louis Car Company, as reported in the Electric Railway Review of June 22. They are to be delivered by September 15, 1907. The specifications call for the following details:

Type of car.....Metropolitan	Length of body.....28 ft. 3 in.
Seating capacity.....44	Over vestibule.....39 ft. 6 in.
Weight.....30,000 lb.	Over all.....41 ft. 2 in.
Wheel base.....4 ft. 6 in.	Width inside.....7 ft. 3½ in.
Height inside.....8 ft. 1¾ in.	Over all.....8 ft. 5 in.
Sill to trolley base.....9 ft. 2¾ in.	Body.....Wood
Height track to trolley base.....11 ft. 7¾ in.	Underframe.....Wood

Special Equipment.

Bolsters.....Cast steel	Interior finish.....Cherry
Brake rigging.....Peacock	Journal bearings.....Bronze
Couplers.....Van Dorn	Journal boxes.....Malleable
Curtain fixtures.....Burrowes	Motors.....Westinghouse 93A
Curtain material.....Pantastote	Paint.....Valentine
Destination signs.....Hunter	Safety tread.....Stanwood
Fenders.....Parmenter	Sanders.....Robinson
Gears and pinions.....Nuttall	Seats.....Rattan
Gongs.....Brill Dedenda	Springs.....
Heating system.....Consolidated	New York Car & Truck Co.
Headlights.....United States	Trucks.....Peckham

SHOPS AND BUILDINGS.

Camden Interstate Railway, Huntington, W. Va.—This company is building new car houses which will occupy the entire square between Eighteenth and Nineteenth streets and Washington avenue, Central City, W. Va. The construction will be of steel and brick, with concrete foundation and floor. There will be accommodation for 60 cars and also for the general machine shops, blacksmith shop and winding rooms.

Houghton County Street Railway, Hancock, Mich.—This company will rebuild the large pavilion at Electric Park which was destroyed by fire last year.

Illinois Traction Company, Champaign, Ill.—This company will establish general terminal facilities in St. Louis, Mo. Its plans include a bridge across the Mississippi river, a passenger station and freight depot. The estimated cost is about \$5,000,000.

International Railway, Buffalo, N. Y.—This company has just completed a new car house on Broadway, at a cost of

\$100,000, and is now enlarging its Hertel avenue car house at a similar cost.

La Crosse (Wis.) City Railway.—This company is making extensive improvements on its car houses, preparatory to the reception of new cars.

Rockford & Interurban Railway, Rockford, Ill.—This company, it is reported, has had plans prepared for a passenger station at Janesville, Ill., and will ask for bids soon.

TRADE NOTES.

Baldwin Locomotive Works, Philadelphia, has shipped 16 sets of Baldwin trucks to the Interurban Railway & Terminal Company, Cincinnati, for equipping its old cars.

Southern Steel Company, Gadsden, Ala., is receiving bids for the construction of a pressed steel car plant to have a capacity of 35 cars a day and to employ 1,000 men.

F. A. Johann, St. Louis, Mo., dealer in railway equipment and supplies, who has heretofore been located in the Equitable building, St. Louis, has moved to 1624 Pierce building.

Magann Air Brake Company, Limited, Detroit, Mich., has equipped 50 cars of the Toronto (Can.) Railway with its storage air brake system and will equip 100 more for the same road.

Fuller Railway Electric Signal Company, Atlanta, Ga., has been incorporated with \$500,000 capital stock and privilege of increasing to \$1,000,000. Incorporators: W. R. Fuller, A. P. Morgan and W. P. Fain.

General Systems Company, Dayton, O., has sold 80 outfits of its triplicate system of train orders to the Lake Shore Electric Railway, Cleveland, and 30 to the Indianapolis Crawfordsville & Western, Indianapolis, Ind.

American Bridge Company has been awarded the contract for 2,100 tons of structural steel to be used in the erection of a new mill for the American Steel & Wire Company, Cleveland, O. The contract price is \$150,000.

F. Bissell Company, Toledo, O., has found it necessary, on account of its growing business, to establish a traffic department. A. G. H. Jenson, formerly with the Wabash general freight offices, has been placed in charge.

W. McConway has been elected a director of the Westinghouse Electric & Manufacturing Company to fill the vacancy caused by the death of P. F. Topping. All the other retiring members of the board of directors were re-elected.

Acme Supply Company, Chicago, manufacturer of the Acme diaphragm, curtains, etc., which recently removed its office and works from 100 Lake street to 2745 West Lake street, has opened a downtown office at 304 Great Northern building, Chicago.

Berkshire Electric Company, North Adams, Mass., has been incorporated with a capital stock of \$10,000, to do construction and allied work in the building of electric railways. Incorporators: W. F. Waterman, Boston, Mass., and Joseph Lyons of North Adams, Mass.

Logan Truck Company, Logansport, Ind., has been incorporated with a capital stock of \$100,000. The company will establish a large plant to manufacture and build electric railway trucks. The directors of the company are C. F. Williams, C. B. Holmes and H. R. Adams.

Consolidated Lighting Company, Camden, N. J., has been incorporated with a capital stock of \$100,000 to manufacture gas and oil machines for the production and supply of light, heat and power. The incorporators are: William C. Harris, 1926 Girard avenue, Philadelphia; Theodore B. Fryer, Magnolia, N. J., and Winfield S. Caldwell, Beverly, N. J.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., established a new record in its shipping department during the month of May. During that month the company shipped no less than 750 carloads of electrical machinery, or an average of 30 carloads a day, aggregating 10,000 tons and representing in value about \$4,000,000. This exceeds by 110 cars any shipping record for one month that has ever been made at these works. The high record heretofore was held by the month of August, 1906, when 640 carloads were shipped.

Rostand Manufacturing Company, Milford, Conn., is now fully prepared to manufacture the McCarthy hat and bag racks for trolley cars and passenger coaches. The company's first order for trolley car trimmings was secured during the past few weeks and is for 133 new cars for the Consolidated Company, now being built at the Wason and Stephenson plants. This company makes a specialty of brass trimmings of every

character and is one of the concerns in New England whose growth in the four years that it has been in existence is considered phenomenal.

A. S. Blanchard, who was mentioned in the Electric Railway Review of July 20 as having been appointed assistant to the president of the Atha Steel Casting Company of Newark, N. J., informs us that his position is that of assistant to the vice-president and not as stated.

Erie Stone Company, Huntington, Ind., an Ohio corporation, has been admitted to do a general contracting and engineering business in Indiana. The company will establish a stone crushing plant and will make a specialty of ballasting electric railroad bed. C. E. McKee is state agent.

John A. Stewart Electric Company, Cincinnati, O., makes a specialty of second-hand power house equipment and carries, ready for immediate delivery, a number of large engines, rotary converter outfits, etc. It has just published a new list of second-hand apparatus for electric railway power stations.

Case Manufacturing Company, Columbus, O., manufacturer of overhead cranes, has shipped a large hand-power crane to the Pittsburgh Harmony Butler & New Castle Railway. It has a capacity of 20 tons and a span of 45 feet and will be installed in the traction company's new power house.

American Concrete Coal Company, Richmond, Ind., has been incorporated, capitalized at \$10,000, to manufacture reinforced or armored concrete cementitious telegraph, telephone, electric light and trolley poles. The directors of the company are William M. Bailey, James S. Brady, Jr., and A. C. Lindemuth.

Central Inspection Bureau, 17 State street, New York, is at present inspecting 56 cars for export shipment to South America, and also a number of cars for Porto Rico, which are now under construction at the works of The J. G. Brill Company. It is equipped to furnish competent inspectors for all classes of equipment.

McClintic-Marshall Construction Company, Pittsburgh, Pa., has been awarded the contracts, together with the Riter-Conley Construction Company, for the construction of new open-hearth furnaces and mills for the Pittsburgh Steel Company at Monessen, Pa. The company has also been awarded the contract for 3,000 tons of structural steel for the new shops of the St. Louis & San Francisco Railroad at Springfield, Mo.

Browning Foundry Company, Ravenna, O., recently incorporated, has taken over the foundry building and grounds formerly owned by the American Foundry & Machine Company and has succeeded V. R. and E. H. Browning in the operation of the plant. Practically all the product is used by the Browning Engineering Company, Cleveland. Officers of the new company are: President, V. R. Browning; secretary, E. H. Browning; treasurer, Frank Root.

McGee Switch & Signal Company, Dallas, Tex., whose incorporation was noted in the Electric Railway Review of July 13, is contemplating the erection of a large plant. The plans have not yet been definitely decided upon. The company wants prices on electric motors and general supplies for railway signal service and also on foundry machinery. W. M. Jones is president; R. M. McGee, vice-president and managing engineer; M. N. Chrestman, secretary. The company's present offices are 314 Slaughter building.

Detroit Graphite Company is the new corporate title of the Detroit Graphite Manufacturing Company of Detroit, Mich. F. W. Davis, Jr., has been elected vice-president, and T. R. Wyles, second vice-president of the company. A. A. Boutell is president. With the very extensive additions and improvements that have been made to its building and machinery departments the company is prepared to give even prompter attention than heretofore to all orders. The great increase and demand for its light color paints has necessitated the reservation of one building especially for this department. The company's factories are located at Detroit, and its mines are at L'Anse, Mich. It maintains offices in the following cities: New York, Boston, Chicago, Buffalo, Cleveland, St. Louis, Atlanta and Kansas City.

Von Schrenk, Fulks & Kammerer, consulting and timber engineers, have opened offices at Tower Grove and Flad avenues, St. Louis, for the purpose of establishing a technical laboratory and consulting office devoted to the prosecution of investigations for the uses of timber. With this end in view Herman Von Schrenk, who is well known as the pathologist in charge of investigations on timber diseases in the United States department of agriculture, has resigned his position in the government service. Messrs. Fulks and Kammerer, who are associated with him in the new partnership, were for several years actively connected with the timber-

preserving work of the United States department of agriculture, and for the past two years have been conducting timber-preserving investigations for various railway companies. Mr. Von Schrenk and his associates announce that they are prepared to carry on investigations and make reports on all problems dealing with the best method for handling and utilizing timber. The closer adaptation of the qualities of any and all kinds of wood to special uses will be looked into; determinations as to the character and value of various preservative processes for increasing the length of life of timbers will be made. The office will be prepared to make reports on problems dealing with logging methods, the manufacture of lumber in its various phases, dry kiln operations, wood waste utilization, paper pulp industry, the manufacture of special articles, the seasoning and preservation of timber in its various forms, such as ties, telephone poles, mine props, posts, etc., the adaptation of various timbers for building purposes, and problems relating to electric railway track and bridge construction. In addition to these general problems of wood utilization, arrangements have been made with a prominent firm of consulting forest engineers to handle all problems dealing with the planting and management of timber lands. It is the aim of the office to stand ready to advise users of wood concerning all phases of forest operation and timber utilization, to the end that the longest and most efficient service may be obtained therefrom.

ADVERTISING LITERATURE.

Hawley Down Draft Furnace Company, Chicago and New York.—A 20-page pamphlet, 7 by 10 inches, entitled "The Down Draft System of Smokeless Combustion," containing a description of the Hawley apparatus with illustrations of important installations and the results of tests which have been made on various plants equipped with the Hawley apparatus.

James F. McGregor, 715 Majestic Building, Detroit, Mich.—Journal bearings, locomotive castings, journal boxes, car couplers, car roofing, electric railway material, all kinds of new and rebuilt cars, new and relaying rails, frogs, switches, crossings, jacks and waste are handled by Mr. McGregor, who has recently opened an office at the address as stated above. A blotter calls attention to his ability to furnish the supplies indicated.

Reinforced-Concrete Construction Company, 803 Tobin Building, St. Louis, Mo.—The catalogue issued by this company contains an impartial and thorough discussion of various principles and theories of reinforced-concrete designs, and the advantages thereof. The standard system of this company consists of straight and bent rods, and hooped stirrups or shear bars. It is set forth that the great advantages of the hooped shear bars are to create near the supports of a beam or girder where the negative moments are maximum, a real hooping of the concrete in the lower part of the beam, which increases considerably the resistance of the concrete in compression. The catalogue also contains a large number of illustrations showing buildings completed and under construction by its standard system of construction.

National Brake & Electric Company, Milwaukee, Wis.—The "National Air Brake Instruction Book" is the title of a very comprehensive manual on the construction and maintenance of air brakes which has just been issued by this company. The book is neatly bound in cloth, contains 140 pages and is 4¾ by 7 inches in size. The manual is a very thorough discussion of the principles upon which air brakes depend for their successful operation. It also includes a detailed description of the products of the National Brake & Electric Company and its concluding section discusses the theory and design of brake levers. The information contained in this latter part is compiled from various sources and should be found of especial value to those engaged in the design, inspection and maintenance of rolling stock equipments.

Carbolineum Wood Preserving Company, 349 West Broadway, New York.—The company's latest catalogue and special circular pertaining to the use of its "Avenarius Carbolineum" wood preservative by electric railways, light and power companies, contain a very complete and clear dissertation regarding this product, accompanied by many testimonials from present users of "Avenarius Carbolineum." The life of poles, cross arms, pins, brackets, ties, platforms and understructures, bridge, trestle and foundation timbers, fence posts, guard rails, insulator blocks and other woodwork, it is claimed, is lengthened 100 per cent by the use of its product. A long, although but partial, list of electric railways using the company's product is given, as well as a list of engineering companies which specify its use. Ernest F. Hartman is president of the company.

AUTOMATIC ELECTRIC SIGNALS.

BY JOHN J. RUDDICK, CONSULTING ENGINEER UNITED STATES ELECTRIC SIGNAL COMPANY.

We all know that it is quite natural when writing or speaking on any subject to present only that side, or as much of it, as is in harmony with our own ideas or interests. It would be refreshing indeed to those interested to read a criticism in which all the facts relative to a subject were brought out without prejudice or favor.

I will endeavor in this article to present a few ideas relative to signaling electric railways, which I hope will be unbiased and of interest to its readers. Speaking from the

viewpoint of the novice this class of signaling is quite an easy undertaking, which, theoretically speaking is true, but in practice is a most difficult one, and I fear that effort in this line has not been given full credit for the progress made.

Personally I began in this art in time to accompany it through all the various changes of equipment and construction that have taken place in nearly the whole history of electric railroading, and would say in defense of all thus engaged that to plan and adapt a device that is applicable to all these changes and modifications is of itself no mean effort, aside from



John J. Ruddick.

the actual reduction of an invention to practical use. A signaling device must not only be safe in every particular and under all conditions, but sufficiently practical so that it can be used with a reasonable degree of satisfaction.

It must be constructed on a plan that will anticipate all manner of line trouble without the least liability of producing a signal that will endanger traffic. It must not be too expensive in price, cost of installation or maintenance. All of these requirements have been given the attention suggested by an ever-present want, and the large number of signals now in use, and the great demand for them, speaks plainer than words for the high practical standard to which this class of signals has been developed.

The task of signaling electric railways seems to have been one beset by every natural obstacle and disadvantage as completely as though it had been so designed. While it is possible to anticipate the difficulties in the construction of apparatus, they are not eliminated from the art by any means, and only assimilated in a manner that they will not be a source of danger.

Therefore, a signal that does not give annoyance in case of line trouble may be suspected of not being very safe under dangerous conditions. The first requisite of a signal plant is good clear lines, without which it can never be operated successfully. Nine-tenths of all expenses for supplies and cost of repairs could be saved if the lines were kept free from grounds and crosses.

There is an idea prevalent among railway managements that signals are too expensive to maintain in operation, and that the convenience and protection afforded does not warrant such an outlay of capital which, speaking from a standpoint of direct returns, seems quite true, but since corporations have largely passed from the speculative stages to that of substantial money-earning industries, managements have been quick in taking advantage of any insurance against future liabilities, as well as immediate convenience.

The cost of maintenance of signals is now being regarded more in the sense of insurance, and while it is not possible to reckon on any definite benefit or return, the same can be said also of fire insurance, yet no prudent man would allow his property to go without this protection, as it is upon this basis that we are able to figure definitely on a profit.

While collisions will sometimes happen even where signals are used, I think I am conservative in saying that the liabilities are 100 times less than if no protection were used. In view of the above I am pleased to give a few figures relative to the cost of equipping, installing and maintaining a plant which I will select as being in size and amount of apparatus employed, best qualified to typify the business in general. The plant referred to is on the Fairmont (W. Va.) & Clarksburg

Traction Company's line, which is an interurban road with a 1-hour headway time, with frequent extras.

The apparatus was furnished by the United States Electric Signal Company, and consists of 10 blocks, having both lights and semaphore discs for visual signals, with four operating switches per block, making in all 100 distinct pieces, the cost of which at factory was as follows:

Apparatus	\$2,800.00
Installation	100.00
Wiring complete	1,788.80
	<hr/> \$4,688.80

Cost of maintenance one year, supplies.....	\$130.09
Cost of maintenance one year, labor.....	47.00
	<hr/> \$177.09

While we have reckoned up the total cost as above, we are aware that during the year the cost of some of these signals did not exceed the price of a fuse. In the same time these signals were out of commission from all causes on an average of 40 minutes each month per block, including all time for repairing, cleaning and oiling.

This road covers a distance of some 25 miles or more, embraces nearly all conditions incidental to interurban construction, and has no advantages over any other first-class road having careful and efficient management.

This estimate, which is based upon the most complete data, shows conclusively that the cost of maintenance is more than balanced by the time saved in running cars, aside from the security from collisions, which is of itself well worth the cost.

The greatest obstacle in the way of this class of signaling is caused by line trouble, and arises from local conditions which the designer can only control by anticipation, and as they are oftentimes of a dangerous nature, the best he can do is to provide that they may not cause a signal to indicate safety when a dangerous condition exists. These difficulties are so hidden and deceptive in nature that they can only be detected by an expert, and I would suggest to those purchasing signals to connect up a block of the same and take it through a course of something like the following: First bare the line wires somewhere between stations. Now touch the bare portions together, crossing them temporarily. If this restores the signals to normal they are defective in respect to line trouble, and could not be used with safety.

After this make the following test: Ground the signaling circuit somewhere between stations and connect in this ground circuit a rheostat having some 2,000 or 3,000 ohms of resistance. Begin testing by setting and restoring the signals with all the resistance in, moving the switch lever of the rheostat over some 25 or 30 ohms after each test. If a point is found at which the installation will show a home signal, and the distant signal does not operate, try to set the home signal at the other end, and, if it be possible that these two home signals can be set through the ground mentioned with any resistance found, the signals will be dangerous to use, since on account of trees and foliage these conditions come frequently within the scope of practice.

This test does not include, however, all the technical dangers to which a signal is subject. The circuits leading from the operating switches, or the switch itself, may be involved, but as these circuits are short, reaching only from the switch down to the box, the liability of their meeting with trouble is remote, and if the former difficulties have all been removed, the chances of danger resulting therefrom have been reduced to a minimum.

The above test can be made by any intelligent electrician without a technical knowledge of cause and effect, and while it will bring out the most serious defects that might be included in the original design, it does not safeguard against poor construction and isolation, which should also be carefully looked after.

To justify the above suggestion I wish to say it is quite easy to design a device that would work seemingly safe under ideal conditions, but these conditions seldom, if ever, exist in practice, and it is advisable to make some sort of a test by which a dangerous defect may be discovered. It is quite possible that any proposition so apparently simple calls into the inventive field a large class of inventors, some of whom are unreliable, and through ignorance, avarice or self-aggrandizement, would not scruple to apply their ideas to meet a want of gain or convenience without regard to safety, especially so if the elements of danger in their inventions were obscure or remote.

In so serious a matter we must use that precaution consistent with the prevailing circumstances and conditions, fully appreciating the fact that in adapting an invention of this character to practical use there is a limit to its scope of protection, a height beyond which the next step is downward.

This is the boundary between prudence and ambition, through which intelligence and vigilance must raise the line of demarcation.

WAGENHORST AUTOMATIC ELECTRIC BLUE PRINTER.

The usual method of making blue prints by sunlight calls for some considerable skill on the part of the person making these prints. On a cloudy day it is almost impossible to get a print. At other times after an accurate idea of the light strength has been obtained a stray cloud crossing the sun often will spoil an important print. The accompanying illustration shows an electric blue printer, made by J. H. Wagenhorst & Co., Youngstown, O.

The Wagenhorst machine consists principally of a vertical glass cylinder through which an arc lamp descends axially at a uniform speed.

On the outside of the glass cylinder is a roller curtain operating on wire cables. This curtain will stand in any position without clamps or hooks. The largest tracing or



Automatic Electric Blue Printer.

drawing can be easily placed on the machine by one person: it is simply necessary to catch one edge under the roller. The roller-curtain is then rolled over the rest of the drawing, rolling it out smooth and holding both drawing and paper firmly against the glass.

The lamp, which is a high-efficiency arc lamp, is suspended in the center of the cylinder and is attached to a wire cable connected to a plunger in an oil cylinder. This plunger is provided with a regulating valve, by means of which the length of exposure can be adjusted to various kinds of printing paper and different drawing paper and tracing cloth. Each lamp is provided with a rheostat so that it will be available over a wide range of voltage.

A single trial will usually determine an adjustment that will give good results until a change is made in the strength of the sensitized paper. After placing the paper on the cylinder it is only necessary to raise the lamp to the top of the cylinder, and close the switch. After the lamp has made its descent the current is automatically cut off. The drawing

and print can then be removed and the print washed in the usual manner.

One of these machines will make a drafting-room independent of the weather as well as turning out the work in a small fraction of the time required for sun printing. These machines are made in six sizes, the smallest one taking prints 42 by 44 inches and the largest one 42 by 72 inches.

SHAWMUT POCKET TEST LAMP.

Nearly all users of inclosed fuses have experienced trouble with defective indicators, also with refilled fuses, which seldom have indicators. The usual methods of testing for blown fuses are more or less cumbersome.

The accompanying illustration shows the Shawmut pocket test lamp for testing fuses and determining points of opposite polarity. This device has been recently put on the market by the Chase-Shawmut Company, Newburyport, Mass.

It is made up of a specially designed incandescent lamp



Pocket Test Lamp.

inclosed in a fiber casing. This casing has ferrules and knurled binding posts on each end, while at the middle a hole through both walls of the casing allows the illumination of the lamp to be plainly seen.

For the majority of switches and fuses the metal ends of the test lamp will bridge the parts of opposite polarity. For other cases where the distance is greater wires of any length can be attached at the binding posts.

This lamp is not designed for continuous service, as the casing would soon become too hot if left long in circuit: it should be used only for flashing. The lamps are made in two sizes, one for 110-volt and the other for 220-volt circuits.

THE COLE TROLLEY HANGER.

The attention of the public is quite frequently called to the danger to which it is exposed in passing under live trolley wires. Such accidents may cost a railway company considerable money through damage suits. The danger and seriousness of a broken trolley wire will increase materially if higher voltages are employed, which is now being done in many instances.

As the fear of broken trolley wires and accompanying dangers was in the early days of electric railways a serious



Cole Trolley Hanger.

drawback to the introduction of electric traction, many inventors, then and since, have attempted to devise some means of either rendering a broken trolley wire harmless or of preventing the trolley wire from breaking. As the latter is a practical impossibility, the former method is more logical.

We present herewith an illustration showing a device invented by George F. Cole, P. O. Box 539, Chicago, Ill., which will render a trolley wire harmless should it be broken. It will be seen by examining the illustration that it consists of an ordinary trolley hanger having a lug cast on each end of the ear. This lug carries a brass or bronze ring thoroughly insulated from the hanger proper. A wire having a brass nut on one end and a tube of insulating material on it where it passes through the brass ring is securely soldered to the trolley wire at a point T.

The brass rings, G, are connected electrically by a small wire to automatic switches or circuit-breakers placed at intervals of three or four blocks apart, and which when open disconnect the trolley wire in that section from the feeders.

The method of operation will now readily be understood by examining the right-hand side of the illustration. Should the trolley wire break as shown, it will sag and pull the wire, F, until the brass head or nut, H, comes in contact with the brass ring, G, sending the trolley current through a small auxiliary wire to the circuit-breaker, energizing the solenoid of the breaker and thus shut off the current before the wire has had time to reach the ground. It is not sug-

gested by the inventor that this device should be fitted to all hangers on the trolley line, though it would be desirable, but he simply suggests that they be installed and used in the more crowded and densely traveled portions of the city lines.

THERMIT STEEL FOR REPAIR WELDING.

The success which the thermit process has met with during the last few years, together with the many improvements which have developed concerning its use, has created a demand on the part of shop foremen and engineers for more specific directions covering its various applications. To satisfy this demand the Goldschmidt Thermit Company, 90 West street, New York, has recently issued an interesting pamphlet describing the general applicability of this process to railway repair work. It is thought that a careful study of this pamphlet will enable anyone to make the ordinary repairs by the thermit process.

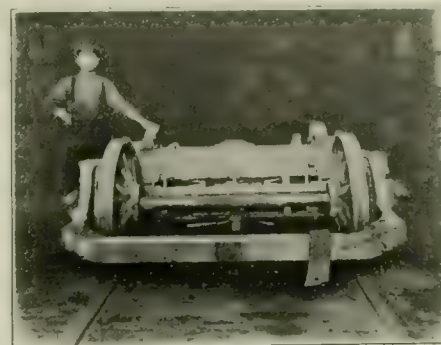
Thermit is a mixture of finely divided aluminum and iron oxide. When ignited in one spot, the combustion so started continues throughout the entire mass, without supply of heat or power from outside, and produces superheated liquid steel and superheated liquid slag (aluminum oxide).

Thermit Steel for Welding.

Owing to the superheated condition of thermit steel it possesses the property of melting any metal with which it comes in contact and uniting with it to form one solid mass. In repairing large flaws or welding together two pieces of large area, the parts to be welded are first thoroughly cleaned and any scale or poor metal cut away. (In the case of a crack

in the casting, if the section is thick the metal should be cut away along the fracture, leaving a space for the free flow of thermit steel between the parts to be welded.) The flaw or fracture must then be surrounded with a mold.

The principle guiding the construction of the mold for welding is that the steel must run through



A Thermit Repair.

a gate to the lowest point of the mold and rise through, and around, the parts to be welded and into a large riser. The mold must allow for a band, or collar, to be cast around the defective parts or the ends of the pieces to be welded. In cases where the break may have occurred through lack of strength in the original casting, the collar acts as a reinforcement and should not be machined off.

The matrix or pattern of the part to be repaired with the reinforcing band around it is first made, and from this a mold is constructed. A good material for making molds is two parts of sharp sand and one part of good fire clay, mixed dry and moistened just enough to pack well.

Yellow Wax Molds.

As practically no two repairs in a railway shop are alike, the time and cost of making wooden patterns is considerable. A convenient way to make the molds for this class of work is to use yellow wax as a matrix. The parts to be welded are first laid together and a wax pattern of the exact form desired in the final weld is shaped about them. After this is done the molding sand, which consists of fire clay and sand, is tamped around the matrix in the usual manner, except that a small hole is left at the very lowest part of the mold.

The patterns for runner and riser are best made of wood. Their volume should equal the volume of the reinforcement or collar which is cast around the fracture, as the first steel running out of the crucible into the mold becomes chilled when coming in contact with the casting, which—even when preheated—has a considerably lower temperature than the thermit steel.

When the mold box is completely filled, the wooden runner and riser are withdrawn. Then, instead of taking off the mold and drying it, a torch is directed into the riser, directly on to the green sand. The heat melts the wax, which runs out of the hole at the bottom. After the mold is thoroughly dried, the hole at the bottom can be closed up with a sand core and backed up with a little sand. The mold is then ready for casting.

If a wooden pattern is used and the mold is made and dried

in the ordinary manner, the joints of the mold box or flask should be sealed with a little fire clay to avoid leakage. Asbestos wick may also be used for this purpose.

Particular care should be taken to make the mold strong enough to withstand the weight and scouring action of the superheated thermit steel.

A simple method of determining the amount of thermit necessary, when wax is used for a pattern or matrix, is to weigh (in ounces) the quantity of wax on hand before and after building up the matrix. The difference multiplied by two gives the weight of thermit in pounds.

Repairs with Thermit Steel.

The following are some of the more important repairs that have been made recently on steel castings and forgings of all sizes, and for which the thermit process proved to be the best adapted for the work: Repairs on locomotive frames, welding stern frame of steamer "Apache," welding broken dredge buckets in the field, repairing locomotive cylinders on the Southern Pacific Railroad, burning a new jaw on a heavy shear, and miscellaneous repairs to motor frames, casings and trucks.

Motor Frames, Casings and Trolley Trucks.

During the past year several street railway companies welded all their broken steel motor and truck frames by the thermit process. They have also used the process for welding lugs which have been broken from gear cases. All the parts welded have been steel castings and the results have been most satisfactory. The illustration shows two welds made on a broken steel truck frame. This truck was welded without dismantling, the wheels being banked with sand to prevent any molten metal from coming in contact with them. Ingredients used for making the molds consisted of 1 part flour, 10 parts sand and $\frac{1}{2}$ part molasses.

This mixture should be baked and then formed into shape to suit the weld. The two parts to be welded should be thoroughly cleaned and holes chipped through them at different points so that the thermit steel can get through and hold them firmly. The parts are then heated to a high temperature, after which the molds are placed in position. Welds of this nature have been most successful and form an economical method of making repairs on street railway machinery. By the use of wax as a matrix, however, they are much simplified.

Work with gray iron castings requires more experience. In cases where the flaw has but a slight effect upon the strength of the casting, it is possible to effect the repair in essentially the same manner as for steel castings. This method, however, is not recommended where the flaw is an important one, as the thermit steel does not amalgamate with the cast iron so readily as it does with steel, owing to the fact that the surface of the fracture is usually glazed by graphite carbon. In such cases, therefore, the following procedure should be observed:

A pattern is constructed of yellow wax, and the mold built up around it of sand, in the usual manner. A torch is then applied through the riser and the wax melted out, and the process of heating continued until the fracture is at a red heat. Thermit steel is then poured in through the gate, the function of the steel being to heat the cast iron to the welding point. When this is accomplished, gray iron is poured in through the riser, displacing the steel in the mold and uniting with the fractured casting. It will therefore be seen that the function of the thermit steel is simply to heat the casting, so that it will unite with the molten gray iron, when same is poured into the mold.

MAGIC BOILER COMPOUND.

Boiler scale is an ever-present foe to those who operate or are in any way connected with steam plants. The principal scale-forming substances in feedwater are carbonate of lime, sulphate of lime or gypsum and magnesia. These are soluble in cold water and in water of moderately high temperature, but precipitate at a temperature of 303 degrees, which corresponds to an absolute steam pressure of 70 pounds. Part of the precipitation is deposited as mud, and part settles in the boiler, where these mineral substances may get in contact with the iron and form scale.

Scale seriously detracts from the heat-transmitting power of the metal that is in the boiler. It is stated that in boilers having a $\frac{1}{16}$ -inch scale, the efficiency is decreased 30 per cent, thus requiring about 15 per cent more fuel to get the required evaporation. Scale keeps the water from coming in contact with the plates, causing them to become overheated, which greatly shortens the life of a boiler.

A compound that will remove scale that is already formed must act on the iron in such a manner as to remove the scale, and once removed, keep it so. This is the effect claimed for

"Magic Boiler Compound," now being offered for sale by the H. W. Johns-Manville Company. When introduced into the boiler it seeks the iron, and working its way between the scale and iron, causes the scale to loosen and fall off, and presents a surface to which no further sediment will adhere.

Magic Boiler Compound is adapted to every climate and locality and no analysis of water is required in order to secure the best results. The H. W. Johns-Manville Company is issuing an interesting folder entitled "How to Clean a Boiler," which gives some very valuable information on this subject.

IDEAL TROLLEY WHEEL.

This is a new trolley wheel recently placed on the market by the Lumen Bearing Company, Buffalo, N. Y. In the design of this wheel three things were kept constantly in mind—lightness, strength and balance—for with a contact surface of equal quality an advantage in these three points should give an advantage over a cast wheel in mileage life.



Ideal Trolley Wheel.

The ends of the hub are rolled over against the flange centers, holding the wheel solidly together and forming the side contact surfaces on which the contact springs rest.

For lightness and strength the flanges are made of a high grade of soft rolled steel of uniform thickness. The contact ring is made of a copper casting forged under a drop hammer, which considerably densifies and toughens the metal without destroying its conductance. This treatment is about the same as has shown such good results in the manufacture of commutator bars. The hub of the wheel being integrally connected with the contact ring, provides a direct electrical path without the steel flanges necessarily forming part of the circuit.

DIRECTORY OF ELECTRIC RAILWAY ASSOCIATIONS.

American Street and Interurban Railway Association. Secretary, Bernard V. Swenson, 20 West Thirty-ninth street, New York. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Accountants' Association. Secretary, Elmer M. White, assistant treasurer Birmingham Railway Light & Power Company, Birmingham, Ala. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Engineering Association. Secretary, S. Walter Mower, general manager Southwestern Traction Company, London, Ont. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Claim Agents' Association. Secretary, B. B. Davis, claim agent Columbus Railway & Light Company, Columbus, O. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Manufacturers' Association. Secretary, George Keegan, 2321 Park Row building, New York, N. Y. Annual meeting, Atlantic City, N. J., October 14-18.

Canadian Street Railway Association. Secretary, Allan H. Royce, president Toronto Suburban Railway, Toronto, Ont. Next meeting, Montreal, September.

Central Electric Railway Association. Secretary, W. F. Milholland, secretary and treasurer Indianapolis Traction & Terminal Company, Indianapolis, Ind. Next meeting, Columbus, O., September 27.

Colorado Electric Light Power and Railway Association. Secretary, John F. Dostal, Denver Gas & Electric Company, Denver, Colo. Next meeting, Denver, Colo., September 18, 19 and 20.

Iowa Street and Interurban Railway Association. Secretary, L. D. Mathes, general manager Union Electric Company, Dubuque, Ia.

Massachusetts Street Railway Association. Secretary, Charles S. Clark, 70 Kilby street, Boston, Mass. Meetings held in Boston on second Wednesday of each month, except July and August.

Northwestern Electrical Association. Secretary, R. N. Kimball, Kenosha, Wis. Annual meeting, Milwaukee, Wis., January, 1908.

New England Street Railway Club. Secretary, John J. Lane, 12 Pearl street, Boston, Mass. Meetings held on fourth Thursday of every month.

Oklahoma Electric Light, Railway and Gas Association. Secretary, Galen C. Crow, general manager Guthrie Electric Light & Power Company, Guthrie, Okla.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 5

CHICAGO, AUGUST 3, 1907

WHOLE No. 223

TABLE OF CONTENTS.

Editorial:		Cleveland Traction Situation.....	137
Inspecting Lightning Arresters.....	121	Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.....	138
Short Cuts and Transmission Lines.....	121	News of the Week:	
Store Department Tracks.....	121	—Electric Operation on the New York New Haven & Hartford.....	139
Reducing Power Demand in Emergency.....	122	—New York Public Service Commission.....	139
Electric Railway Construction in Indiana.....	122	—Application of Indiana 2-Cent Fare Law to Interurbans..	140
Standardization Progress.....	122	—Chicago Union Traction.....	140
Gas Engine Troubles.....	123	Construction News:	
Construction Features of the Ocean Shore Railway (Illustrated)	124	—Franchises.....	142
Saturday Session, Cleveland Meeting of the Standardization Committee.....	128	—Incorporations.....	142
Hints on Shop Management. By H. F. Schmidt.....	129	—Track and Roadway.....	143
South Bethlehem Line of the Easton Transit Company (Illustrated).....	131	—Power Houses and Substations.....	145
C. H. Venner Attacks Chicago City Railway.....	131	Personal Mention.....	146
Final Report on Municipal Ownership by Civic Federation Commission.....	132	Financial News.....	146
Granite-Faced Concrete Bridge of the Boston & Worcester Street Railway (Illustrated).....	133	Manufactures and Supplies:	
The Creation of Pension Funds for Employees. By William R. Bowker.....	134	—Rolling Stock.....	147
Public Service Commission Investigation of New York Transit Facilities.....	135	—Shops and Buildings.....	147
Ohio Commission Reversed in Hocking Valley-Scioto Valley Case	135	—Trade Notes.....	147
Piping and Power Station Systems—XLVII. By W. L. Morris, M. E. (Illustrated).....	136	—Advertising Literature.....	148

The recent crippling for 11 days of a well-known 13-mile city road in the middle west again calls attention to the necessity for efficient lightning protection. While it is usually the high-tension transmission line that suffers the most from lightning discharges, the lower voltage direct-current lines and car equipments are also frequently affected. The facts that none of the lightning arresters gives absolute protection at all times and that a satisfactory test of lightning protective apparatus on the line, in the substation and in the power house, is also impossible and is seldom made a part of regular routine work often combine in not infrequent disastrous results to electrical apparatus. The Central Electric Railway Association has recognized the need for more careful engineering in the lightning protection field and it is hoped that when the data blanks recently sent out by this association have been returned and their information tabulated, definite conclusions can be drawn, which will greatly reduce the present troubles caused by lightning.

In the construction plans of new electric roads under conditions involving the transmission of high-voltage current from a central power plant to distributing substations, the usual practice is to install the transmission line, feeders, trolley circuits and connections upon the same set of poles.

To do this insures a convenience of inspection and repairs that is often very desirable, but in some cases it is a more costly method than the provision of short cuts in the transmission line itself. The longer and more winding the route of the tracks, the more likely it is that it will pay to build high-voltage lines "across lots." An example of the apparent saving by cutting across curves is noted in the description of the Ocean Shore Railway, in this issue. The high-tension lines of this company do not follow all the curves of the track, and a saving of about three miles of pole line results. No general statement of value can be made as to the limits in alignment which dictate the partial separation of the high-potential line from the car route, but from the electrical

standpoint there is no reason why the two should be parallel. In dealing with line locations, the factors of importance are the cost of copper, poles and right of way, with some allowance for the extra guys and anchorages required on high-tension curves and an appreciation of the convenience of inspection from the car track instead of from the field or forest path. In a nutshell the case is one of saving in copper or aluminum. In figuring these cases there is no advantage in estimating the detailed costs of the two lines as far as including items common to each is concerned, unless the total figures are wanted by those financing the project. There should be some saving in the cost of poles required for the feeder and trolley supports in case the high-voltage line is deflected from the main route. As the size of copper decreases, the saving due to short cuts in the pole line is, of course, much reduced, but under favorable conditions of pole erection without expensive blasting and haulage the outlook for economy through deflection is bright through the range of commercial transmission line wire sizes. From some points of view the advantages of high-potential line isolation exceed those of easy inspection from the track. There is a tendency toward perfunctory inspection if it is carried out from the car platform, and if the deflected line is carried across fairly open country there should be a freedom of repairs and increased safety through reduced chance of high and low potential line crossings that will work out very attractively from an operating view.

A point sometimes neglected in the construction is to provide a track connection with the storeroom. In some respects

Store Department Tracks.

this is a small matter, but as supplies are frequently delivered in bulk at the store department door the cost of the extra handling is worth saving, if possible. Most shop plans locate the stores department conveniently with respect to the machine division, and there is little need of special facilities for the local distribution of supplies, if the passageways are wide enough to permit spare armatures to be trucked through them. Hoisting facilities are rather scarce in modern storerooms, but there is a place for

them where bulky supplies are kept at a height of six feet or more above the floor. Land is usually cheap enough at a car shop site to permit the laying of a track from the main line or yard rails parallel to or stub-ended against the storehouse. In large shops platforms enabling unloading to take place at the car level are a great convenience. These practical considerations look familiar enough on paper, but it is surprising how many small shops are minus such simple arrangements for saving labor. Worn-out rails are practically good enough for this yard track. The elimination of muscular work makes a great difference in the flexibility of shop operation.

No matter how far-sighted the engineers of a company may be, it is always within the bounds of possibility that there will be a shortage of power at critical times. It is therefore vitally important to consider the means of saving power which can be adopted when the need is great.

Reducing Power Demand in Emergency.

Waste of power is always objectionable, but there is a difference between the losses permissible in ordinary practice and those enforced by unusual and extreme conditions. When a road is short of power it should be clear that the cars have the first claim upon the generating plant. So far as possible auxiliary uses of power should then be confined to non-peak hours. If necessary the large tools in the shops can be shut down before the maximum load appears at the switchboard. If it be cold weather greater care can be taken in regard to the use of car heaters. Motormen can be urged to coast more if their schedules allow it, though proper feeding is admittedly one of the hardest problems to settle satisfactorily. Something might be done through the use of wattmeters on the most hilly lines with a bonus for the lowest power record in a given time. On a pinch it may pay temporarily to install more feeders. The bonding of the track should not be overlooked. Economy of power production is not the point at issue in times of severe shortage. It is better to generate at a sacrifice of the usual efficiency than to cut off the car service. Even reduced speeds are preferable to lengthened headways, from the public's standpoint. There is no time when it pays better to get in close touch with the public than when some unavoidable occurrence reduces the station capacity below par. It is a question if the advantages of frankness at such times are fully appreciated in railway circles, but it is a well-defined truth that much inconvenience will be cheerfully borne by the public if the patrons of the company are encouraged to learn that the company is doing its best to meet the situation. There is no doubt that a great deal of bad feeling, and often appeals to state boards, can be avoided by taking pains to inform the public in a brief but comprehensive way of the reason for poorer service than usual. The essential point is to show that a power shortage is not in effect for the purpose of greater profits but to enable the company to handle the traffic without decreasing the transportation facilities.

A map of the electric interurban railways in Ohio, Indiana and Michigan, recently issued, calls attention to the remarkable development of the interurban railways of that section, and especially in Indiana. In the latter state 166 miles of new lines have been placed in operation since January, 1906. According to recent information

there are now 1,816 miles of electric railways in Indiana, constructed and in operation, and when all the work now under way is completed, 370 miles, the total will be brought up to 2,186 miles. The most important additions during the past year are the new line of the Indianapolis Crawfordsville & Western Traction Company, from Indianapolis to Crawfordsville, 44 miles, and the extension of the Ft. Wayne & Wabash Valley Traction Company, from Logansport to Lafayette, about 40 miles. The new line of the Terre Haute Indianapolis &

Eastern Traction Company, from Danville to Greencastle, has also been put into operation recently. Among the most important of the new lines now actually under construction may be mentioned the following: The Indianapolis Newcastle & Toledo Electric Railway, from Indianapolis to Newcastle, which is expected to be opened for traffic in September; the connection between Indianapolis and Louisville, which is now being built by the Indianapolis Columbus & Southern Traction Company, which is extending from Columbus south to Seymour, 18 miles; and the Indianapolis & Louisville Traction Company, which is building the remainder of the distance to Sellersburg, where connection will be made with the Louisville & Northern Railway & Lighting Company, operating from Sellersburg into Louisville. The construction work on this line is now approaching completion and through cars are expected to be running between these two important cities some time in the fall. The Chicago Lake Shore & South Bend Railway has laid several miles of track on its road from South Bend to a connection with the Illinois Central Railroad at Kensington, Ill., and its officers state that cars will be running by the first of the year. There is only a link of about 30 miles to be completed between Danville, Ill., and Crawfordsville, Ind., to make possible a continuous ride in electric cars from St. Louis, Mo., to Erie, Pa., over 600 miles.

STANDARDIZATION PROGRESS.

The problem of standardizing electric railway rolling stock may be considered as too great a task to be executed by one committee; so at least it would seem from suggestions recently made by members of the present standardization committee of the American Street and Interurban Railway Engineering Association. It has been suggested that satisfactory results would be realized much more quickly than they have in the past if the preliminary work of choosing standards were divided among a number of subcommittees. To each subcommittee could be assigned one phase of the general problem, such, for instance, as the design of the wheel tread. It would of course be advisable to have as members of this committee representatives of the manufacturing interest, as well as purchasers and users of wheels. If the entire list of subjects to be standardized were apportioned, one each to a small committee, it is thought that the work as a whole could be more quickly and satisfactorily accomplished.

Under the guidance of W. H. Evans as chairman a large amount of work was satisfactorily handled at the recent Cleveland meeting of the Engineering association standardization committee. While no direct results were announced as the outcome of this meeting, it is believed that the organization is now better able than ever before to crystallize its ideas and to recommend to the Engineering association at the Atlantic City meetings a definite set of standards.

The manufacturers' representatives, who were invited to act in an advisory capacity at the Cleveland session, requested further time in which to consult with other members of their fraternity. For this reason it has been decided to hold another meeting of the standardization committee in New York in September, as announced elsewhere in this issue. It is to be hoped that as a result of the coming New York meeting the views of the members engaged in electric railway operation, aided by suggestions from the manufacturing interests, may be unified and result in recommendations which can be adopted by the Engineering association at Atlantic City in the fall without the necessity for extended discussion at that time.

It should be remembered that any standards recommended by the association must eventually serve for all the electric railways in North America. For this reason it is obvious that as few standards as possible should be chosen for any one class of service. With a multiplicity of standards their value becomes lost; with few standards the manufacturing cost should be lower, resulting in a reduced cost to the pur-

chaser. Other advantages as regards operation are numerous and already well known.

In a few words, the desired result of standardization is to "make the manufacturer storekeeper for the electric railway," rather than to require the operating departments to invest in and care for a vast number of supply parts and materials, few of which are applicable to use on all the cars of any one system. A unification of design for many parts now doing a single duty should result, as stated, in a lower selling price to the railways. That standardization will benefit the manufacturer is a well-known fact. As evidence of this, the representative of one rail maker some time since stated that his plant had in the past rolled 215 different rail sections for electric railways, and requests for new sections were being made at the rate of about one a month. With standard sections this number would probably be reduced to less than 10, and these of a far more desirable quality.

GAS ENGINE TROUBLES.

The successful operation by the California Gas and Electric Corporation of three 5400-kilowatt gas-engine-driven units in synchronism with a large transmission network connecting water-power generating stations 140 miles apart, brings to mind the one criticism, unreliability, that has in the past been thrown on the shoulders of internal combustion engines. The large station mentioned was built in direct contradiction to the criticism of unreliability. It has an engine capacity, at normal rating, of 16,200 brake horsepower. To the present equipment of three units a fourth is being added and a fifth will soon be contracted for. Had the past year's service from the gas engine plant been unreliable it hardly seems possible that, with fuel oil available for a steam plant, still more gas engines would be installed.

The modern gas engine has attained a remarkable development within the past few years, and its use on a large scale in railway plants is now assured. In some quarters, however, the gas engine is still viewed with the suspicion that its reliability is not yet what it ought to be, and this opinion undoubtedly deters many managers from enlarging their power capacity on the gas basis. To some degree, of course, it is true that the gas engine is an experimental motive power, for there has not as yet been gained sufficient experience to enable one to predict the cost of maintenance and the life of engine parts with accuracy. On the score of economy there is no question about the gas engine's meeting its specifications if properly operated and maintained, and this is the chief advantage of the internal combustion engine. Under the skilled oversight found in the railway power plant there is no reason to expect less reliable service from the gas engine than can be anticipated from the steam turbine or the steam reciprocating unit, particularly if the comparison includes the gas-generating equipment and the boilers and piping.

To the power plant engineer trained in the operation of steam-driven machinery, the gas engine presents an unfamiliar cycle, and a certain amount of experience is essential to the best results in handling the newer prime movers. The gas engine operators of the next few years must come mainly from the ranks of licensed steam engineers, and it is not to be expected that in the first few weeks of service in a gas plant the operation will be as smooth as would be demanded in a steam-driven station. The indications of sound are as helpful to the gas operator as to the steam engineer, but they cannot be expected to become familiar all at once.

As with a steam engine, the possible troubles of the gas engine are numerous enough to call for skilled diagnosis when things go wrong.

Builders of internal combustion engines are doing their best to produce machines free from complication, and the later valve motions show a marked tendency toward more positive action, with increased simplicity of design. The provisions

for water circulation through the piston cylinder walls and heads in the best modern engines are amply generous to prevent excessive heating or obstruction to the water flow if proper maintenance and care are given. In such units the valves are tight without excessive friction; the gases are not wire-drawn at admission and discharge, and accessibility for inspection and adjustment is a recognized feature. The possible troubles encountered group themselves naturally into defects of ignition, faults in the fuel supply, mixture of air, valve setting, compression, leakages and obstruction of circulation.

Many of the difficulties of the gas engine can be avoided by the simple expedient of keeping it clean. Cylinders, pistons, valves, igniters and exhaust outlets need periodical inspection to prevent the accumulation of carbon deposits, grease and gummy substances, with resulting clogging of pipes, possible back firing of the charge, failure of spark plugs and vaporizers. One of the most serious troubles to be avoided is the failure of the circulating water supply. No large internal combustion engine can run long in this condition, for the lubricating oil soon burns and the overheating of the cylinders causes the piston to move stiffly and stick. The conditions are exactly the reverse of those in the steam engine cylinder. There the temperature must be carried as high as possible to reduce liquefaction losses; in the gas engine a large part of the great heat developed at the moment of explosion must be sacrificed to prevent harm to the engine itself.

As Commander J. K. Barton, U. S. N., points out in his recent book, "Internal Combustion Engines," a reduction in the amount of this loss is one of the attractive possibilities of gas engine improvement. In view of the importance of sustained circulation the practice of some installations in depending upon a single water circulating pump for the entire plant opens the way toward breakdowns and stoppages of the generating units at times when a spare pump would be worth a dozen times its cost.

Excessive lubrication, defective lubrication, late and pre-ignition, weak explosions, loss of compression, misfiring, back firing, smoky exhaust, muffler and crank chamber explosions, sudden stops and improper mixtures of air and gas are also common difficulties where the engines are not handled with experienced judgment. Care in starting up a plant is an essential of good subsequent performance. For cylinder lubrication the oil should be free from acids and hydrocarbons that leave a residue after combustion, the burning point being well above 500 degrees F. Excessive lubrication tends to foul the igniter and produce a smoky exhaust, while the lack of sufficient oil produces the usual overheating of moving parts. Failure to adjust the oil flow to the temperature outside the engine is responsible for much inadequate lubrication.

The study of indicator cards and proper setting of the valves and ignition points will do much to remedy cylinder troubles, and the use of an electric indicator in series with each spark circuit is well worth its slight expense. Leaky valves are sure to produce trouble, and it goes without saying that loose joints and brasses, poorly set cams and other mechanical defects are as capable of shutting down a gas plant as a steam engine installation. A too rich mixture of gas and air tends to create premature explosions and back firing, with violent strains upon the engines. Only by careful attention to the makers' instructions can gas engines be operated with the maximum success. Given the proper supervision, the troubles occurring should be easily remedied and the plant sure to produce an enviable record in fuel economy.

A report states that the results of the Baltimore and San Francisco fires did not, by any means, indicate that either hollow tile or concrete is altogether a failure or altogether a success. Both fires indicated very clearly that commercial methods of applying both materials are inadequate; both also indicated very clearly that successful results can be attained with both materials.

CONSTRUCTION FEATURES OF THE OCEAN SHORE RAILWAY.

The Ocean Shore Railway, when completed, will be a double-track, high-speed electric line 83 miles long, connecting San Francisco with Santa Cruz, Cal. Construction work is



Ocean Shore Railway—Map Showing Territory Served.

now well advanced. Inasmuch as the right of way for this line closely follows the shore of the Pacific ocean for the entire distance between terminals, and as this location has heretofore been considered unfeasible for a steam railroad on account of the rugged hills which reach the water's edge,

there are in the new construction work many features of especial interest. At some points the elevation of the roadbed on the side hills is from 200 to 300 feet above the surface of the ocean. The accompanying illustrations will serve to show the character of the roadbed construction.

Traffic Resources.

The towns and cities through which the Ocean Shore line passes are shown on the map reproduced herewith. It is expected that the railway will construct and operate an amusement park with a casino and bathing beach at Balboa, which is about 20 miles south of San Francisco. A heavy passenger traffic over the new line between Santa Cruz, San Francisco and intermediate points may be expected, since the Southern Pacific Railway, the alternate route from San Francisco to Santa Cruz, is 120 miles long, as compared with 83 miles via the Ocean Shore Railway. Rolling stock equipment has been ordered with a view to handling a daily maximum passenger travel of 4,500 passengers each way between San Francisco and Balboa; and between San Francisco and Santa Cruz, 750 each way on express service and 400 on local service. In addition to the passenger traffic an unusually heavy freight business is expected. The new road passes



Ocean Shore Railway—Earthwork Along Cliffs.

through one of the most fertile farming districts in the United States. Other than the farm products available as a source of traffic, there are cement plants, asphalt mines, rock quarries, sand pits, charcoal ovens, ranches and timber reserves, the products from all of which may be shipped to San Francisco or Santa Cruz over the new line.

The location of the Ocean Shore Railway with respect to the territory which it serves is rather unique. It will be noticed by reference to the halftone map that the line closely follows the ocean shore and is paralleled by a valley a short distance eastward from the shore. To the east of this valley, which at present has no railroad facilities, is a range of rugged mountains over which the produce now raised in the valley must be hauled by wagon. The rugged nature of the mountain ranges inclosing the valley will also serve to prohibit competition from railways.

According to a recent estimate the ton-miles of freight per annum will reach a total of 25,545,000. This traffic will require for its handling 226 freight cars together with the necessary locomotives for hauling the trains. By reference to the map it will be noted that the sources of freight

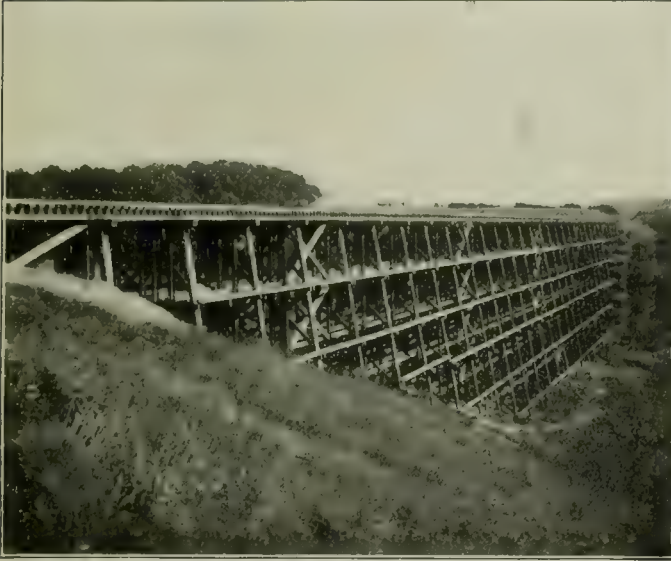
throughout the length of the new line are very evenly distributed. This will aid materially in producing a traffic uniform over the route, thus lessening materially the comparative cost for transporting the freight and also reducing the number of cars that might be required to handle the traffic.

Construction of Roadbed.

Owing to the rough nature of the country through which

is shown in an accompanying illustration. These trestles, however, have since been filled in to afford the track a more permanent roadbed.

Because of the peculiar character of the rock through which the larger part of the roadbed is excavated, a very unique method of drainage was employed. This method comprises the use of tunnels dug around the end of the side hills. With these tunnels to take the drainage from the upper side



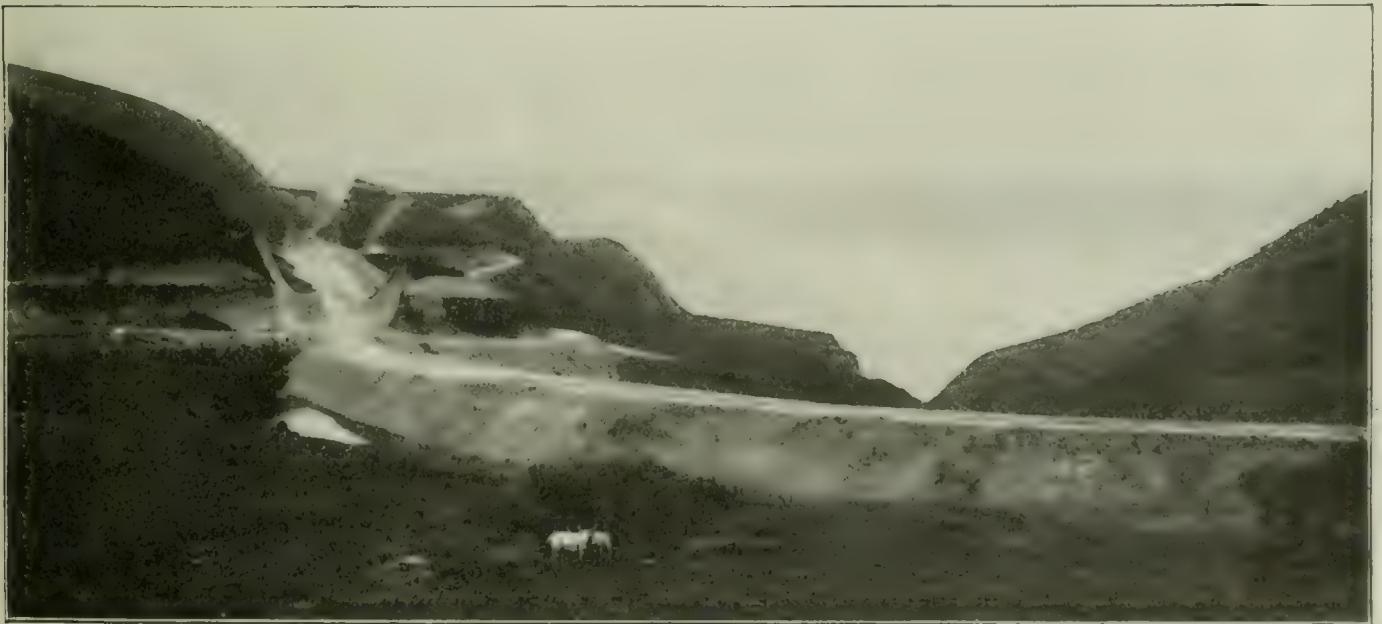
Ocean Shore Railway—Trestle Near Entrance to San Francisco.



Ocean Shore Railway—Rebuilding Roadbed Destroyed by Earthquake.

the line passes, a comparatively large amount of cutting and filling, together with a number of tunnels, was required for the construction of the roadbed. These tunnels occur at the southern end of the line. In the neighborhood of San Pedro

of the fills through the solid rock and out to the lower side, no extensive concrete culverts were required. One of the accompanying illustrations shows the work in progress on such a tunnel at the end of a fill where there is also, at an



Ocean Shore Railway—Roadbed as Completed Near Balboa.

mountain the cost for earthwork was approximately \$160,000 per mile. The rock through which a large portion of the road is cut is of a soft, chalky nature, which, in most instances, was easily excavated with steam shovels. Accompanying illustrations show the character of the construction where the roadbed passes along the side hills. It was necessary in some instances to erect large trestles, one of which

elevation above that of the tunnel, a subway being dug to be used as a farm crossing. The soft, chalky rock was easy to work and exceptionally suitable for tunneling.

The width of the roadbed in embankment is 28 feet 6 inches and in cut 32 feet 6 inches. The tunnels have vertical sides, 23 feet between the faces and the height of the roof above the subgrade is 23 feet. The vertical sides rise 14 feet

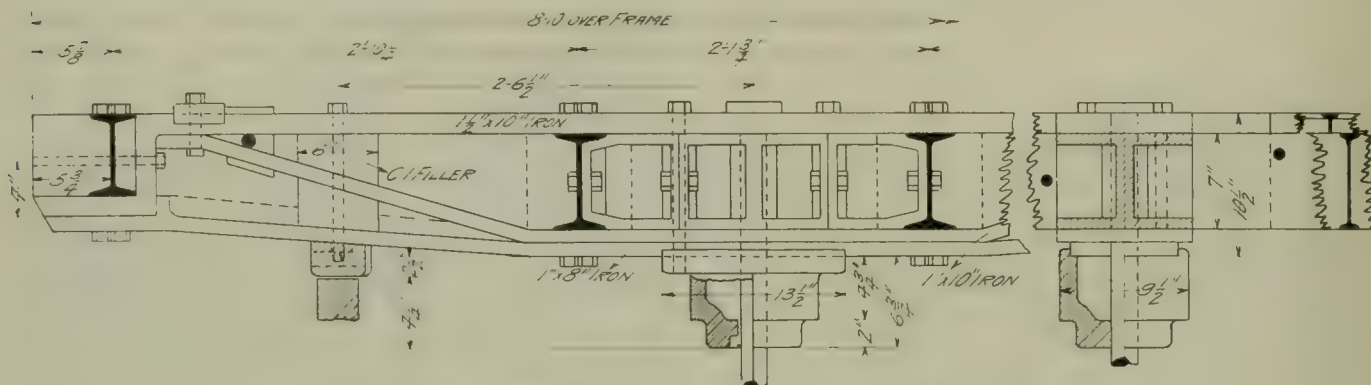
6 inches from the subgrade and are surmounted by a semi-elliptical arch, rising 8 feet 6 inches above the springing line.

The maximum grade of the roadbed is 2 per cent, except in a few special instances where later on the accepted grade now existing will be reduced. The maximum rate of curvature is 16 degrees, except at the entrance to the San Francisco terminal, where there is a 20-degree curve. Inasmuch as the line follows the contour of the beach there are necessary a great many curves, and few long tangents exist. Nearly 25 miles of the 83 miles of route are curved track.

There will be 20 sidings, each 500 feet long, located at

The insulator pins will support 6,600-volt insulators, carrying the messenger wire from which will be suspended the trolley. The poles will also carry on cross arms, 4 by 5 inches in section, telephone, telegraph and block signal wires.

The high-tension feeder line will be carried on a separate pole line. In an article in the Electric Railway Review for June 15, 1907, page 779, Sidney Sprout, electrical and mechanical engineer of the Ocean Shore Railway, described in an interesting way several tests made to determine the effect of salt spray and fogs on high-tension insulators. As a result of these tests a special type of insulator comprising a number of



Ocean Shore Railway—Bolster Construction for Passenger Coaches.

the various stations. The main track is laid with 14-foot centers. The rails used weigh 70 pounds and have 6-bolt standard angle joints. The type of rail bond to be used has not yet been decided, but these will be of 500,000-circular mil capacity.

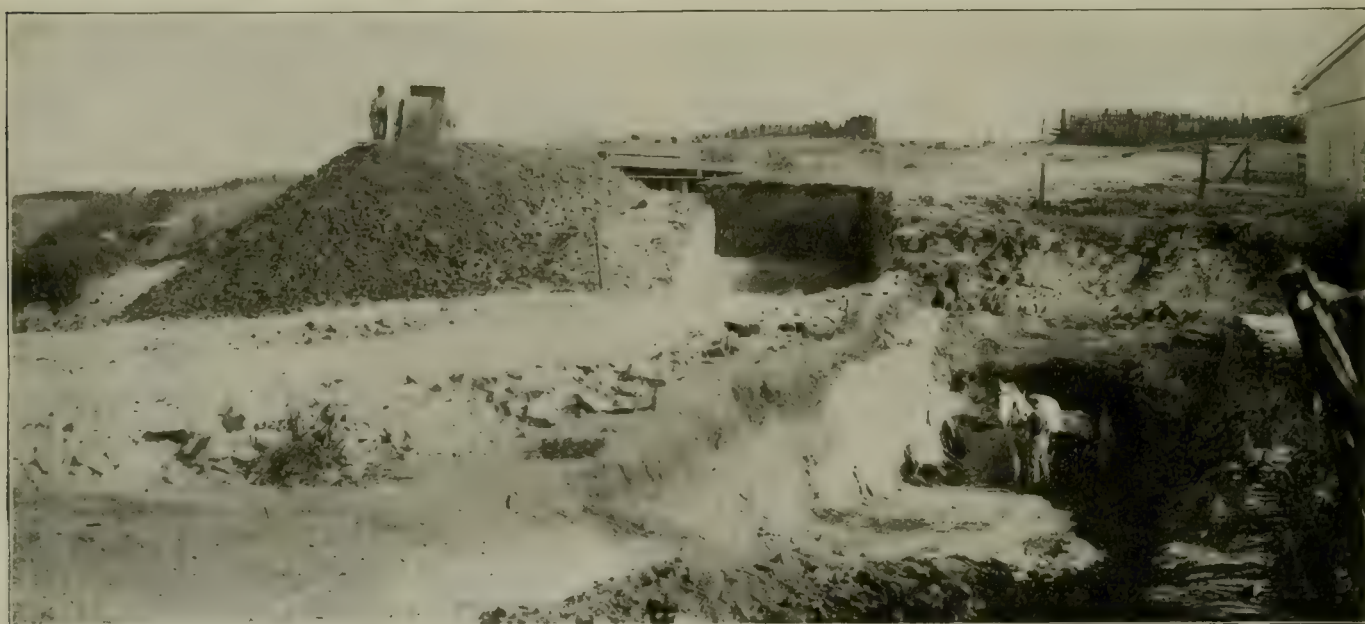
Overhead Work and Electrical Equipment.

Owing to the dense, salt fogs, peculiar to the California

comparatively flat petticoats will be used for this transmission line.

The trolley wires will be of grooved section No. 0000, supported by a 7/16-inch double galvanized steel strand messenger wire. Vertical hangers will connect the messengers with the trolley wires at distances of approximately 15 feet.

The transmission line will be operated at 33,000 volts



Ocean Shore Railway—Outlet of Drainage Tunnel Around Fill, Also Showing Farm Under Crossing at End of Fill.

coast, it was impracticable to use the third-rail type of distribution because of the scale which would be formed on the steel by the heavy salt air. For this reason the catenary type of overhead construction was adopted. The two trolley wires will be supported by wooden center poles, except in the few miles of track laid in paved streets in San Francisco, where ornamental steel poles will be employed.

The wooden poles, 30 feet long, will be fitted with 8 foot 6 inch iron brackets, bearing stay rods and insulator pins.

and will distribute the current to nine substations. An accompanying illustration reproduced from a line drawing shows the floor plan and sections of a typical substation. The transmission line will be somewhat shorter than the track because several large curves in the track will be avoided by running the pole line directly over the hills.

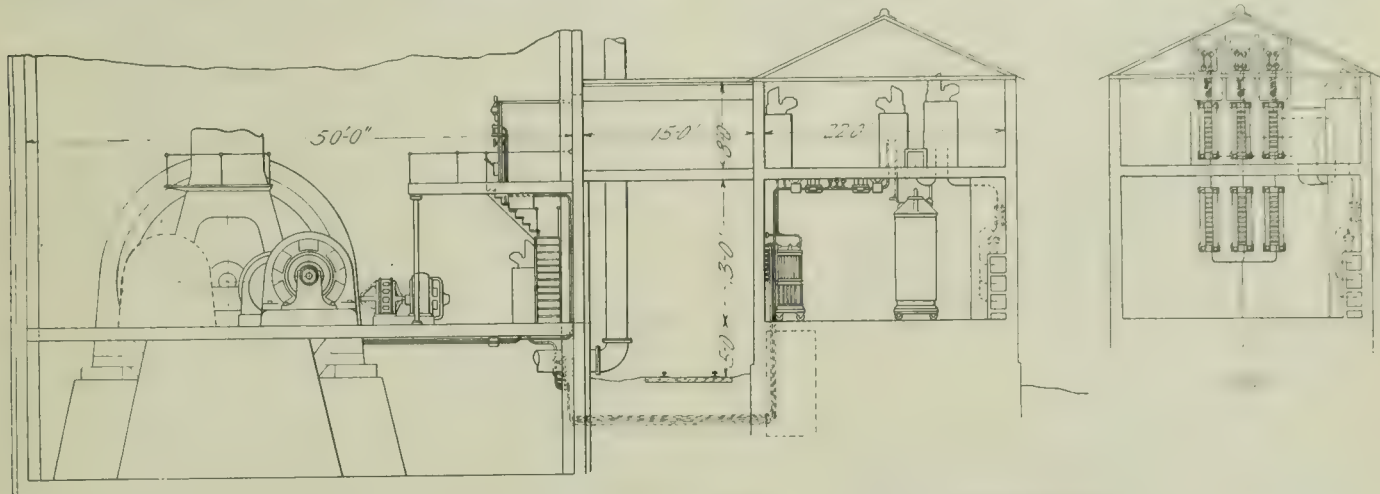
A very complete block signal system will be installed by the Union Switch & Signal Company. The signals of this system will be of the three-position, automatic, normal clear

type. Trains will be handled by a telephone system, using Stromberg-Carlson instruments, both in the stations and on the cars. This telephone system will be supplemented by a telegraph line, and normally all train orders will be telegraphed to the station agents, who will deliver them to the conductors.

Rolling Stock.

The initial rolling stock equipment of the Ocean Shore Railway will comprise 30 combination passenger cars, 60 feet

feed pumps with adjusters and oil release valves. Goubert vertical oil heaters, pressure gauges and thermometers, and a Spencer automatic damper regulator will also be provided. The oil supply will be stored in one 28,000-barrel and two 1,000-barrel capacity oil tanks. The oil feed pipe will be fitted with a Worthington oil meter, by which the amount of fuel used can be determined accurately. The boiler feed pump will be of the Snow duplex compound type and Goubert vertical Class B auxiliary feed-water heaters are to be in-



Ocean Shore Railway—Preliminary Arrangement for Part of Power Station.

long, each with a seating capacity for 60 passengers, and ten 50-foot passenger cars, with a seating capacity for 40 passengers each. These cars are being built by W. H. Holman & Co. of San Francisco. The trucks of the Master Car Builders' type were built by the Baldwin Locomotive Works, and these will carry two GE-66 motors, with type M control. The Westinghouse Traction Brake Company will equip the cars with its No. 3 electric brake. Each car will have a General Electric pneumatically operated pantograph trolley.

The interior and exterior arrangement and some of the details of construction of the cars are shown by accompanying line drawings.

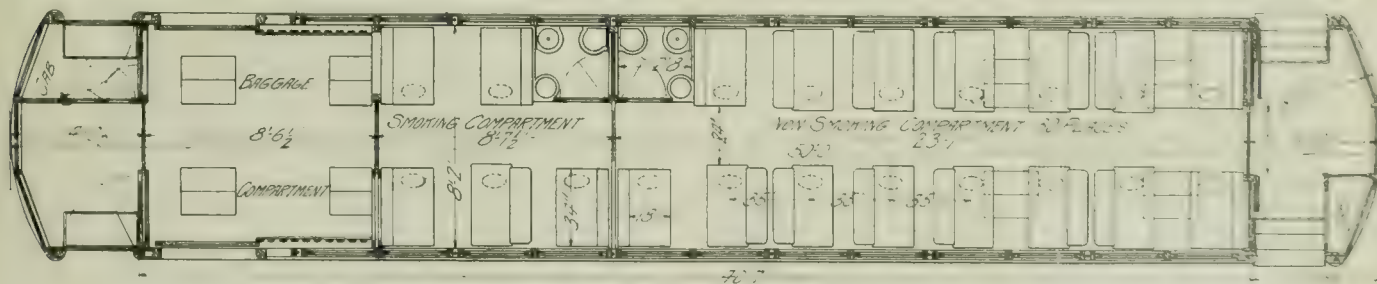
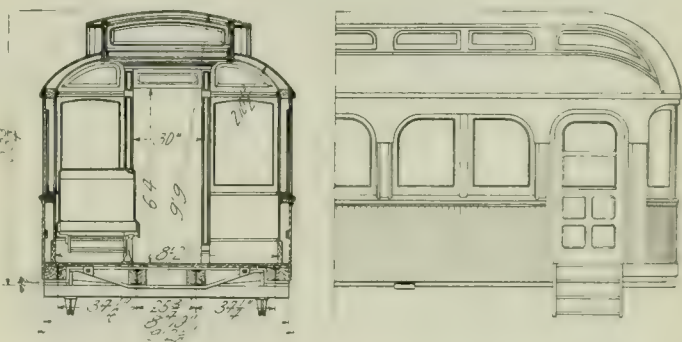
Power House, Substations and Car Barns.

Power house and car shops will be located at Balboa, about 20 miles south of San Francisco, at which point the company owns a tract of land of sufficient size to permit of the erection of a suitable group of large buildings and also the amusement resort earlier mentioned.

A cross section is presented, showing the general arrangement of the various parts of the power house. The power

stalled. A Worthington feed-water meter will be fitted in the feed main.

The main generating equipment will comprise three 2,000-kilowatt 2,300-volt 25-cycle three-phase fly-wheel type General Electric alternating-current generators, direct driven by three vertical cross-compound condensing McIntosh & Seymour steam engines, fitted with Richardson force-feed lubricators.



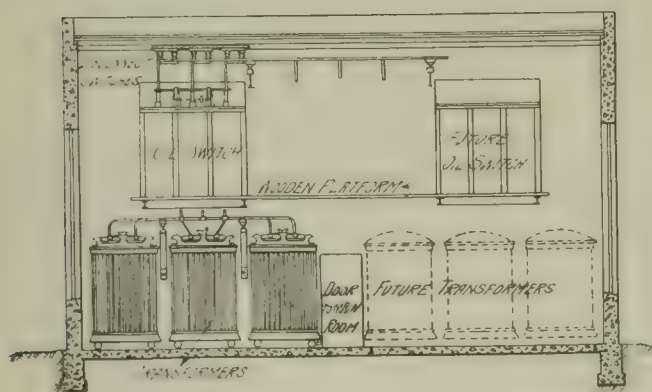
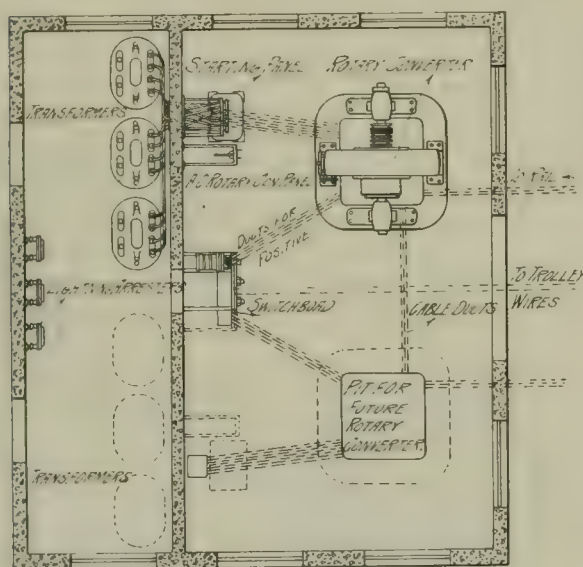
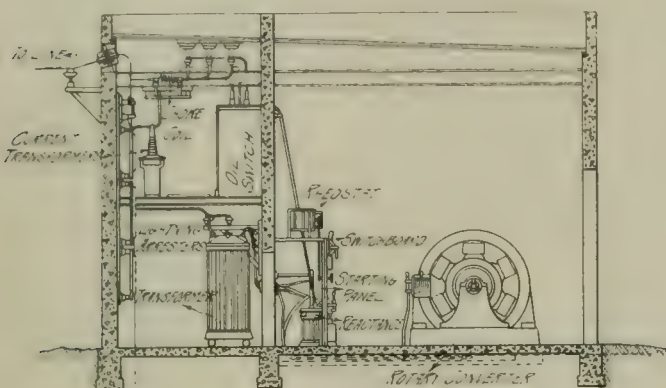
Ocean Shore Railway—Plan, Sections and Part Elevation of Passenger Car.

house building, which is to be of concrete, will be 150 by 200 feet in ground dimensions. The boiler equipment will comprise seven Babcock & Wilcox horizontal water-tube boilers, fitted with superheaters. The gases from the furnaces will discharge into two Weber steel-concrete chimneys, 10 feet in diameter and 125 feet high. Fuel oil will be used and the boilers will be equipped with Peabody's fuel oil burners and furnaces. The oil will be pumped by three Snow duplex oil

The generators are designed to carry 50 per cent overload for two hours. In addition to the main generating units there will be one 125-kilowatt direct-connected Harrisburg engine-driven exciter unit, and one 90-kilowatt exciter unit driven by a 2,300-volt three-phase induction motor, running at 750 revolutions per minute.

By reference to the illustration it will be noted that the transformers, high-tension oil switches, lightning-arrester

banks, and other electrical mechanisms, are installed in an independent building, to be reached from the power house by an inclosed bridge, as shown in one of the drawings. In this building are to be seven 1,000-kilowatt oil-insulated and water-cooled single-phase transformers. By means of these transformers the generating pressure of 2,300 volts will be raised to 33,000 volts, at which pressure the current will be trans-



Ocean Shore Railway—Arrangement of Substation.

mitted to the substations. The switchboard for the entire power plant will be located in the gallery in the engine room.

The condensing equipment will comprise three Wheeler admiralty-type surface condensers, fitted with absolute vacuum gauges, each condenser being served by an Edwards steam-driven twin-crank and flywheel suction valveless air pump. The condensers will receive cooling water from three engine-driven centrifugal circulating pumps, taking water through two 24-inch cast-iron suction lines and discharging from the

condensers through a 24-inch tile pipe outlet. The exhaust mains are to be fitted with Wheeler horizontal exhaust relief valves.

An automatic engine-oiling system will be installed, comprising two Turner oil filters with oil-storage tank, filtered oil-storage tank, engine oil-receiving tank and a pressure system for distributing the oil to the engine. For general use about the plant there will be a Westinghouse air compressor with its auxiliaries. The gauge and clock board will be fitted with steam receiver and exhaust pressure gauges and Bristol automatic recording steam pressure and vacuum gauges.

The railway company has contracted with Charles C. Moore & Co., San Francisco, to furnish the complete power plant equipment.

There are to be nine 1,000-kilowatt capacity substations, located at uniform intervals along the line, and one 500-kilowatt converter station at the power house. But half the capacity of each substation will be utilized at present. In addition to these permanent stations there will be a portable substation of 500 kilowatts capacity, maintained for emergency service.

Buildings and Stations.

The station buildings are divided into three classes, the large and elaborate stations to be known as Class A, the combination freight and passenger depots, with spacious platforms, to be known as Class B, and the passenger shelters and small platforms to be known as Class C. There will be three Class A depots, to cost about \$10,000 each, one each located at San Francisco, Balboa and Santa Cruz. Twenty-one other passenger stations will be erected, some of which will have freight depots and platforms. Besides these facilities will be afforded for handling freight at seven other stations along the line. The company will build 16 cottages for the use of substation attendants and their families. Eight section houses with bunks and tool sheds and also four water tanks for the use of construction locomotives will be erected.

It is interesting to note that the Ocean Shore Railway Company has been able to obtain a high-speed entrance into the center of the business district of San Francisco. Double tracks will be laid through the city to the terminal building, to be erected on the block of ground owned by the company at Eleventh and Market streets.

We are indebted to A. B. Rogers, chief engineer, and Sidney Sprout, electrical and mechanical engineer, for information used in describing this line. J. Downey Harvey is president of the Ocean Shore Railway Company, with offices at Eleventh and Market streets, San Francisco.

SATURDAY SESSION, CLEVELAND MEETING OF THE STANDARDIZATION COMMITTEE.

A meeting of the "Standardization" committee of the American Street and Interurban Railway Engineering Association was held at the Hollenden hotel, Cleveland, O., on Friday and Saturday, July 26 and 27. The first day's session of this meeting was reported in the Electric Railway Review for July 27.

It was the purpose of the meeting to consider standards for axles, journals, journal bearings, journal boxes, brakeshoes and heads, tread and flange of wheels and to discuss a standard rail section as affecting wheel treads and flanges.

The discussion on Saturday was confined principally to the subjects of wheels and axles. There were so many points involved which could not be decided without further consideration on the part of the manufacturers and operators that it was decided to call another meeting of the "Standardization" committee at New York on September 12 and 13, and then to proceed further in the matters discussed at the two days' Cleveland meeting. In the meantime W. H. Evans, chairman of the "Standardization" committee, will appoint subcommittees to consider the details of the various problems with which the committee is confronted.

HINTS ON SHOP MANAGEMENT.

BY H. F. SCHMIDT.

The fundamental basis for saving money is first to find out the sources of loss and waste and then to determine methods of preventing them. This is true of all manufacturing and applies particularly to the management of shops where a great number of different operations are performed. Unless the individual cost of performing a certain operation is definitely determined it is impossible to tell whether or not a saving of time or material could be produced by the introduction of new tools or jigs or by a change of workmen. It is therefore essential to the economical management of shops to ascertain definitely the exact cost of the various operations performed, including the cost of labor, supplies and wear and tear on the tools and machinery, cost of power and the maximum time required for performing the operation without crowding the workman to a pace wholly beyond his endurance.

Time Keeping.

In order to determine shop costs it is necessary to introduce some form of time keeping other than simply recording the total number of hours each man works a day. There are a number of methods of keeping time which offer advantages, and in larger railway shops important advantages would be gained by combining two or three of them, at least for a sufficient period of time to ascertain the elements of shop costs. In some systems of time keeping cards are issued for each job, on which the time for performing each operation is recorded, together with the workman's number, machine number and shop order number. The data contained on all the job cards, relating to one shop order, give a complete record of the time required for completing that shop order and the machines used, from which the exact cost of completing the shop order can be ascertained—excepting, of course, the cost of material.

In other systems each man receives a timecard, on which he records the time spent on different shop orders during the course of the day; thus, if a man works on four or five different shop orders he will enter four or five separate periods on his card with the shop order numbers. This system involves more clerical work in figuring shop order costs, though it is apparently simpler because only one card is issued to each man instead of four or five. An important point to be remembered before condemning a system of time keeping because it involves the use of a large number of cards is that paper is far cheaper than time.

The general advantages of the job card system are that it shows exactly what each man has been doing during the day, and points out the industrious workmen. As the time for completing each operation is known by this system, it is easy to compare the time taken by different men performing the same operation.

Machine Timecards.

For operations requiring the use of individual machines, such as large lathes, planers, shapers, milling machines, etc., a system of "machine timecards" offers an advantage, since it shows the number of times various operations are performed and thus is a valuable guide in determining special or automatic machines which could profitably be installed, and the operations for which jigs and special tools might profitably be devised.

Issuing Supplies—Supply Cards.

In addition to the labor timecards, a system of supply cards by jobs is very important. For each operation requiring the use of materials, such as, for instance, rewinding a field coil, a job material card is issued bearing the shop number, the number of the employe to whom the supplies are issued, the number of pounds and size of wire, amount of insulation, etc., which were issued from the stockroom for this particular job. Upon completing the job, the wire and insulating material which has not been used is returned to the storeroom, and

credited on the card, together with the weight of old wire which was removed from the burned-out coil. The advantages of this card system are that it prevents issuing supplies which are not needed and prevents waste of supplies, since all material not used on the job must be returned to the storeroom, together with the scrap, the value of which is credited to the job from which it was taken. This permits ascertaining the exact cost of materials, allowing for the value of the scrap, and prevents the removal and sale of scrap material and excess material taken from the storeroom without the company's knowledge. The use of shop material cards serves to check up the supplies purchased and thus materially reduces the chance for material being removed from the storerooms and shops.

Crediting Value of Scrap to Jobs.

If the actual cost of making repairs is to be accurately determined, and the cost is to be systematically kept, it is absolutely necessary to credit the salable price of scrap to each repair job. If this is not done and all scrap is collected and sold once or twice a year and the returns from this source are divided over all the work which has been done in the shop, including the maintenance of buildings, labor and new supplies, the actual cost of making any one particular repair is not accurately known.

Charging Cost of Power to Departments.

Meters should be installed in each of the departments to determine the amount of power and light being used. The cost of power and light used in the various departments should be added to the cost of the work done by the departments. The introduction of meters and department management will tend to reduce the waste of power. In electric railway shops there is a tendency on the part of the employes to think that power costs the company nothing or practically nothing, because there seems to be an unlimited supply available from the power house, but this should be no excuse for wasting anywhere from one to ten horsepower in each of the departments. At one cent per horsepower-hour, 10 hours a day, one horsepower costs the company \$30 per year. If one horsepower is constantly being wasted in each of the six departments of the shop the loss would be \$180 per year. This may appear to be a mere trifle, but it must be borne in mind that it is the little insignificant wastes that cause the total loss.

Issuing Tools to Workmen.

Tools, such as drills, taps, reamers, gauges, etc., should only be issued from the stockroom by a system of checks bearing the number of the workman receiving the tools. Each workman should be given a set of the tools required for all ordinary operations and for which a deposit is left with the company, redeemable upon the surrender of the tools to the company upon leaving. The necessity for carefully watching and keeping a record of all tools issued will be evident to any one who has noticed the abundant and varied supply of tools to be found in all junk shops and pawn shops.

Care and Standardization of Tools.

In systemizing machine tool operations, even in small railway shops, a considerable saving in time can be accomplished by the introduction of a system of standard shop tools forged and sharpened only by the tool department. Thus, by the careful selection of the tools in accordance with the fundamental principles of the art of cutting metals, the time required for performing any given operation can be reduced by one-half. A great saving in labor cost will also result by reducing the time spent by employes sharpening and grinding their own tools. Further, under this system, properly enforced, it is necessary for the men to return dull tools to the tool keeper for resharpening, which will soon indicate who are the incompetent workmen. The introduction of high-speed tool steel used in place of common tool steel will also well pay for the

investment and the additional cost involved in forging the special steel.

Independent Department Accounting and Operation.

The separating of the various parts of the shops into departments, independent of each other, is now a standard practice in the most progressive manufacturing plants of the country, but has not been generally introduced into electric railway shop practice. Under this system the machine shop, forge shop, foundry, armature shop, erecting shop, carpenter shop and paint shop are run independently under their respective foremen as though they were individual manufacturing establishments. In the operation of this system, requisition orders are issued from one department to another for materials and work required. These requisitions are made out by shop order number and job number and on them is stated the amount of material and work to be done, its exact nature, and the time when the material must be delivered or the work finished. The shop foreman receiving such a requisition makes out his job order card, which he turns over to the respective employees who are to do the work.

The special department costs of all the work done under certain shop order numbers are charged to the departments issuing the original shop order. In making up these inter-department bills, the cost of labor, value of the time of machines in service and an amount proportional to the maintenance and operating cost of the shop are added in the same manner as bills would be issued from one manufacturing concern to another.

The advantages of this system are that it gives the exact cost of conducting the different departments, stimulates the heads of the departments to exert their best efforts to reduce the labor cost and waste of material, power, etc., and shows which departments are the sources of loss and waste. It also shows, if such be the case, which department should be abandoned and the work done by it let by contract.

By this method of operating the departments independently of each other and by stating on the requisitions when work or material must be delivered, the cause of delays is easily ascertained and responsibility for the delays placed upon the proper employees. This, further, will readily indicate any department which is inadequately equipped or incompetently managed, and thus aid in synchronizing the various departments. Under this system of operation it will soon be found that many of the delays and the consequent loss of money and time occasioned by them are caused through one department delaying all the others, simply for the lack of a little machinery, an insufficient number of employees or poor management. Not only will the operating cost be materially reduced, but a marked improvement in the uniformity and quality of the work will be one of the inevitable results.

A Gang-Bonus System for Erecting Shops.

In erecting shops, where the number of operations performed daily by each man makes the use of job cards impracticable, a satisfactory system of obtaining better work from the men is to institute a form of gang bonus. For instance, a standard time allowance for erecting a car, assembling trucks, or making certain standard repairs could be set, and, if the erecting gang decreased the time below the standard, a bonus could be added to the pay of each man in the gang, including the foreman, whose bonus would be in proportion to his pay. Or, if a reduced gang does the same amount of work in a given time as the gang for which the standard time was set, they should be paid at a rate proportional to the decrease in the time for an equivalent standard gang.

The effect of the gang-bonus system on the men is not only to make each man work harder and waste less time, but it has the influence of practically making each man his own boss. As one lazy or inefficient man in a gang can keep the whole gang from earning its bonus, each man will closely watch his neighbor through self-protection, so that the men themselves will soon get rid of a man who is not working

up to the standard. A further influence of the bonus system is to establish a more friendly feeling between the railway company and its shop employees. It gives the men a feeling of confidence, because they know that as they perfect themselves in performing certain operations and as they become more skilled and rapid in their work their pay increases in direct proportion. The men see a future ahead of them and therefore there is more encouragement for a man to keep his position, changes will be less frequent and a higher standard of workmanship will inevitably result from the greater experience of the employees.

Such a bonus system should, however, be arranged so that if a greater time than the standard is taken no deduction from the pay should be made, the standard time selected being such that it will require constant effort on the part of the men to perform the work in it without loafing, but without overworking them. Then the men can fall considerably short of standard time without being inferior to the ordinary erecting gang.

Such a bonus should be faithfully maintained, regardless of how much the individual earnings of the men may increase under it, as the failure of practically all bonus systems has been that as soon as the management ascertains the maximum amount of work a man can do, the standard is changed to this limit, which discourages the men, and the final result is worse than if a bonus system had never been introduced. In car shops, where the total cost of repairs must include a certain allowance for the time a car is off the road, a considerable saving in operating expenses can be obtained by offering a bonus to the erecting gang for each hour that it decreases the standard time required for the erection of a car or for the completion of specific repairs.

Bonus System Applied to Machine Tool Operation.

With the introduction of standard tools in machine shops it is possible to set a fixed time for the completion of each operation and give the men a bonus for increasing the output in a given time or reducing the time of a single operation. The extent to which bonus systems can be introduced into a railway shop will depend greatly upon its size and the facilities with which it is equipped for doing work.

The Best Method of Comparing Costs.

Having introduced systems for accounting and determining the cost of individual operations and products, it is necessary to have a convenient means of comparing the costs thus determined. For, if this is not done, the advantages resulting from the introduction of a system and the expenditures involved in additional clerical labor, printing, etc., will be wasted unless the lessons taught by the results obtained are studied and used to the fullest extent. No system of comparing results shows so exactly what has happened as does that of plotting the results in the form of curves on cross section paper. A glance at the curves thus obtained will give an accurate comparison of all the results obtained. These curves can be applied to show the cost of producing any manufactured product, cost of making repairs, etc.

Simplicity the Keypoint of System.

Time, job and shop order cards should be designed with great care, and particular attention must be given to making them as simple as possible, so that little clerical work will be required in filling them out. It must be borne in mind that, to avoid errors, the methods adopted must be exceedingly simple. Failure to consider these points has been the cause of practically all cases in which such systems have not proved successful.

Necessity of Keeping Records of the Finished Product.

In street railway operation the problem of shop management is considerably different from that of ordinary manufacturing enterprises, for the possibilities of reducing expenses in the shop are intimately connected with the finished product after it has left the shops. Hence the shop records

should not only contain an accurate account of all the work which has been done on the various cars, but it should also contain opposite each entry the number of the car upon which the work was done. This not only enables the cost of repairs on each different type of car to be accurately ascertained and thus makes possible the selection of those types which are most suited for the service which they are expected to give, but it also enables the master mechanic to single out those cars which return most frequently to the shops for repairs.

The shop records should contain entries showing the motorman in charge of cars which are returned to the shops for repairs and each motorman's record might be kept in the shops in the form of a curve showing the number of motor burn-outs, controller burn-outs, broken fenders, flat wheels, etc., for which he is responsible.

SOUTH BETHLEHEM LINE OF THE EASTON TRANSIT COMPANY.

The Easton Transit Company has just begun the operation of its new line from Easton to South Bethlehem, Pa., which was incorporated as the Easton & South Bethlehem Transit Company. The new line is almost a direct route between Easton and Freemansburg, the junction with the Freemansburg Street Railway, and makes it possible to operate the cars between Easton and South Bethlehem by a much shorter route than the one via Butztown, the distance being $12\frac{1}{2}$ miles from Centre Square, Easton, to New street, South Bethlehem. The length of the newly constructed section, Easton to Freemansburg, is seven miles, and over this section the company expects to operate at speeds ranging from 30 to 40 miles per hour.

The new road is a single-track, stone-ballasted line, running outside of city limits, on private right of way between

the new line about 1,300 to 1,800 kilowatt-hours per day, but the main power supply comes from the direct-current water-power station of the Easton Power Company, known as the South Plant, which is located between the Lehigh Coal & Navigation Company's canal and the Lehigh river.

The feeders for the new line are No. 0000 copper, one feeder extending from the Easton Power Company plant via the new line to South Bethlehem, and a second parallel feeder



Easton & South Bethlehem Transit Company—Map of Territory Served.

stopping at a point on the new line three miles distant from the power plant. These are tied to feeders from Butztown to South Bethlehem and from Butztown to a point on the new line one mile east of Freemansburg. The transmission line is supported on 35-foot poles, which, on tangents, also support brackets of the Craghead type for carrying the No. 00 trolley wire. The pole and line construction does not differ from that on the remainder of the system.

The car barn of the Easton Transit Company is located at Sixteenth and Washington streets, Easton, and in order to store the cars for the new line it has been decided to build an addition to this barn, which will be 40 by 150 feet in size, to accommodate nine large cars. This will be of concrete-steel construction.

About \$100,000 is to be expended in general improvements for the Easton Transit Company system in Easton, and in Phillipsburg, across the Delaware river in New Jersey. Switches will be relocated to give a 10-minute service on all parts of the system. In Phillipsburg the company has purchased a stone building formerly used for a malt house and will convert this into a car barn, amplifying it by a 100-foot addition to accommodate 20 cars. The North Main street line will be extended one mile to the works of the Ingersoll-Rand Company in order to secure the traffic revenue from that source. For the Phillipsburg line six cars of the semi-convertible type have been ordered from The J. G. Brill Company.

C. H. Venner Attacks Chicago City Railway.

On August 1 E. N. Zoline, representing C. H. Venner of 33 Wall street, New York, instituted mandamus proceedings in the Cook county circuit court to compel the Chicago City Railway Company to exhibit its books, including all books of account. Mr. Venner alleges he is the owner of 200 shares of Chicago City Railway stock and has been denied the privilege of inspecting the books.

It has been stated by Mr. Zoline that a bill in equity will be filed praying that the Chicago City Railway Company be enjoined from issuing any bonds or expending any money in carrying out the terms of the ordinance recently accepted by the company. The principal reasons alleged for the action are: (1) The city delegated discretionary and unlimited power to the board of supervising engineers, a body unknown to the law, unaccountable to the people and not elected by them, and the mayor and city council divested themselves of all power of vetoing any of the acts of the board. (2) The stockholders' position has become subordinate to that of the city in many respects, a relinquishment of power that would require the consent of all the stockholders. (3) The franchise is void because the consent of the property owners along the lines has not been obtained, whereas the Illinois supreme court recently held that where franchises expire the consent of the property holders must be obtained anew.



Easton & South Bethlehem Transit Company—View of Track.

20 and 50 feet wide. The track is laid with 70-pound T-rails, on 6 by 6 inch ties, 8 feet long. The rails are electrically connected by the Roebling soldered bonds. The right of way is to be fenced throughout with American wire fencing. The line crosses the Lehigh Valley Railroad by a subway.

Like the other Easton Transit Company lines, this new line will be operated by direct current at the ordinary voltage, supplied mainly by the Easton Power Company. The railway company has a small power station at Butztown equipped with two 225-kilowatt direct-current generators, delivering to

FINAL REPORT ON MUNICIPAL OWNERSHIP BY CIVIC FEDERATION COMMISSION.

Exceptions to the final report of the conclusions of the committee on investigation of the municipal ownership commission of the National Civic Federation are taken by Walton Clark, vice-president of the United Gas Improvement Company of Philadelphia; Charles L. Edgar, president of the Edison Electric Illuminating Company of Boston, and William J. Clark of New York, general manager of the foreign department of the General Electric Company. The report of the committee was signed by all the members except Walton Clark, who presented a separate statement. Charles L. Edgar and William J. Clark presented a joint statement of exceptions.

Report of the Committee.

An abstract of the report of the committee follows:

The public utilities studied are so constituted that it is impossible for them to be regulated by competition. Therefore, they must be controlled and regulated by the government, must be left to do as they please, or must be operated by the public. There is no other course. None of us is in favor of leaving them to their own will, and the question is whether it is better to regulate or to operate.

We wish to bring to your consideration the danger here in the United States of turning over these public utilities to the present government of some of our cities. Some, we know, are well governed and the situation on the whole seems to be improving, but they are not up to the government of British cities. We found in England and Scotland a high type of municipal government, which is the result of many years of struggle and improvement. Business men seem to take a pride in serving as city councilors or aldermen, and the government of such cities as Glasgow, Manchester, Birmingham and others includes many of the best citizens of the city. These conditions are distinctly favorable to municipal operation.

In the United States, as is well known, there are many cities not in such a favorable condition. It is charged that the political activity of public service corporations has in many instances been responsible for the unwillingness or inability of American cities to secure a higher type of public service. This charge we believe to be true. However, there seems to be an idea with many people that the mere taking by the city of all its public utilities for municipal operation will at once result in ideal municipal government through the very necessity of putting honest and competent citizens in charge. While an increase in the number and importance of municipal functions may have a tendency to induce men of a higher type to become public officials, we do not believe that this of itself will accomplish municipal reform. We are unable to recommend municipal ownership as a political panacea.

Public utilities, whether in public or private hands, are best conducted under a system of legalized and regulated monopoly.

Public utilities in which the sanitary motive largely enters should be operated by the public.

The success of municipal operation of public utilities depends upon the existence in the city of a high capacity for municipal government.

Franchise grants to private corporations should be terminable after a fixed period and meanwhile subject to purchase at a fair value.

Municipalities should have the power to enter the field of municipal ownership upon popular vote under reasonable regulation.

Private companies operating public utilities should be subject to public regulation and examination under a system of uniform records and accounts and of full publicity.

The names of the members of the committee were given in the *Electric Railway Review* of July 13, 1907, page 40.

Exceptions of William J. Clark and Charles L. Edgar.

William J. Clark and Charles L. Edgar present these exceptions to the report of the committee:

First—The report says: "There are no particular reasons why the financial results from private or public operation should be different if the conditions are the same. In each case it is a question of the proper man in charge of the business and of local conditions." We dissent from the implication in this paragraph that the conditions are or are likely to be the same.

Second—The report says: "We are of the opinion that a public utility which concerns the health of the citizens should

not be left to individuals, where the temptation of profit might produce disastrous results, and therefore it is our judgment that undertakings in which the sanitary motive largely enters should be operated by the public." We dissent from this conclusion as having been proved by our investigation. In our opinion, privately operated water systems were, especially as regards their consideration for the public health, as properly and successfully managed as the publicly operated water systems.

Third—The report says: "We have come to the conclusions that municipal ownership of public utilities should not be extended to revenue-producing industries which do not involve the public health, the public safety, public transportation, or the permanent occupation of public streets or grounds, and that municipal operation should not be solely for profit." This sentence is so drawn that to a casual reader it implies that the opposite is advisable. From this we strongly dissent.

Fourth—The report says: "To carry out these recommendations effectively and to protect the rights of the people, we recommend that the various states should give to their municipalities the authority, upon popular vote under reasonable regulations, etc." The words "under reasonable regulations" were put into the report at the suggestion of Charles L. Edgar, and were intended by him to mean such regulations as would compel deliberate consideration not only by the people, but by their representatives, and would consequently prevent the superficial attractiveness of the scheme from overriding the "sober second thought" of the people. We strongly dissent from any definition of "regulations" which does not cover these points.

Fifth—The second and fifth conclusions in the latter part of the report, being merely repetitions of previous statements, are of course subject to the same dissents.

Conclusions of Walton Clark.

Walton Clark, in his paper, speaks of his agreement with the other members of the committee on the statement that "companies intrusted with franchises and charters for the operation of so-called public service industries should be subject to regulation." He dissents, however, from the statement of the committee regarding waterworks, saying:

Recognizing the almost supreme importance of an adequate and cheap supply of pure water, I dissent from one of the recommendations of my associates, in effect that waterworks should be operated by public bodies. I dissent for the reason that my study of the report of the waterworks expert employed by your committee, and my personal investigations, lead me to the conclusion that the water companies have made the more intelligent efforts toward adequacy and purity of supply, and that, all conditions considered, the result of their efforts has been and is a better and cheaper water supply and service than that maintained by the municipal waterworks department.

Mr. Clark also dissents from the statement made in reference to politics in Glasgow, Manchester and Birmingham, that these conditions are distinctly favorable to municipal operation, if by this is meant a municipal ownership that may be favorably compared with private ownership, in the character of its results and in benefit to the city and citizens served. He says:

My knowledge of the question is had from personal investigation, and from a study of the reports of the experts employed by this commission, and of the writings of members of the commission. It leads me to the conclusion that the city and citizens of Glasgow, Manchester and Birmingham, as well as of the other municipalities investigated, are not so well served by their public service trading departments as the cities and citizens of London, Newcastle, Sheffield, Dublin and Norwich are by companies operating similar trading industries, and that there is no element of blessing in the municipalization in the former cities to compensate for the indifferent character of the service rendered.

Mr. Clark says that the investigation in which he has taken part has convinced him that municipal ownership has not proved equal to private ownership, in benefits to the consumer, the citizen or the city. He does not agree that the way should be left open for any municipality to undertake any trading operation, without special authorization by the legislature of the state wherein it is located. Mr. Clark adds:

I cannot believe that the prescribed remedy for any ill should be a worse ill, and I cannot recommend that a municipality suffering, or believing that it suffers, under public administration of a public utility, should be given the right to engage in the operation of such utility for itself, without such

a course of procedure as will make sure that the sober second thought of the people shall have ample opportunity for development and expression, before the community is committed to municipal ownership with the accompanying dangers and difficulties, of which you are warned in the majority report.

Because I believe that the general credit of municipalities should be conserved for the benefit of public and necessary improvements, from which, in the nature of things, private enterprise is excluded; and because I believe that a municipality should not in any event engage in any trading enterprise that will not pay its own way, and have the confidence of the citizens as financially sound, I think that municipalities should be prohibited by statute from making investments in trading operations, except with money borrowed on mortgage, or otherwise, the loan being secured by a lien on the plant in which it is invested, and on the right to operate the same, and on this only.

Believes in State Regulation.

Mr. Clark also dissents from the opinion that a city should have the right to purchase at its option the property of public service corporations for operation, lease or sale. He bases his opposition on the belief that it is practically impossible to secure private funds for investment in an enterprise subject to purchase by a municipality, at any date to be selected by the municipality, and because he believes that the impossibility of so securing private investment may, and often will, work a social harm to a community. He says:

I believe in state regulation and protection of public service companies. I do not understand that your committee

GRANITE-FACED CONCRETE BRIDGE ON THE BOSTON & WORCESTER STREET RAILWAY.

The granite-faced concrete highway and railway bridge carrying the Boston & Worcester Street Railway tracks over the Charles river at Boylston street at Newton Upper Falls and Wellesley, Mass., is a most effective improvement from a scenic standpoint. This bridge was built under the direction of John R. Rablin, engineer of the Massachusetts Metropolitan park commission. The structure was erected at a cost of \$31,000, part of which was paid by the railway company. The artistic effect of the completed bridge is well shown by the accompanying photograph herewith presented, and is a great improvement over the old wooden bridge and dam which were there before the completion of the new bridge.

The bridge consists of one 50-foot arch and one 14-foot arch, and is 70 feet wide between parapet walls. This width is sufficient for two 8-foot sidewalks and a roadway 54 feet wide, in the center of which are located the double tracks of the Boston & Worcester Railway.

The abutments, piers and the 14-foot arch are constructed of plain Portland cement concrete and the 50-foot arch is of concrete reinforced with "Johnson" corrugated steel bars. The entire faces of the bridge, including arch rings, spandrel wing and parapet walls, are constructed of quarry-split granite rubble masonry, this material having been used to give a



Granite-Faced Concrete Bridge on the Boston & Worcester Line.

was charged with the duty of recommending to you a form of regulation. I know that your committee made no special study on this subject. Therefore I am not prepared to propose any detailed plan of regulation.

Finally, regretting to be in any degree in conflict of opinion with my associates, I may still satisfy my sense of duty to my fellow citizens and my sense of obligation to you for the honor of a share in this important work, by recording the conviction I am under at the close of this investigation.

I am convinced that the condition of the British people, individually or collectively, has not been improved by the municipalization of the industries we have investigated.

I believe that political and social conditions in the United States are less favorable to the success of municipal ownership than are the same conditions in Great Britain.

I find this conclusion strengthened by our investigation into municipalized industries in the United States.

I am convinced that, under American conditions, the system of private ownership of public utilities is best for the citizens and the consumers.

I recommend state regulation and protection of public service companies, provided by statute, and as far as possible automatic in its application and operation.

According to reports of inspectors for the Indiana railroad commission, interurban and steam railway stations and depots are not adequately lighted. The commission has sent circular letters to the companies calling their attention to the provision of the law requiring that passenger stations, platforms and approaches thereto shall be properly and adequately lighted, and asking for prompt and effective compliance.

rustic appearance to harmonize with the surroundings. The bridge was constructed one half at a time in order to afford uninterrupted traffic during the period of construction. As shown in the photograph, a circular dam of concrete, with the same stone facing, was constructed in connection with the bridge. This dam runs from the pier between the two arches to the shore and this makes the 14-foot arch a sluiceway with gates in the upper end, through which the basin above the dam may be drawn off.

A 1,230-foot fall on the Mokelumne river, central California, will be developed by the General Electric Power Company of Rochester, N. Y., to supply current for light, power and railway service in towns within 300 miles of the station. It is proposed to develop 69,000 horsepower by a dam 150 feet high. This will create a lake flooding about 400 acres. This company will build an electric railway from Lakeport to San Francisco, a distance of 130 miles. The surveys for this road are complete and the right of way has been secured. The total cost of the development is placed at \$10,000,000. Walston H. Brown & Brothers, 45 Wall street, New York City, have taken the contract for all construction work, and plan to begin work in the coming fall.

The Toledo Urban & Interurban Railway of Toledo, O., has abandoned the use of automatic switches and has equipped its track with standard switches.

THE CREATION OF PENSION FUNDS FOR EMPLOYEES.

BY WILLIAM R. BOWKER.

The strike problem is one of the gravest and most serious conditions with which street railway officials and capitalists have to grapple. The result of a strike is that both the company and the men are losers financially. Unfortunately, in the majority of cases, compromises cannot be effected. Bodies or unions of men are very easily swayed and led to do desperate acts, by either real or imaginary grievances; and in many cases are entirely guided by the eloquence of their leaders; and the question is never asked: "What shall we do if we lose?"

Pension Funds.

The writer is an advocate of a fair day's pay with reasonable hours of labor; and the undertaking should be so organized and administered that the finances will admit of such a condition. To my mind the only permanent remedy for strikes is one based upon the principle of clearly illustrating that excessive or exorbitant demands for present monetary gain would, if the men were losers, be ultimately greatly to their financial disadvantage. The only scheme to provide this argument is by the initiation and adoption of old age pension funds.

It is to the interest of electric companies to induce good men to join their service. Intelligent and conscientious motormen and conductors are needed. The inducement could be offered in the form of a sensible day's work with good pay; payment of bonuses for efficiency, etc., and, in addition, a friendly society and superannuation fund. Every railway undertaking of any magnitude should have such a society. It brings about a harmonious condition between employer and employee which it is impossible to attain in any other way. The men do not find so many just or imaginary grievances against their employers when such societies exist. The companies would, of course, subscribe to the funds, which make possible a wise monetary provision in the case of death, accidents and old age pensions. By such inducements the service is made more attractive, better men join, and a more permanent staff is insured. The establishment of a friendly society and a superannuation fund forms the strongest tie between employer and his employee.

Certain rules and conditions mutually satisfactory are absolutely necessary to carry on the organization of such societies in a substantial, businesslike and financially successful manner. Trustees and a committee of management are needed.

The following information may be of value as showing the conditions and financial basis of such societies, as adopted by several large railroads and street railways in England. In the United States the contributions, benefit allowances and superannuations could be in harmony with the wages earned here.

Friendly Society (English System).

No man over 45 years of age would be allowed to join, and all must be medically examined. An entrance fee of 1 shilling or 1 shilling and 6 pence would be payable on joining, which could be deducted in two or three equal instalments from the wages. Two classes of members would be instituted. Class A, employees receiving wages above 18 shillings per week of six days; Class B, employees receiving wages under 18 shillings per week of six days. The members' contributions would be Class A, 6 pence per week; Class B, 3 pence per week. The street railway would add a sum equivalent to one-half of the members' contributions.

The sick benefit would be: For Class A, 15 shillings per week; for Class B, 7 shillings and 6 pence per week. No member would be entitled to sick benefits until he had been in the society three months. Full payment would be allowed for the first 26 weeks in the case of a long illness, and two-thirds

for the second 26 weeks. After the full year, if still unfit for work, the employee would cease to be a member, and all claims on the fund would end. Allowances for death, payable to the nearest relative of the member, would be: Class A, £12; Class B, £6.

If there were sufficient funds a member on leaving the service for legitimate causes, would be refunded one-third of his contributions, less the amount of any benefits he had received from the society.

Superannuation Fund (Method I).

No pension would become payable until after 15 years' membership, and if the fund had been managed in conjunction with the friendly society funds, and two pence per week per member had been set aside to the fund from the society's funds, superannuation allowances could be rated on the following scale:

Period of Membership. Years.	Weekly Superannuation Allowance.
15.....	10 shillings.
16.....	11 "
17.....	12 "
18.....	13 "
19.....	14 "
20.....	15 "
21.....	16 "
22.....	17 "
23.....	18 "
24.....	19 "
25.....	20 "

No member would be entitled to a pension until he had become partly or wholly unfit for work.

Superannuation Fund (Method II).

Membership would be compulsory upon every employee of the undertaking receiving a monthly salary, with the proviso that no person is permitted to become a member after the age of 26 years. The members' contribution would amount to 2½ per cent per annum upon their salaries, deducted monthly from the pay, but the company would contribute an amount equal to the contribution of each member. In the event of the death of a member before superannuation, his representatives would receive either the equivalent of half a year's average salary, calculated over the whole term of his contributions, or the sum of his contributions and those of the company, in his behalf, whichever might be the greater. Any member retiring from the service of his own accord before superannuation receives back one-half of his own contributions.

A member who is dismissed from the service for any cause other than fraud or dishonesty receives the whole of his contributions; but if dismissed for dishonesty he may, in the discretion of the committee, forfeit the whole.

In the case of a new enterprise it would not be difficult to initiate at once a superannuation fund; and to make it compulsory for every man to join within a suitable prescribed age limit. A sum of say 25 or 50 cents per week could be contributed by each man, and an equivalent sum contributed by the company. An insurance actuary would be needed to formulate a "scheme" providing for sound financial stability. There would of necessity be certain provisos. If any member were discharged for proved dishonesty or fraud, he would forfeit all claim to superannuation and to contributions; and if the men struck they would forfeit all claims. If the corporation went into receivership the men could have the whole of their contributions returned, less any benefit they might have received.

If an extensive undertaking already in operation intended to institute a friendly society or a superannuation fund, or both, it might be advisable to put the proposition fairly and squarely before the men to see if it met with opposition. If it met with strenuous opposition, it might be advisable to wait until a good opportunity was presented. In the majority

of cases undertakings of moderate size and development could safely institute a superannuation fund.

In the writer's opinion, the establishment of such funds will eventually be generally initiated by street railway undertakings throughout the country. In his judgment they are the logical solution of strike problems.

PUBLIC SERVICE COMMISSION INVESTIGATION OF NEW YORK TRANSIT FACILITIES.

The New York public service commission has begun its investigation of the transit systems of the city by taking up the Interborough-Metropolitan merger. Mr. William M. Ivins, whose appointment as special counsel to investigate the Interborough-Metropolitan Company and the Brooklyn Rapid Transit Company has been previously reported, has been given authority to examine all accounts and records of the two systems, and for the past week he has had a force of expert accountants at work on the books of the companies. The first steps of the inquiry will be devoted to the operating methods of the company, in order to determine whether the carrying capacity of the existing lines can be increased. The first public hearing of the investigation was held on Thursday afternoon of this week. Chairman Willcox was designated to conduct the examination. Mr. Ivins has issued a large number of subpoenas and the first witnesses will include the operating experts of the companies included in the merger.

The first witness called was Theodore P. Shonts, president of the Interborough-Metropolitan Company, and his testimony occupied the entire session. He intimated that in the rush hours the subway and surface systems are run to their fullest capacity, and that if the commission could see some way of increasing the facilities of those systems it would accomplish something the officials of the company find themselves unable to do.

Mr. Shonts admitted that the cars of the surface lines might be operated at a higher speed, and that more cars might be run, but this would be possible only if the city kept the tracks clear of vehicular traffic. It would be possible also, he said, to improve the service in the subway, but this could only be brought about by building two extra tracks between Ninety-fourth and One Hundred and Sixth streets to prevent the switching at the junction of the east and west side lines of local trains on to the express lines.

Mr. Shonts said his company had asked for authority for new lines, and that while the old rapid transit commission had approved the additional tracks the board of estimates had gone on its summer vacation without acting on the matter.

The only other relief Mr. Shonts could suggest was to increase the service on the Second, Sixth and Ninth avenue elevated lines. More trains could be put on these lines, he said; but, when asked if the Third avenue route was not also capable of development, he declared that in the rush hours that line was operated to the limit of its capacity.

As president of the Interborough-Metropolitan, he said, he did not issue any orders to the companies that comprised that corporation, but supervised the affairs of these companies as chairman of the executive committee of each company. He explained that August Belmont, as chairman of the Interborough-Metropolitan board, looked after the finances of the corporation, and that to himself was left the supervision of the operating and construction departments.

To show that the Interborough-Metropolitan Company is seeking to improve its facilities, Mr. Shonts said the company now had under construction 200 new cars for the elevated lines, 50 for the subway, 155 for the surface lines and 40 for the Queens county lines. He said the new surface cars would be made larger than the present type. When asked why more cars were not run on the surface lines, Mr. Shonts said that they did not have the full use of the tracks on account of the congestion of the vehicular traffic.

Mr. Ivins questioned Mr. Shonts at considerable length on the advantages which might be obtained from the use of cars with side doors. Mr. Shonts admitted that the Illinois Central car, a sort of compartment car with several side doors, had a great deal in its favor, but he did not think such a type could be used in the subway, for the reason that the curved platforms at many of the stations would be a source of danger. Furthermore, there would be so much confusion in the struggle of passengers to board or leave the cars it would be impossible to maintain any kind of regular schedule.

OHIO COMMISSION REVERSED IN HOCKING VALLEY-SCIOTO VALLEY CASE.

Judge T. M. Bigger of the common pleas court at Columbus, O., has rendered a decision in the case of the Hocking Valley against the Ohio railroad commission in which he reverses the decision of the commission in this case. This very interesting case was referred to in *The Electric Railway Review* of May 4, 1907, page 591.

The Hocking Valley and the Scioto Valley, the latter an electric interurban line, are parallel and competing lines between Columbus and Lancaster, O. The Scioto Valley made low rates between Columbus and Lancaster, and the Hocking Valley, in order to meet the competition, placed its rate between Columbus and Lancaster on a basis of 1.2 cents per mile. The Hocking Valley also made a low rate of 1.6 cents per mile between Columbus and Logan, the next considerable station on its line south of Lancaster. A. E. Price, a citizen of Athens, a point still farther south on the Hocking Valley, appealed to the railroad commission to compel the Hocking Valley to reduce its rates from Columbus to Athens, to which place the rates were left on a 2-cent basis, alleging that the Hocking Valley in making lower rates to some points than to others, was unjustly discriminating. The railroad commission ruled in favor of Mr. Price and ordered the Hocking Valley to raise its rates between Columbus and Lancaster to the level of those of the Scioto Valley, and to raise its rates between Columbus and Logan to the basis of two cents per mile.

The court of common pleas holds that the Hocking Valley was justified in making as low or a lower rate to Lancaster than that of the Scioto Valley if this were necessary to meet competition. It was shown that travelers had begun to buy tickets from Logan to Lancaster over the Hocking Valley and from Lancaster to Columbus over the Scioto Valley, and the court held that the Hocking Valley was justified in making a low through rate from Logan to Columbus in order to secure the traffic all the way. It was alleged that the object of the Hocking Valley in making the low rate to Logan was to prevent the extension of the Scioto Valley to Logan, and the railroad commission denounced this as an attempt not to meet, but to prevent, competition. The court holds that the reduction to Logan was justifiable because this point was within the sphere of competition.

The rates to the competitive points were made lower by the Hocking Valley than to some intermediate points the distances to which were shorter. The court construes the long and short haul clause of the Ohio law in the same way that the United States supreme court has construed the similar clause of the interstate commerce act, holding that competition is one of the elements to be considered in determining whether under the law a greater charge may be made for a longer than for a shorter haul.

The Utah Light & Railway Company is now expending \$3,000,000 in improvements to its system in Salt Lake. The entire tracks are being rebuilt, mostly with 85-pound rails, and the expenditure for rails alone amounts to about \$500,000, of which \$350,000 worth are already on the ground. The company is now building a large car house on the block bounded by Fourth and Fifth South and Sixth and Seventh East streets. This block will also contain machine shops and a building to be used as an employees' club house, costing \$75,000.

PIPING AND POWER STATION SYSTEMS—XLVII.

BY W. L. MORRIS, M. E.

Ordinarily the roof of a power station is far removed from any inflammable material liable to set fire to it, but in nearly every case there is no protection for the roof, though the latter is the most common fire loss. The roof is quite as liable to be set afire from the top as from the under side, and to provide the best protection, a system such as shown in Figure 297 (M 1-2) would be found valuable and more particularly so if the power house be located close to some other building or combustible material. The perforated pipes should be so arranged that the trap door will be protected with water. Then, if necessary, an operator can get on to the runway in case of fire around the hatch. A hose connection should be provided on the roof, the latter detail being shown later under "fire service."

In considering fire protection, it is first necessary to determine whether it is simply to be for the power station or for buildings in its immediate vicinity. If there are other buildings to protect it would be more than possible that they would be insured, and to secure the best protection and insurance rate it probably would be necessary to install an underwriters' fire pump in the power station so connected that it would be always ready for fire service and so arranged that all other services taken from the fire main could quickly be shut off. In this case it is quite probable that the fire pump would not be connected to serve as a reserve feed pump, thus requiring two feed pumps in addition to the fire pump.

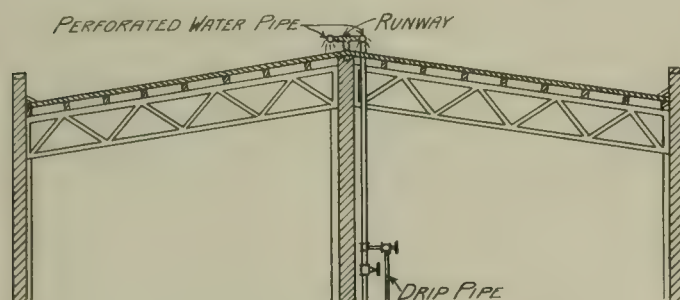


Figure 297 (M 1-2).

Further to insure the reliability of fire service it would be advisable to install one of the feed pumps so that it could be used for fire service if necessary, thus maintaining the fire water supply whenever the regular fire pump is being repaired or repaired. The regular feed pumps should be of the outside packed-plunger type, the fire pump of the underwriters' type and the second feed pump of the center-packed plunger type, with extremely light rams to permit its being operated at the high speed necessary for fire service. A fairly good arrangement is to use one feed pump and two fire pumps of smaller size. The latter plan is, however, objectionable if an open feed-water heater is used, since the hot water from the heater will soon destroy the inside packing of the fire pump, which must be of the piston pattern in order to operate under the high speed necessary. If the power station is isolated, little water is required for its protection and ordinarily two pumps will be ample. Both pumps could be of the outside-packed plunger type, and, as all other machinery would be stopped in case of fire, these pumps could be operated instead of one fire pump.

In many plants the steam and feed lines are supported from the roof trusses. The only reason for such an inconsistent construction is that it is the easiest available method of support. Not only should the lines be carried independently of the roof trusses, but they should be supported so firmly that they will remain intact, even if the roof falls on them. The feed main should lie far enough below the tops of the boilers to be protected from anything falling on it.

The safety-valve pipe through the roof should have the lightest obtainable cast-iron elbow at its lower end to protect the safety valve.

Unless the boiler room is protected against the breaking of steam lines in case of fire, there should be some special provision made to insure the continuous operation of the fire pump. The smoke breaching is generally an easily destroyed object in case of fire, and if the fire pump is to be kept running the longest possible time, it would be a more certain arrangement to have a separate underground fire pump connection to, say, two different boilers, one always being in service. In case of fire over the boilers the connections to these would be opened and all others, including those of the boiler feed, water columns, etc., closed. The fire pump in this case should be in a separate building outside the power house, or walls should be built around it so that it could be operated even though the boiler room were completely destroyed or filled with steam and smoke.

The steam contained in the boiler connected to the fire pump would be its "store" to draw from, assuming that it would then be impossible to feed more water or coal to the boiler. This supply, however, would run the fire pumps for a long period, and unless some such provision were made, the fire service would end with the first damage to the piping. It is no uncommon thing to find a fire pump placed in the basement or back of the boilers and in other locations that would compel the operator to leave the pump to itself as soon as a little steam or smoke reached him.

If the outside risk is great, the fire-pump service should be guarded in every possible way. The insurance companies demand a specific construction, but, their rules being general, no expert judgment is used for each individual risk. They oftentimes demand things wholly useless and neglect to make demands that are absolutely essential for protection against fire. This is a feature of their business that cannot well be otherwise.

The fire protection and fire fighting arrangements demanded by the insurance companies are as good as ordinarily found, but the engineer must locate the unprotected risks about his plant and make the necessary provisions against fire. The fact that the plant is equipped so that it can collect its insurance is of but little or no value, for it encourages a feeling of indifference to fire, and though a dollar of insurance may be collected, possibly ten would be lost indirectly on account of the fire. The fire and low pressure service in a power house can both be supplied from the fire pump, but they should be separate lines, with a valve at the fire pump to shut off all indoor piping. The low-pressure main would ordinarily be a separate line, the other low-pressure lines being supplied from the fire main with an outside valve. If it is necessary to open certain valves and close others in case of fire some established system should be followed, such as yellow valves closed and red valves opened in case of fire. These valves should lie as close in a group as possible and a chart should be hung up near them, showing all the valves to be operated, as it is quite easy for any operator to forget when he becomes excited. If there are indoor fire taps at other buildings they may be supplied from the fire main, with the valves left open until the line becomes damaged or the men are driven from the interior of the building. This layout is shown in Figure 298 (M 1-3). No. 1 shows the fire pump, No. 2 the auxiliary or reserve pump and No. 3 the boiler feed pump.

The fire main is in the form of a loop, thus permitting any portion to be shut off and still have fire protection. The valves, b, are the shut-off valves and do not require indicator posts, as they should not be operated in case of fire. The valves, c, shut off water from the inside of shop building, and these should be fitted with indicator posts. The fire hydrants are indicated by the letter d. If the lines running into the shops, shown with the shut-off valve, c, are used for plumbing fixtures only, it may be found advisable to supply them from

the separate main indicated at a, so that they would be shut off before running the fire mains under high pressure. By thus arranging the piping there would be no valves, c, to handle, the only valves to be opened or closed being at the fire pump.

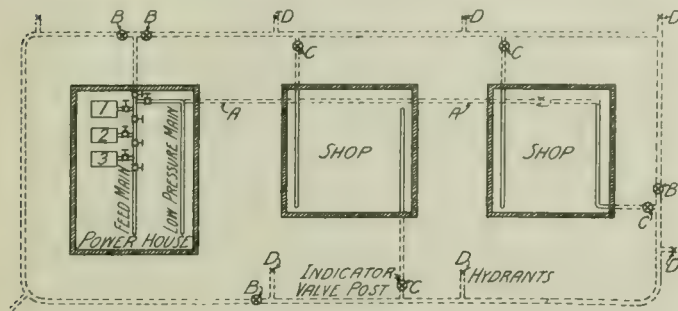


Figure 298 (M 1-3).

The main, a, could have a reducing valve fitted in it so that it would always be full open when the fire pump was working on low pressure and closed whenever the fire lines are operated under high pressure. This arrangement would protect the low pressure line and simplify the operation of the system in case of fire, as practically the only operation necessary would be to increase the water pressure by changing the position of the weight on the pump governor. An automatic device can be used for shifting the weight on the governor and shut off the low-pressure service. This can be done by a loosely fitting piston in the fire service discharge, which would operate the valve and shift the position of the weight previously mentioned, the operating piston leaving the discharge from the fire pump unobstructed while the fire pump was operating under high pressure. With this device it is possible to attach a hose to any hydrant under 20 pounds pressure and by the time the hydrant valve is opened there will be 125 pounds pressure on the entire fire system, and the low pressure system will be shut off. The fact that the speed of the fire pump had increased and the pressure raised would be the first indication to the station operator that the fire service was being used.

With this device in operation the fire line could not be used for any other service, as the flow in the pipe line would trip the valve. The construction of such an automatic valve is shown in Figure 299 (M 1-4). The piston fits the body of this special valve so tightly that the flow of water to one hose is sufficient to trip the weighted lever and draw out the counterweight on the pump governor. The special valve is illustrated, showing the low-pressure main shut-off and the piston out of the flow of the water. The final travel of the piston is given to it by the weighted lever. To place the pump on low pressure after it has been used for fire service, the lever is returned to its former position. This returns the piston to its original position and shifts the counterweight on the pump governor, so that the diaphragm does not have to raise so great a weight in closing the balanced steam valve.

It will be noted that normally the lever is nearly in a vertical position, thus requiring but little pressure under the piston to tip it over. If all the piping is tight and the piston fits its bore closely, this pressure controller can be used in connection with the automatic sprinklers. The standard underwriter pump has a water relief valve at D, and this should be provided in all cases where the pump is to be used for fire service. Priming pipes and a hand-operated cylinder oil pump should be fitted to the pump. All makes of underwriters' fire pumps are designed to conform to the same specification, but there are so many details pertaining to pump construction not mentioned in the underwriters' specifications that no two makes of pumps can be considered equal.

Possibly no other feature in the design of a pump governs its value so much as its weight. Though metal can be wastefully used in the design of a pump, it is quite unlikely that a manufacturer would add weight needlessly. Strength and large port openings, liberal wearing surfaces, etc., are secured only by increased weight, and it is quite impossible to design a light pump having the same merits as a heavier one. When securing prices, the weights of the pumps should be compared.

Referring to Figure 298 it will be seen that water is supplied to each hydrant from both directions, that is, each side of the loop is supplying water to those hydrants being used. A system designed in this manner supplied from a pump with a 6-inch discharge would require loop piping of 4-inch or possibly 5-inch pipe at the most. The loop system is practically equivalent to running a double pipe line of this size to each hydrant. The lineal feet of pipe in the loop main is but slightly greater than in a single main system, and the area of the pipe can be reduced to just one-half that of a single main. Not only is a more reliable system secured in this manner, but also one which is no more expensive to install. The fire main should be placed at the same depth as the city water pipe in the same locality, thus avoiding the possibility of freezing.

For buildings of ordinary height the hydrants should be placed at a distance from a building equal to its height. This

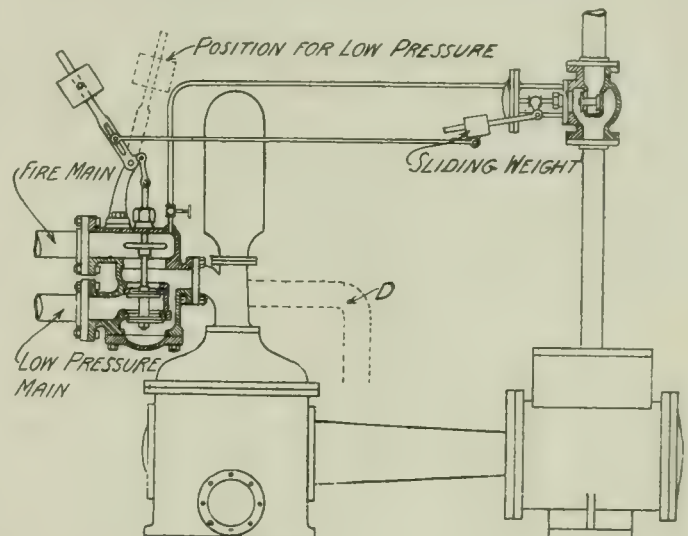


Figure 299 (M 1-4).

avoids the possibility of the walls falling on the hydrants or the fireman. Hydrants or indicator valve posts placed too close to a wall are liable to become unapproachable in case of fire, and cause a serious loss of pressure and a waste of water.

(To be continued.)

Cleveland Traction Situation.

The Cleveland Electric Railway attorneys are now seeking to show that Mayor Johnson is financially interested, not only in the Forest City Railway Company, but also in the Municipal Traction Company and the Low Fare Railway Company.

On July 29 the company secured depositions before a notary, to be used in prosecuting the three injunction suits against the low-fare companies. Considerable testimony was taken which showed the mayor is seeking to get back his personal guarantees given the property owners in return for low-fare consents. It was shown that holders of the mayor's guarantees of \$3.00 per front foot paving rebates in return for consents can obtain the money at once at the city hall upon surrender of the guarantee or receive a new guarantee in the names of the Forest City Railway and the Low Fare Railway.

The Low Fare Railway on July 30 connected its Sumner avenue tracks with the Cleveland Electric track in East Ninth street. No interference was offered by the old company.

After being out of business for 11 days as the result of the destruction of its principal generator by lightning the Forest City Railway on July 28 resumed service on its Denison avenue line.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

**Should Wait for Through Cars and Not Try to Use Transfers—
Right to Regulate Traffic.**

Roach v. Brooklyn Heights Railroad Company, 104 New York Supplement, 219.—The supreme court of New York, appellate division, second department, says that the plaintiff, desiring to go to Greenpoint ferry, the terminus of the defendant's Graham avenue line, boarded a car on Graham avenue, which did not go through to the ferry, but turned off at Meeker avenue, where he demanded and received from the conductor a transfer. He then boarded the following car, which did not turn off, but continued on Graham avenue to the plaintiff's destination. The conductor of that car, however, refused to accept the transfer, and required the plaintiff to pay another fare or get off. He chose to get off, and recovered a judgment for the penalty prescribed for charging excessive fares, which judgment is here reversed.

The reason given for this reversal is that the defendant operated cars which made a continuous trip from the point where the plaintiff boarded the first car to his destination. If he had waited at that point for the through car, he could have made the trip for one fare, and he could easily have learned the destination of the car from the sign or by inquiry of the conductor. The defendant did not violate the statute, for it provided the plaintiff a way to make his trip for one fare, had he availed himself of it, and it is obvious that if the passenger is permitted to board any car he chooses, with the right to be transferred at any point he desires, the defendant will be unable to regulate and distribute its traffic, so as to give the public the maximum service possible. The right to so regulate its traffic is not only reasonable, but absolutely necessary to enable the defendant to maintain any sort of system or order, especially during rush hours at congested points.

Care Required in Providing and Testing Equipment.

Marshall v. Boston & Worcester Street Railway Company, 31 Northeastern Reporter, 195.—The supreme judicial court of Massachusetts says that the plaintiff while riding as a passenger was injured by the derailment of the defendant's car, owing to a wheel on one of the trucks being loose.

In the operation of its road, the defendant bought of a reputable manufacturer the cars with their equipment, and such appliances as might be required to maintain them in suitable repair. By the process of manufacture the wheels were forced on to the axle under such a pressure that if properly adjusted they remained rigid, and when in use instead of revolving on the axle as a center, turned with it. Upon purchase they were placed under the car, which then was run over the track to ascertain if the wheels worked properly, and the gauge corresponded. But no dynamic test was made to determine if they were solidly attached, as the defendant possessed no suitable apparatus for this purpose. It appeared, however, that a practical test by shutting off the motors separately could have been applied, which would have disclosed the defect. Having been in use for two days the accident occurred, and upon examination fine pieces of iron filings were discovered at the point of revolution, and upon measurement the distance between the wheels was found to be somewhat less than the space between the rails. It also appeared that the defendant inspected the wheels and axle after they were attached, but did not apply the test by motor, and until derailment it had no actual knowledge that the wheel was loose. Upon these facts the question was presented as to what degree of care the defendant was required to exercise in the selection, maintenance and use of its rolling stock.

It often has been said that a common carrier of passengers does not warrant that the roadbed, engines, cars or appliances

used shall be perfect, for by the contract of transportation he does not become an insurer of the safety of the passenger. But while the absolute soundness of the equipment used was not guaranteed, the defendant did undertake to provide and maintain suitable cars. The duty imposed was defined in *Ingalls v. Bills*, 9 Metc. 1, 15, as consisting of the "utmost care and diligence," and this definition generally has been followed in this country, although the form in which it is expressed may have varied. This statement of the rule, however it may be phrased, does not mean that the officers and agents of the defendant should have exercised the greatest possible degree of foresight of which men are capable. But in transporting the plaintiff, the defendant was required by the contract, even if the defect was subsequently shown to be hidden, to use the highest degree of active diligence commensurate with the mode of transportation employed, and the practical operation of its railway.

If instead of purchasing the defendant had made the appliance, it could have been held liable for negligence if the looseness of the wheel would have been discovered by a proper inspection during the process of manufacture. By engaging a manufacturer the duty was not shifted, and the defendant still was required to examine thoroughly and skilfully the equipment furnished, before putting the lives and safety of its passengers in jeopardy, from the use of what otherwise might prove to be a dangerously defective car. The defendant consequently was bound to apply every reasonable test and take every reasonable precaution, to discover before using them if the wheels and axle were in suitable condition for service.

Requirements Under Agreement with Turnpike Company.

Chester & Darby Telford Road Company v. Chester Darby & Philadelphia Railway Company, 66 Atlantic Reporter, 358.—The supreme court of Pennsylvania says that the purpose of this suit was to enjoin the defendant and its lessees from maintaining the tracks of its electric railway on the plaintiff's roadway in violation of the agreement under which permission to lay them had been obtained. The lower court found that the complaint was established by the testimony, and entered a decree prohibiting the maintenance of the track at any part of the road higher than it should be to align with and properly continue the camber of the road, requiring the removal of the track to the side of the road in the borough of Darby and elsewhere, and requiring the making of the surface between the rails and that part of the roadway between the track and the Telford portion of the road solid, with an even and smooth surface, and generally to carry out all the covenants and conditions of the agreement. This court has no disposition to interfere with that decree except to modify it in one particular.

The decree, this court holds, was too broad in requiring the removal of the track not only at the foot of Darby Hill, but "elsewhere," "upon the side of the turnpike in accordance with the terms of the agreement." If by this it was meant that on the whole length of the road the outside rail was to be placed a distance of 20 feet from the center line of the turnpike, it imposed a burden on the railway company that was unreasonable and inequitable. In many places the outside rail was laid 18 feet from the center line. This was done with the knowledge and apparent acquiescence of the president of the Telford company, who for it supervised the construction, and of other officers of the company. This slight variation in distance having been made without objection and acquiesced in, if not authoritatively approved, a strict compliance with the letter of the agreement, which would subject the lessees of the railway to great loss and inconvenience without corresponding advantages to anyone, should not now be exacted.

The fact that this suit was not instituted until six years after the track had been laid, is treated as immaterial, there never having been an acquiescence by the Telford company to

the elevation of the track and the failure to make a hard, smooth surface between the track and the improved part of the roadway.

Degree of Care Owed Travelers on Streets.

Henderson v. Los Angeles Traction Company, 89 Pacific Reporter, 976.—The supreme court of California says that it is not the law that in the operation of a street railroad the operator is required to use great care to avoid injury to persons traveling on or using the streets over which the cars are operated. The operator of a street railroad over a street and the traveler on or person using said street, are reciprocally bound to exercise that degree of care which a person of ordinary prudence would use under the same or similar circumstances, which is ordinary care only.

While a less degree of watchfulness and vigilance may be required of one operating cars moved by horse power than is required of one in control of cable cars, and a still greater degree of caution and vigilance may be required from those in control of electric cars, still, when the question of negligence in the operation of cars by any of these different modes or agencies arises, the same standard of accountability is applied, namely: was ordinary care being exercised by the person in control of the car at the time when his conduct relative to its operation is under consideration? No matter by what agency the car he is operating is propelled, whether by the now practically obsolete system of horse power, or by cable, or by electricity, he is not required, in its operation, to use the highest degree of care, nor is the duty cast on him to use great care, but he is only required to use ordinary care, and responsible only for his failure to do so.

The standard by which ordinary care is to be measured is not absolute, and in the case of the operation of street cars it must vary with circumstances attending their operation—the character of cars, the agency of propulsion, the locality in which they are operated, whether in the country or in a city, whether over much traveled or unfrequented streets, and the possibility or probability of danger attending their operation.

Transfers Need Not be Asked for in Same Second of Time That Fares are Paid.

Wasserman v. New York City Railway Company, 104 New York Supplement, 398.—The supreme court of New York, appellate term, maintains that, although the reasonableness of a rule requiring passengers to ask for a transfer at the time of paying a fare has been sustained, nevertheless it must be held that it is not essential that the act of paying fare and the request for a transfer should occur at the same second of time. It says that the plaintiff, his wife and a friend boarded a car. The plaintiff paid the conductor three fares and immediately asked for transfers. No reply being made to his application after waiting, the plaintiff said, "not even a minute," and some of the witnesses saying "less than a minute," he again asked for transfers. The conductor refused to give them, accompanying his refusal by insulting and abusive language toward the plaintiff, because, as he asserted, he did not ask for transfers when he paid the fares. The defendant urged, first, that the first demand for a transfer was not heard by the conductor, and that the subsequent demand was made in violation of the rule above stated; second, that the transfers were refused through the inadvertence and mistake of the conductor; and, third, that error was committed by the trial court in permitting the plaintiff to testify to circumstances other than those alleged in the complaint. But none of these positions was tenable.

It is reported that the Hocking Valley, a steam railway, will install an interurban passenger service to meet the competition of electric railways, and that gasoline motor cars are under consideration.

News of the Week

Elevated Traffic in Chicago.

The elevated railroads in Chicago have made some remarkable traffic gains. The Metropolitan West Side Elevated carried 4,209,149 passengers in July, an increase of 10.37 per cent over the corresponding month of 1906. This gain was made without any increase in track mileage. The South Side Elevated, with its new Englewood extension, carried 3,469,916 passengers, an increase of 20.39 per cent over July, 1906. The Northwestern did even better, with its Ravenswood extension, carrying 2,837,816 passengers, an increase of 24.87 per cent over the number carried July, 1906.

Electric Operation on the New York New Haven & Hartford.

In accordance with the announcement of the New York New Haven & Hartford, the regular operation of electric trains between New York City and New Rochelle, N. Y., was begun on July 24. This event marks the substantial completion of one of the most important undertakings in the direction of substituting electric power on steam railroads. The New Haven company several years ago decided to investigate the subject of electric traction with a view to using electricity in the place of steam power, the final decision being to install the alternating-current single-phase railway system. The contract was made with the Westinghouse Electric & Manufacturing Company for the construction of 35 locomotives, and this company was also given the order for the power house equipment which comprises Westinghouse steam turbines, turbo-generators, switchboard appliances, etc., and Westinghouse, Church, Kerr & Co., engineers, were given charge of the installation for the entire system. The first of the alternating-current locomotives were completed in December last, and the power house was completed about the same time. Tests and trial runs have been made under the supervision of the railway officials and representatives of the electric company, and, as stated, the regular operation was begun on July 24. The last two locomotives on the original order for 35 were shipped from the Westinghouse company's plant on July 22. As previously announced, service was on August 1 extended to Port Chester, and it is expected that by September 1 the road will be enlarged to Stamford, Conn.

New York Public Service Commission.

The New York public service commission for the first district has begun its investigation of the Interborough-Metropolitan merger of the surface, subway and elevated lines of New York City. The first hearing was held on Thursday afternoon of this week. An abstract of the testimony of President Shonts, the first witness, is presented on another page of this issue.

Last week the commission had a staff of inspectors at the terminals of the Brooklyn bridge to gather data for the use of the commission when they take up the question of the bridge crush.

At a meeting on July 29 the commission adopted an order instructing the public service corporations as to the methods to be followed in sending in notifications of accidents. The companies are required to give notice by telephone to the office of the commission immediately after the accident, which notice is to be followed within three days by a written statement containing complete detailed information of the accident, according to a prescribed form.

Commissioner Eustis, after an inspection of the Brooklyn subway, stated last week that the subway extension from the Battery to Borough hall in Brooklyn would assuredly be ready for operation some time in October. The commission took formal action on July 26 on the recommendation made by Chief Engineer Rice that the Rapid Transit Subway Construction Company contractors for the Fulton street and Flatbush avenue sections of the subway should be forced to expedite the work by being compelled to employ night and day shifts. By having night and day forces at work Mr. Rice estimates that at least three months can be saved in completing the subway.

The Merchants' Association has written to the commission favoring the installation of a moving platform on the Brooklyn bridge as a remedy for the congestion of traffic.

The citizens' central committee, representing about 50 Brooklyn organizations, has sent a memorial to the commission suggesting that a traffic agreement be made between the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company and that the Brooklyn bridge elevated tracks be connected with the Third avenue elevated road, so as to allow the Brooklyn trains to run through the Harlem and the Interborough trains to run over the Brooklyn tracks. The following plan was offered as a solution of the fare ques-

tion involved: All passengers going downtown in Manhattan shall pay their fares when entering the station. All passengers going uptown in Manhattan pay going out. In the borough of Brooklyn all passengers going downtown shall pay going in and those going uptown are to enter free and pay going out.

Commissioner Bassett has promised to investigate the proposed method of operation of the Belmont tunnel at Forty-second street. The Queens residents have been considerably exercised over rumors that an extra fare would be charged for the trip through the tunnel.

The Independence League has sent a letter to the commission urging that the dead-end surface terminals at the Brooklyn and Williamsburg bridges be abolished and that the cars be equipped for both overhead trolley and underground conduit operation, so as to permit of a through loop service.

Albert H. Walker and Oliver C. Semple have been appointed assistant counsel to the commission, and with A. E. Blackmar, chief counsel, will proceed at once to organize the legal department.

Application of Indiana 2-Cent Fare Law to Interurbans.

Contrary to the legal opinion of Attorney-General James Bingham, the Indiana state railroad commission has held that the 2-cent fare law, passed by the last general assembly, applies to interurbans as well as to steam roads, and it is stated that a suit will be instituted soon against some traction company to compel such company to accept two cents a mile as the rate for passenger tickets. Many complaints have come to the commission showing that the 2-cent fare law is being violated by the interurbans. The suit will determine whether or not the law applies to interurbans and thus settle a matter that involves, in a way, the constitutionality of the 2-cent fare law itself.

In a formal opinion given the commission several months ago the attorney-general held that the law applied only to the steam roads, and that there was no similarity between the steam and the electric roads substantial enough to warrant the application of the 2-cent fare law of the railroad to the operation of interurbans. A brief resume of the attorney-general's opinion was given in the Electric Railway Review of May 18, 1907, page 659.

Immediately prominent lawyers raised the question as to the constitutionality of the 2-cent fare law if it did not apply to interurbans. They pointed out that the tendency of the higher courts of the state had been recently to class the steam and the electric railroads together and that every new opinion involving this point made the analogy and similarity between these two transportation agencies closer. This being true, the lawyers argued that if the 2-cent rate law did not apply to the interurbans, it was not at all unlikely that the courts would declare it to be unconstitutional, as being class legislation, discriminative against one class, the steam roads, in favor of another class, the electric roads. The commission disagrees with the attorney-general and proposes to have the question settled as soon as possible.

Chicago Union Traction.

The hearings on the proposed plan for distributing the securities to be issued by the Chicago Railways Company, which were begun on July 24, were continued before Judge P. S. Grosscup and Prof. John C. Gray, sitting as arbitrators, until July 30. Attorneys representing the holders of the different issues of securities presented their reasons for asking more than they would be allotted were the plan proposed to be adopted, and counsel for the Chicago Union Traction Company urged the acceptance of the proposed plan as the only means of preserving the property.

On the conclusion of the arguments before the arbitrators Judge Grosscup on July 30 began the hearing on the petition to discharge the receivers for the property and transfer it to the Chicago Railways Company. George W. Wickersham made a brief statement to the court, saying:

"Your honor knows the only chance to salvage this property lies in the acceptance of and obedience to the ordinance recently passed by the city.

"The court can and probably will be asked to order a sale of this property and transfer it to the buyer.

"No new money can be obtained to rehabilitate this property so as to obey the ordinance unless it is a first lien on the property.

"The court now has the property in its possession and can do as it pleases with it. It has full power to lease to the Chicago Railways Company, and such a lease would give the Railways company the possession necessary to comply with the terms of the ordinance.

"No corporations now before the court have any franchises under which they can operate a street car system covering the entire north and west sides. What they had have expired or are now near death. The only franchise ordinance is the one to the Chicago Railways Company.

"This company gives all the present interests the right to participate in its securities, provided they will acknowledge that what money it has to borrow constitutes a prior lien on its properties. All your honor is asked to do is to deliver possession to this new company so it can accept the ordinance and all interests who want to come in can participate in its benefits. I have a long list of authorities to show that the court has the right to take this action if it chooses and can demonstrate that it conforms to the best known principles of equity, but I will not take up the time of the court now. If my position is challenged I shall be glad to make my position clearer."

After an argument by Frank H. McCulloch, representing the Merchants' Loan & Trust Company, the owner of bonds of the North Chicago City Railway, urging the sale of that company's real estate to pay these bonds, the court said: "There is a difference in real estate rights. The private owner can do as he pleases with his own, but a public corporation owns real estate only as a part of its public business, and it must be so considered. If a street car company owned the most valuable piece of real estate in the heart of the city which was used as a terminal and necessary to the business, it would simply be a part of the street car property and not an independent holding. The question is whether the real estate is part of the street car company."

The court said further: "Everybody who comes into the reorganization plan will get a permanent place in that reorganization. Everybody who does not will stand on his legal rights and get whatever the courts, after the proper litigation, may give him."

On July 31 it was announced that the final award of the arbitrators would be made early next week, and it is expected that at the same time Judge Grosscup will enter an order terminating the receiverships and turning the properties over to the Chicago Railways Company.

Fares for Children over Three Years.—The Pittsburg Railways Company has issued a notice that hereafter fares will be collected for children over three years of age. The practice heretofore has been to permit children under five years of age to ride free.

Freight Service, Indianapolis to Greensburg.—The Indianapolis & Cincinnati Traction Company has announced that daily freight service from Indianapolis to Greensburg, Ind., will be started on August 5. The service now extends only to Shelbyville.

North Shore & Western Railway.—This company has recently opened for traffic its new line from Evanston to Glen View, Ill. The track is laid with 65-pound rails and occupies a private right of way. For the present a 2-hour service is given, using a car borrowed from the Chicago Consolidated Traction Company.

Street Railway Association of New York.—The fifth quarterly meeting of the Street Railway Association of the State of New York will be held at Kingston, N. Y., on September 21. The subjects for consideration are: "Interurban Rules," "Express Rates and Service" and "Collection and Registration of Interurban Fares."

Interborough-Metropolitan Merger in Court.—The application of Attorney-General Jackson of New York to begin action to set aside the Interborough-Metropolitan merger agreement was argued before Justice Hendrick of the supreme court on July 29. Deputy Attorney-General Ford appeared in support of the motion. The court reserved decision.

Milwaukie (Ore.) Wants 5-Cent Fare.—A committee has been appointed to file a complaint with the state railroad commission against the Portland Railway Light & Power Company in the endeavor to secure a 5-cent fare from Portland to Milwaukie. The company now sells commutation tickets between the two cities for seven cents.

To Compel Interchange Between Steam and Electric Roads.—The Farmland Stone Company has filed a petition with the Indiana railroad commission that the Cleveland Cincinnati Chicago & St. Louis Railway be required to deliver cars of coal to the Indiana Union Traction Company at Winchester for transfer to its stone quarry near Maxville.

Suit to Recover Car License Tax.—City Solicitor W. B. Rodgers of Pittsburg has brought suit in common pleas court in behalf of the city of Pittsburg against the Pittsburg Railways Company to recover \$94,200 license fees on 942 street cars, at \$100 each. The amount sued for is the tax for the year ended April 1, 1907, with interest from that date.

Richmond & Chesapeake Bay Railway Opened for Traffic.—The line of the Richmond & Chesapeake Bay Railway from Laurel and Broad streets, Richmond, Va., to Lakeside, was opened for traffic on July 27 and regular service has since been installed. The line is practically completed

as far as Ashland, 15 miles, and cars are expected to be running over the entire line in a week or two. The officers of the company are: President, Frank J. Gould of New York; vice-president, H. W. Anderson; general manager, William Northrop; chief engineer, J. H. McLure, all of Richmond, Va.

Judge Upholds Smoking on Running Board.—Judge E. R. Cochran of Wilmington, N. C., has dismissed a man arrested by a detective of the People's Railway Company, charged with disorderly conduct after refusing to stop smoking on the running board of an open car. The judge declared the man had the right to smoke while standing on the running board.

Wages of Conductors and Motormen.—B. V. Swenson, secretary American Street & Interurban Railway Association, is sending to all member companies a very comprehensive compilation showing the wages of conductors, motormen and other employes in the 21 largest cities of the United States, and in 108 other cities. These data should be of great interest and value to all the members of the association.

Ft. Wayne & Wabash Valley to Publish Paper.—The Ft. Wayne & Wabash Valley Traction Company of Ft. Wayne, Ind., will soon begin the publication of a small weekly paper, which will contain the timecards of the interurban roads and reading matter and information of interest to the patrons of the lines. The periodical will be known as the Wabash Valley Interurban News.

Valley Traction Company Will Purchase Power.—The Valley Traction Company of Lemoyne, Pa., has signed a contract whereby it will receive power for the operation of its cars from the York Haven Water & Power Company. The traction company's power house at Lemoyne will be reserved for emergencies. The reason given is that power can be secured more cheaply from the York Haven company.

Limited Cars from Danville to Springfield, Ill.—The Illinois Traction Company is planning to install a new schedule providing for limited cars between Danville and Springfield, Ill., over the recently completed line from Champaign to Decatur. As soon as the new schedule is prepared three cars will be run each way daily. At present it is necessary to change cars at Decatur.

Employes' Picnic.—The Ft. Wayne & Wabash Valley Traction Company of Ft. Wayne, Ind., arranged a picnic for the employes of the Ft. Wayne lines on July 25, furnishing a special car to transport the men and their families to Boyd Park. A bulletin was issued giving the names of those who could be spared for the day and the outing will be repeated a little later for the benefit of the others.

Spokane & Inland Empire Railroad.—Waldo G. Paine, general passenger agent of the Inland Empire System, has issued an illustrated mailing card announcing the extension of service on the Spokane & Inland Railway division to Thornton and Colfax, Wash., on August 1. The card shows a schedule of both passenger and freight trains, with a map of the system and halftones of the company's trains.

Germans to Investigate Electric Lines.—A governmental commission, comprising a number of experts under the leadership of Herr Wittefeld, a prominent official of the public works department, will start for the United States next week to study the organization of the systems of electric railroads throughout America in connection with the plans of the government to electrify the railroads around Berlin, as well as portions of the main lines throughout Germany.

Refuses to Extend Because of High Assessments.—President Henry E. Huntington of the Pacific Electric Railway, Los Angeles, Cal., has written a letter to the North Lincoln Avenue Improvement Association of Pasadena, stating that after receiving the figures of the last assessment on the company's property in Pasadena he had decided not to build any more railway lines in that city. The letter was written in response to inquiry concerning the probable time for the commencement of work on the proposed line out Lincoln avenue.

Whitewashed the Passengers.—An instance of "whitewashing" uncommon in railway affairs occurred on the evening of July 29 in the Park avenue tunnel, New York. The walls and roof of the tunnel are being whitewashed by the use of a pneumatic spraying machine. As an open surface car was alongside the apparatus the hose burst and the motorman, observing something wrong, stopped his car at the psychological moment. The motorman and 15 passengers were added to the list of those who are said to be imitating Mark Twain and James J. Hill in the matter of wearing white clothing.

Strike on Aurora Elgin & Chicago Line Averted.—The threatened strike of the employes of the Aurora Elgin & Chicago Railway was averted on July 27, when the officials of the company accepted a third arbitrator to consider the de-

mands of the men. Judge E. O. Brown of the appellate court was the man selected. The two arbitrators previously chosen are H. L. F. Meyers of South Bend, Ind., chosen by the company, and Jacob Le Boskey, chosen by the men. It is expected that these men will at once take action on the demands of the men for a 20 per cent increase of wages, a hearing when discharged for dishonesty or incompetence, a car to be provided by the company to transport the men to union meetings, and the right of employes on city lines to be transferred to the main line, according to seniority.

Binghamton (N. Y.) Street Railway Strike Ended.—The strike of the employes of the Binghamton Street Railway, which was declared on April 26 last, was terminated at a meeting of the strikers held in Binghamton on July 21, when after a vote was taken a small majority was found to be in favor of ending the struggle. The strikers had demanded more pay, shorter hours and the recognition of the union by the company. About a week after the strike was started the company partially conceded the demands by raising the pay of its men from \$1.75 to \$2.00 per day and granting one or two other concessions. These were not satisfactory to the unions and it was decided to continue the strike. The positions of most of the old employes are now filled by non-union workmen, the strikers themselves having obtained employment elsewhere. For this reason, therefore, and the demand of public sentiment, which at first had been with them, the striking employes decided in favor of terminating the strike.

Freight Handling by the York County Traction Company.—A new system of freight handling, which the officials say will greatly facilitate this branch of their service, has been put into operation by the York County Traction Company of York, Pa. A schedule of advanced freight rates went into effect at the same time. Under the new system the freight and passenger traffic are handled separately; freight will no longer be carried in passenger cars nor passengers in freight cars. All receipts and deliveries of freight will hereafter be made through the new warehouse on North George street at the Northern Central Railway crossing. Only two freight cars have been put into service so far, and the schedule is experimental and may be revised within a week. Two more freight cars are, however, being built for the company and will be placed in service as soon as they arrive. With the operation of the new system, the new extension of the Dallastown, Red Lion and Windsor line to Bittersville, about two miles beyond Windsor, has been opened for freight alone.

Recent Accidents.—While rounding a curve at a high rate of speed on July 21, a Creve Cœur Lake car of the United Railways Company of St. Louis collided with a work car which was standing on the track near Homestead, about five miles west of the city limits. The car was crowded with passengers, several of whom were injured. The car was badly damaged.—As the result of a collision at the Standard Steel Car Works terminal on the lines of the Butler (Pa.) Railway on July 17, 14 persons were injured. Two cars crowded with workmen were running down a sharp grade when the brakes of the rear car suddenly let go, allowing it to plunge down the incline into the forward car.—On July 20 a passenger car of the Louisville & Northern Railway & Lighting Company was telescoped by another car carrying workmen employed on the company's lines, resulting in the death of the motorman of the passenger car and the injury of three passengers. The accident occurred on a sharp curve near Watson, Ind., seven miles north of Jeffersonville, and is said to have been caused by the slipping of the wheels of the car carrying the workmen, all of whom escaped without injury.

Rights of Vehicles on Street Railway Tracks.—The Missouri supreme court recently handed down an opinion touching on the rights of vehicles to occupy the tracks of a street railway company. The plaintiff, Bernard Zander, had sued the St. Louis Transit Company for damages for injuries sustained, when his wagon, which he was driving on the street railway track, was struck by the defendant's car, on a dark night. The lower court found against the plaintiff on the ground of contributory negligence. The supreme court in reversing the decision of the lower court and remanding the case to the trial court says:

"When a defendant sees, or by the exercise of ordinary care can see, the peril of the plaintiff, caused by the latter's contributory negligence, in time to avoid injuring him, then the plaintiff can recover, notwithstanding his contributory negligence. The plaintiff had a right to drive along the street, and even to drive upon the track of defendant if the condition of the street or the exigencies of the case required it. But he should have exercised care in listening for the gong or signal of an approaching car from the rear, and if he heard one, to have withdrawn his wagon from the tracks."

Construction News

FRANCHISES.

Aurora, Ill.—President L. J. Wolf of the Elgin Aurora & Southern Traction Company has offered to contribute \$42,000 toward building new bridges, provided the city will extend the company's franchises 20 years and make other concessions.

Canyon City, Colo.—Frank D. Heath, president of the Canyon City & Royal Gorge Railroad, has received the franchise for a street railway system in Canyon City, which has been held in escrow by the mayor since the purchase by Mr. Heath of the property of the Canyon City Florence & Royal Gorge Electric Railway from F. S. Granger. At the time of the purchase Mr. Heath voluntarily consigned the franchise to the mayor, pending a settlement of some \$70,000 of indebtedness which his predecessor had incurred. Finding it impossible to enlist the necessary capital to build the road as long as this \$70,000 of indebtedness stood in the way, Mr. Heath has asked that the franchise be surrendered to him without that condition. The Heath company is capitalized at \$750,000, and will build altogether about 30 miles of track, 12 miles of which will be in the Royal Gorge division. Work has been in progress on this enterprise during the last two weeks.

Chattanooga (Tenn.) Railways Company.—An ordinance granting the right to lay tracks on Rossville avenue has been passed by the city council.

Fargo, N. D.—The franchise held for several years by the Fargo & Moorhead Street Railway Company for the use of Front street in crossing the bridge over the Red river for entrance to Moorhead, has been formally abandoned by the company with the permission of the Fargo council. The franchise has not been available because of the refusal of the Moorhead council to allow the company the use of the bridge in Moorhead, and now that Front street in Fargo is to be paved the company is not willing to pay its portion of the work because it has been unable to use the franchise.

Ft. Worth, Tex.—A franchise has been granted to the Northern Texas Traction Company for an extension on Central avenue to Main street, and from the end of the North Main street line to the city limits.

Gary, Ind.—It is reported that the United States Steel Corporation has decided to ask the town trustees of Gary for a referendum on the street car franchise question. The ordinance of the Gary & Hammond Traction Company, a subsidiary company of the steel corporation, was rejected by the trustees three weeks ago and the franchise was given to Frank N. Gavitt, a lawyer at Whiting, who has organized the Gary & Interurban and turned the franchise over to it. Gavitt secured the franchise under an agreement to give eight tickets for 25 cents.

Greencastle, Ind.—The Chicago & Western Indiana Traction Company has been granted a franchise in this city for its line from Greencastle to Lafayette. Work is to begin at once.

La Junta, Colo.—The Canyon City La Junta & Pueblo Railway & Power Company will apply on August 5 for a franchise through La Junta.

New Orleans, La.—An ordinance has been introduced providing that the city comptroller shall advertise for sale to the highest bidder a franchise covering certain streets for 25 years.

New Westminster, B. C.—The Burrard Westminster & Boundary Railway & Navigation Company has applied to the city council of New Westminster for a franchise to build its electric line, which will be extended to Seattle, Wash.

Oakland, Cal.—Agents of the Southern Pacific Company have been circulating a petition asking the city council for a franchise for an electric line along Franklin street, from Fourteenth street to Twentieth street; thence across a private right of way northward one-half block, thence westward across a private right of way between Twentieth and Twenty-first streets, to San Pablo avenue, where a station will be erected.

Paducah, Ky.—The Paducah Traction Company has applied for a franchise for an extension from Broadway through Mechanicsburg, crossing Island creek by a trestle, to be constructed jointly by the citizens of Mechanicsburg and the street railway company.

Pasadena, Cal.—The Pacific Electric Railway of Los Angeles has applied for a franchise to double-track its Colorado avenue line and to build a loop to relieve the congestion on that line.

Peoria (Ill.) Railway.—S. L. Nelson, vice-president, has sent a communication to the city council agreeing to build a double track on Washington street from Chestnut street to Western avenue, conveying the ownership to the city, reserving the right to occupy and use the track, and maintaining it while the Peoria & Canton Railway and the Illinois Traction system use it solely.

Ravenna, O.—Thomas L. Childs of Akron, O., has secured from the county commissioners an extension of one year to the franchise granted to him some time ago for the purpose of constructing an electric line from Akron to Youngstown, O. The old franchise provided that work on the road must be started by July 1, 1907, and completed by October, 1908, which provisions had not been complied with.

San Angelo, Tex.—Col. J. H. Ransom of Hereford, Tex., has applied for a franchise for a street railway.

Toledo, O.—The Toledo Railways & Light Company has applied for a franchise for a single track on Collins street, from the Brown road to Woodville avenue.

Troy, N. Y.—The United Traction Company of Albany, N. Y., has secured a franchise for a double-track line from the corner of Pawling and Spring avenues along Spring avenue to Hill street and along Jefferson to Fourth street.

Waterloo, Ia.—M. D. Locke and others have applied for a franchise for a new electric railway system in Waterloo.

RECENT INCORPORATIONS.

East Moline & Campbell's Island Railway, Moline, Ill.—Incorporated in Illinois to build an electric railway from East Moline to Campbell's Island, Rock Island county, Illinois. Capital stock, \$2,500. Incorporators: J. F. Porter and J. F. Lardner of Davenport; B. E. Peek, C. E. Dietz and O. E. Childs of Moline. This incorporation is merely a legal formality. The company now operates a line from Warner's Crossing to Campbell's Island.

Enid Blackwell & Osage Interurban Traction Company, Enid, Okla.—Incorporated in Oklahoma to build an electric railway from Enid to Pawhuska, Okla., 85 miles. Capital stock, \$1,000,000. Incorporators: George W. Bear, Frank Bradfield, S. I. Hudkins, John R. Clover, A. W. McWulkin, T. C. Cone and Guy S. Manatt, all of Enid.

Enid Waukomis & Oklahoma City Interurban Railroad, Waukomis, Okla.—Incorporated in Oklahoma to build an interurban electric line, 100 miles long, from Enid to Oklahoma City, through the counties of Garfield, Kingfisher, Logan, Canadian and Oklahoma. Capital stock, \$200,000.

Illinois & Northwestern Electric Railway, Chicago, Ill.—Incorporated in Illinois to build an electric line from Lyons south to Bloom, Ill., 15 miles; also a number of branches. Capital stock, \$10,000. Incorporators: A. B. Konsberg, E. J. Cady, C. P. Chamberlain, H. S. Martin and W. E. Phillips.

Interurban Power Company, Duluth, Minn.—This company has been organized in Minnesota with a capital stock of \$100,000. Incorporators: Charles C. Cokefair, Francis A. Cokefair and William Harrison.

Pacific Traction Company of Maine.—This company has been incorporated in Washington with a capital stock of \$3,000,000. Incorporators: Lewis A. Burleigh, J. Berry, I. E. Chadbourne, M. H. Simmons and E. M. Leavitt.

Portland Gray & Lewiston Railroad, Portland, Me.—Incorporated in Maine to build an electric railway through Falmouth, Gray and New Gloucester and thence to Auburn and Lewiston. Capital stock, \$150,000. Incorporators: Edward W. Gross, Charles C. Benson, Lewis A. Goudy, John D. Clifford, William M. Sturgis, N. D. Sturgis and Tracey W. Holland. The principal stockholders of this company are identified with the Portland & Northern Railroad, which proposes to build from Portland to Bridgton and Naples.

Toledo & Ft. Wayne Electric Railway, Toledo, O.—Incorporated in Ohio to build an electric railway from Toledo, O., to Ft. Wayne, Ind., passing through Lucas, Defiance and Williams counties, Ohio, and Allen county, Indiana. Capital stock, \$10,000. Incorporators: E. J. Pinney, H. J. Nord, Lewis A. Goldstein, Thomas C. Willard and John E. Lowry. This company was incorporated in Indiana several weeks ago.

West Shore Traction Company, New York, N. Y.—Incorporated in New York to build an electric line from Tomkins Cove on the Hudson river to a point on the state line, 25 miles south, passing through Piermont, Nyack, Haverstraw and Stony Point. Capital stock, \$500,000. It is planned also to build a branch from Nyack to Tuxedo Park. Searing & Co. of 7 Wall street, New York, are interested in the company.

TRACK AND ROADWAY.

Aiken, S. C.—It is reported that a project is on foot to build an electric railway from Aiken, S. C., to Augusta, Ga., by a route several miles shorter than that of the Augusta & Aiken Electric Railway, and including Hampton Hollow, Warrensburg and Hamburg. It is stated that this is the revival of an old plan and that northern capitalists are interested.

Akron Canton & Youngstown Railway, Akron, O.—This company, which proposes to build an electric line connecting the towns named in the title, has secured the right of way from Main street in Akron, through Springfield and Mogadore, to the county line. The company has also filed a mortgage to the Cleveland Trust Company, covering a bond issue of \$200,000.

American Railways Company, Scranton, Pa.—Vice-President H. J. Crowley has been in Scranton recently on business connected with the project for a viaduct from Mulberry street over the Lackawanna river, which will give more direct approach to and from the North Scranton section and eliminate a dangerous grade crossing. The estimated cost of the viaduct is \$235,000, and it will be 1,600 feet long. The electric railway company proposes to bear a part of the cost of the viaduct in consideration of a right of way over it.

Ashville, N. Y.—It is announced that financial arrangements have been made for building an electric railway from Columbus, Pa., to Ashville, N. Y., to connect with the line of the Chautauqua Traction Company, and that surveys will be started next week.

Aurora Elgin & Chicago Railway.—This company is planning to lay conduits for $1\frac{1}{4}$ miles at Elgin, Ill.

Austin, Tex.—Surveys have been started for the proposed electric railway between Austin and Lockhart, Tex.

Baltimore Frederick & Hagerstown Electric Railway, Baltimore, Md.—It is reported that this company is planning extensions for freight carrying purposes into the coal fields of Maryland and possibly West Virginia and Pennsylvania.

Berkshire Street Railway, Pittsfield, Mass.—It is reported that this company has discontinued work on its 13-mile extension from Great Barrington to Canaan, Conn., and the 3-mile extension to South Egremont on account of failure to secure franchises for express.

Boston.—The transit commission has purchased the ground at Winter and Washington streets for use in connection with the Washington street tunnel. This is said to be the most valuable piece of land in the city, being estimated at \$479,400, exclusive of the building, or \$234 a square foot.

Boston, Mass.—Patrick McGovern of Boston has been awarded a contract for \$23,289 for constructing entrances and exits at Winter street for the Washington street tunnel.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—Rapid progress is being made on this line from Erie to Buffalo. Grading has been completed from the Buffalo end as far as Angola and for a considerable distance out of Dunkirk. A contract has been made for power with the Ontario Power Company.

Butte (Mont.) Electric Railway.—This company is making surveys for an extension of the Centerville line through Dublin gulch, past the Anaconda mine, beneath the tracks and through the Gray Rock district, to connect with the extreme east end of the Centerville line on East Center street when that extension shall have been completed. The company is also preparing to run an extension to the Five-Mile house. As soon as an easement on property on the flat can be secured the survey will be commenced. On the west side the company is about to build an extension of the Silver street line to the School of Mines.

Chambersburg Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—It is reported that this company contemplates building an extension from Greencastle to Chambersburg and a short line from Shady Grove to a connection with the Chambersburg-Greencastle line about three miles north of Greencastle.

Chicago City Railway.—The board of supervising engineers has announced that reconstruction of the tracks with 129-pound rails will begin at once in the following streets: Wentworth avenue, Root street to Fifty-fifth street; Sixty-first street, Root street to Fifty-fifth street; Jefferson avenue, Sixty-third street to Sixty-fourth street; Fifty-ninth street, Halsted street to Ashland avenue. Work on new tracks in the following streets will begin as soon as the material can be obtained: South Chicago avenue, Grand Crossing to Cottage Grove avenue; Cottage Grove avenue, Seventy-first street to Twenty-second street; Indiana avenue, Fifty-first street to Thirty-ninth street; Fifty-fifth street, Cottage Grove avenue

to Lake street; Vincennes road, Seventy-third street to Sixty-eighth street. Work has already been completed on Root street, from Wallace to State street.

Chicago Lake Shore & South Bend Railway, South Bend, Ind.—It is reported that work is progressing rapidly between Indiana Harbor and Gary, Ind. The line is under construction from South Bend, Ind., to a connection with the Illinois Central Railroad at Kensington, Ill. About 15 miles of track has been laid from the South Bend end. J. B. Hanna of South Bend is president.

Chicago Ottawa & Peoria Railway.—Ralph Modjeska, consulting engineer, Chicago, has submitted plans for the bridge to be built over the Illinois river at Ottawa jointly by the city and the railway company.

Cleveland Alliance & Mahoning Valley Railway, Cleveland, O.—It is stated that this company has sold its bonds and that contracts for the electrification of the old Baltimore & Ohio line from Ravenna to Newton Falls, O., which has been purchased, will be let at once. Contracts are also to be let for the construction from Newton Falls to Warren, 9 miles.

Columbus Railway & Light Company, Columbus, O.—The board of public service has ordered this company to proceed with the work of double-tracking its line on West Broad street.

De Kalb-Sycamore Electric Company, De Kalb, Ill.—It is announced that this company has completed arrangements for building its proposed extension from Sycamore to Belvidere, Ill., 23 miles. W. H. Zimmerman, general manager.

Des Moines Winterset & Creston Electric Railway, Des Moines, Ia.—This company has about concluded the financial arrangements for building the line from Des Moines to Winterset and Creston, Ia., and is ready to ask for bids for construction. A. E. Park, general manager; B. Schreiner, chief engineer.

Detroit & Adrian Traction Company.—This company is being organized by Antoine Robert of Montreal to build an electric railway from Detroit to Adrian, Mich., 61½ miles. No bonds are to be issued and construction is not to begin until all of the amount considered necessary to build the road has been subscribed. The proceeds from the sale of stock are to be deposited with the Security Trust Company of Detroit as trustee until the full amount has been subscribed. The company will have a capital stock of \$2,000,000. It is estimated that the cost of the road and equipment will be \$1,459,430. The line as planned will enter Detroit on Fort street and will run through Oakwood, Ecorse, Dearborn, Taylor, Nankin, Romulus, New Boston, Van Buren, Ypsilanti, London, Augusta and York. It is stated that the company has received liberal franchises from the city of Adrian and from the villages of Tecumseh and Milan. Outside of the cities and villages the road will be built upon a private right of way 50 feet wide, with 70-pound rails and gravel ballast.

Duluth (Minn.) Street Railway.—This company has decided to proceed with the extension of the Superior line to Allouez, in the vicinity of the Great Northern docks, and the work of delivering material has been started.

Duluth (Minn.) Street Railway.—This company has just completed the construction of its line on Twenty-fourth avenue east, connecting Superior and Fourth streets.

Elgin, Ill.—Preliminary investigations have been made in the vicinity of Elgin with the object of constructing an electric railway to Sycamore.

Evansville & Boonville Traction Company, Evansville, Ind.—It is stated that surveys will be started this week on the extension from Boonville to Chrisney, Ind. It is understood that work on the extension will be begun as soon as the survey is finished and that the road will eventually be extended from Chrisney to Cannelton, Troy and Tell City.

Evansville & Eastern Electric Railway, Evansville, Ind.—This company is reported to have purchased land in Rockport, Ind., for terminal purposes.

Evansville Suburban & Newburg Railway, Evansville, Ind.—It is reported that a petition will be submitted to the council of Evansville for authority to build a transparent train shed extending across Fifth avenue.

Elyria Southern Electric Railway, Wellington, O.—This company has secured right of way through Penfield, O., and surveys have been completed through Lorain, Medina, Wayne, Ashland, Richland and Knox counties.

Franklin & Towamensing Street Railway.—It is reported that this company has finished securing the right of way for its line from Slatington to Leighton, Pa., nine miles. This

road will complete the connection between Philadelphia and Scranton. Construction is to be started within a few days.

Indiana Columbus & Eastern Traction Company, Columbus, O.—John T. Adams of Columbus has been awarded the contract for ballasting the line between Columbus and Springfield, O., including the London cut-off, for which rails are now being laid. Mr. Adams also has a contract for tracklaying and ballasting on the extension from Bellefontaine to Lima. General Manager J. L. Adams is quoted as saying that the Lima extension will be completed and in operation by Christmas.

Indianapolis Columbus & Southern Traction Company, Columbus, Ind.—The tracklaying on the extension from Columbus to Seymour, Ind., is now completed as far as Azalea.

International Railway Company, Buffalo, N. Y.—This company is now rebuilding its tracks on Niagara and Main streets and South Park avenue, in Buffalo, with 140-pound girder rails. As the tracks are rebuilt, the poles are being removed from the center of the street to the sides.

Kent Traction Company.—It is stated that financial arrangements have been made for building this proposed road from Chestertown to Tolchester, Md., 11 miles, via Fairlee, Georgetown, Melitota and Lankford. The right of way has been secured and work is to begin at once. A. A. Lamkin, secretary and treasurer, Baltimore.

Lansing-Jackson Electric Railway, Lansing, Mich.—W. E. Tench & Co. of Detroit, Mich., have been awarded a contract by the Northern Construction Company of Lansing for the grading of this proposed road from Lansing to Jackson. It is stated that the work will be started at once between Mason and Lansing.

Lewiston & Southeastern Electric Railway, Lewiston, Idaho.—The permanent survey of the section of the line between the Waha plateau and the Craig mountain elevations was completed late this week, and Chief Engineer Wood, who has been directing the survey since spring, has returned to Lewiston. The work has been permanently connected up and the line is now ready for cross sectioning the entire distance from Lewiston to Grangeville.

Louisville & Northern Railway & Lighting Company, Louisville, Ky.—The permanent survey of the proposed line from New Albany, Ind., to French Lick and West Baden springs, which has been in progress several months has been completed and the corps of surveyors has begun the permanent survey of the proposed line from New Albany to Corydon. This line extends from a point on the French Lick and West Baden Springs line four miles north of the city, through Georgetown and Lanesville to Corydon.

Minneapolis Rochester & Dubuque Traction Company, Minneapolis, Minn.—H. M. Boutell and T. W. Stevenson have been elected directors in place of W. P. Mason and C. W. Shivel, resigned. Mr. Boutell has been elected secretary and Mr. Stevenson vice-president. Surveys have now been made from Minneapolis south to Decorah, Ia., and five miles has been graded.

Mount Desert Transit Company, Bar Harbor, Me.—It is reported that this company has secured a tract of land in Bar Harbor for terminal purposes. Fred G. Lyman is interested in the company.

Northern Electric Railway, Chico, Cal.—It is announced that Bayles Brothers, who have the contract for grading the line from Red Bluff to Chico, Cal., will resume work on this section about September 1.

Northern Texas Traction Company, Ft. Worth, Tex.—H. T. Edgar, general manager, has notified the city officials that the company will be ready to operate cars on Houston street about August 1.

Oakland, Cal.—The San Francisco Oakland & San Jose Railway (Key Route) and the Oakland Traction Company, which are controlled by the same interests, have laid out an extensive programme of improvements for Oakland and vicinity, involving an expenditure of \$3,500,000. The Key Route has purchased the entire right of way for its extension from the corner of Fortieth street and Telegraph avenue to Piedmont. Other extensions planned include a new line on Sacramento street and the Claremont avenue spur. It is also planned to establish a 10-minute service between Oakland and San Francisco. The Oakland Traction Company will extend the Grand avenue, Fourth avenue and Hayward avenue lines besides several extensions in the Berkeley district.

Ocean Shore Railway, San Francisco, Cal.—This company has now completed its line out of San Francisco as far as Salida Beach, 13.6 miles. The road is under construction from San Francisco to Santa Cruz along the shore of the Pacific ocean.

Pacific Electric Railway, Los Angeles, Cal.—Work has been started on the extension of the North Fair Oaks avenue line in Pasadena, from Montana street to Mariposa street in Altadena. The extension will be completed in about a month.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company is planning to extend its road from Sebastopol to Lake Jonive, Cal., about one mile.

Philadelphia Rapid Transit Company.—This company has begun tearing down buildings in Darby, Pa., preparatory to building a double-track line from Darby to Folsom.

Portland (Ore.) Railway Light & Power Company.—This company is now extending its track in Shaver street, about 1,000 feet. Considerable track is being reconstructed on First street, Hubbard street, McMillen street and Williams avenue.

Pottstown & Northern Street Railway, Pottstown, Pa.—The Trooper-Souderton road was opened for traffic on July 21 from Trooper to Center Point, seven miles. The new line will reach Norristown, through a traffic agreement with the Schuylkill Valley Traction Company. At Skippack the road will branch, one branch going to Souderton and the other to Sumneytown and Pennsburg, to connect with the road to Allentown. George Hoeger, president, Norristown, Pa.

St. Joseph & Nodaway Valley Railway, St. Joseph, Mo.—Work has been started on the construction of the line from St. Joseph to Tarkio, Mo.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—Work was started last week on the 200-foot double-track reinforced concrete bridge over the Weber river on the line between Salt Lake and Ogden, Utah. It is intended to push the work so that trains may be running by the first of next year. The road is now operated as a steam line but will be electrified as soon as the bridge is completed and the line extended into the city of Ogden. While the bridge is being constructed the company will complete the 1½ miles of track necessary to reach the heart of the city. This involves some very heavy work. For over half a mile a cut varying in depth from 50 to 75 feet will be necessary. S. Bamberger is president and general manager.

Schuylkill Valley Traction Company, Norristown, Pa.—It is stated that the reconstructed line between Pottstown and Ringing Rocks will be put in operation in 10 days.

Scranton, Miss.—It is reported that M. J. McDermott, Sidney Lowenstein, J. D. Willoughby, R. O. Harris and others of Mobile, Ala., are interested in a project to build an electric railway from Scranton, Miss., to Mobile, Ala., 40 miles. A stock company is to be organized with \$500,000 capital stock.

Selma (Ala.) Street & Suburban Railway.—It is stated that this company has purchased water rights on Mulberry creek, near Autaugaville, about 14 miles from Selma, and will build a large dam and power house at that point for the operation of the street railway system and for electric lighting.

Sharpsburg, Ky.—It is reported that a contract has been let to the Kaufman Construction Company of Salt Lick for the survey of an electric line through Sharpsburg, Carlisle and Owingsville to West Liberty, 65 miles.

Sioux Falls, S. D.—F. M. Mills, who has a 30-year franchise for a street railway system in Sioux Falls, is making rapid progress on the construction work and expects to have several miles completed within the next two or three months. Ties and other construction material have been received and poles have been erected.

South Lorain & Eastern Traction Company, Avon, O.—This company, which recently applied to the Lorain county commissioners for a franchise for its line from Lorain to Cleveland, O., is an outgrowth of the Suburban Improvement Association, organized in 1900, which projected the line but failed to secure financial backing. The improvement association has now been reorganized as the Suburban Realty Company and the South Lorain & Eastern Traction Company, the principal promoters being Rev. A. B. Stuber of Avon and Attorney D. T. Miller. They have secured about 12 miles of the right of way and franchises in Rocky River village and Cuyahoga county, and propose to build from Avon to Dover, securing an entrance to Cleveland over the tracks of the Cleveland Southwestern & Columbus Railway and to Lorain over the Lake Shore Electric Railway. It is expected that grading will begin this fall. The P. A. Pease Engineering Company is in charge of the work. A. B. Stuber is president and D. T. Miller secretary.

South Side Elevated Railroad, Chicago, Ill.—The new branch from the main line at Fortieth street and Indiana ave-

nue to Forty-second street and Lake avenue is now expected to be ready for operation early in September. The new line will use a part of the right of way of the Chicago Junction Railway. When the line is completed an express service to the city will be given in rush hours. The branch running west in Fortieth street to the stock yards district is not expected to be finished and ready for trains until March.

Springfield & Southeastern Traction Company, Springfield, Ill.—It is stated that this company will begin within 30 days the work of construction on its line from Springfield to Taylorville, Ill. The company has already done some grading at Taylorville. J. B. Beardsley of Mineral Wells, Tex., is in charge of the construction work.

Statesville Air Line Railway.—At a recent meeting of the directors it was decided to begin at once the preliminary survey of the line between Statesville and Mt. McCurry, N. C.

Stockton, Cal.—It is reported that Stockton capitalists are projecting an electric railway from Stockton to Copperopolis, Cal., by way of Bellota and Jenny Lind.

Texas Interurban Company.—This company has filed an application for a charter. It will have \$400,000 capital stock. The incorporators are: Thomas Moore of Elizabeth, N. J.; C. P. Scrivener and S. M. Posey of Austin, and others.

Texas Traction Company, Dallas, Tex.—The interurban railway which is being built from Dallas to Sherman, Tex., 63 miles, is expected to be ready for operating by January next. It has now 30 miles of grade completed. The line will run via the following towns: Howe, Van Alstyne, Anna, Melissa, McKinney, Allen, Plano and Richardson. The large power station is under construction at McKinney. It is a building 130 by 100 feet, and there will also be substations near Sherman, Van Alstyne, Plano and Dallas. Thus far the plans of the company cover an expenditure of more than \$2,000,000. A terminal station is to be erected in Dallas, and it is anticipated that the Northern Texas Traction Company may join with the Texas Traction Company in building a union depot. Work has begun on the steel frame of the bridge over Post Oak bayou, in West Middleton street, Sherman, and also on the steel viaduct, which is to carry the Sherman-Dallas tracks over the Ft. Worth & Rio Grande Railway and to connect with the steel bridge in course of construction over Choctaw bayou. The company has been financed from New York and Boston, and the president and chief promoter is J. F. Strickland of Dallas.

Toledo Fostoria & Findlay Railway, Fostoria, O.—It is announced that the extension from Pemberville to Toledo, 17 miles, will be in operation about November 1.

Toledo Port Clinton & Lakeside Railway, Toledo, O.—It is reported that a branch will be built from Oak Harbor to Fremont.

Toledo Wabash & St. Louis Railroad, Toledo, O.—Work on the road between Toledo and Defiance has been delayed by scarcity of men and teams, according to President C. D. Whitney. Grading has been completed, except for about half a mile, from Whitehouse to Neapolis, $4\frac{1}{2}$ miles.

Tri-City Railway, Davenport, Ia.—This company is now laying track on the extension of the Brady street line in Davenport to the city limits. The company expects to begin work on Second street on September 1.

Tri-State Traction Company.—This company has started the work of laying about half a mile of track in North Wellsburg, O., which will straighten out the route between Steubenville and Wellsburg.

Unionville, Pa.—Plans for construction of the new electric road from Unionville Junction on the West Chester Street Railway to Oxford, by way of Unionville and Crawfordville, are progressing. It is reported that citizens of Unionville will give \$2,000 toward the expense of grading and will furnish all the poles and ties needed for the road from Unionville Junction to the center of Unionville.

United Railways & Electric Company, Baltimore, Md.—This company is now engaged on the construction of several important extensions and several more are contemplated. More than 1,600 feet of single track has been laid on the St. Paul street boulevard and a second track is to be built. A double-track line will be built on Eighth street, from Orangeville to Highlandtown. The York road is to be extended from Towson to Lutherville, two miles. This route has been surveyed and the right of way practically secured. A double-track line from the terminus of the Wilkins avenue line in southwest Baltimore to Elkridge, $4\frac{1}{2}$ miles, is contemplated. The company also contemplates the extension of the Guilford avenue line and a cross-country line from Catonsville to Towson. The Lorraine Electric Railway, controlled by the interests that manage the Lorraine cemetery, is now building

a line $1\frac{1}{2}$ miles long from the terminus of the United's line at Dickeyville to the cemetery. This line will be operated by the United company. The work is about half completed and it is expected to begin operating about September 1.

Virginia Passenger & Power Company, Richmond, Va.—The receivers have been authorized by Judge Waddill of the United States court to expend \$20,500 for rehabilitation of the tracks from Q street to Oakwood cemetery.

Visalia Electric Railway Company.—This company is now building a single-phase electric railway system from Visalia to Lemon Cove, via Exeter, Cal., 23 miles. Power will be purchased from the Mt. Whitney Power Company, being transmitted at 17,500 volts to the main substation at Exeter, and converted to 11,000-volt 15-cycle single-phase current for transmission to the transformer substations. The officers are: W. H. Hammond, president; Ben M. Maddox, vice-president; E. E. Baker, secretary; James H. Crossett, engineer and superintendent.

Warren (Ariz.) Electric Railway.—We are officially advised that this company has completed tracklaying on its line from Warren to Bisbee, Ariz., four miles, via Bakerville and Lowell, and that surveys have been made for a line from Warren to Tombstone Canyon, five miles. Grading began on March 1. The overhead work has been completed from Warren to Bakerville, one mile. There are several concrete and timber bridges on the line. The power house was completed July 1 and the car barns are to be completed by August 15. The rolling stock consists of 10 cars. Haggott, Girraud & Smith of Prescott, Ariz., are the contractors. The officers are: President, L. W. Powell; chief engineer, E. G. Minder; electrician, A. G. Adsit; superintendent, M. A. Trenham, all of Bisbee, Ariz.

Waterbury & Milldale Tramway Company, Waterbury, Conn.—This company, which recently secured a charter from the Connecticut legislature for an electric railway from Waterbury to Milldale, has completed its organization and elected the following officers: President, Charles H. Clark, Southington, Conn.; secretary, John H. Cassily; treasurer, Edwin S. Todd.

Waycross, Ga.—Mr. Burdette Loomis, Hartford, Conn., is quoted as saying in a letter to Mayor A. M. Knight of this city, that his company soon will ask for bids on the installation of gas, electric railway and power plants for which franchises recently were granted here. George W. Deen of Waycross and F. H. Elmore of Jacksonville, Fla., together with Mr. Loomis, obtained the franchises, as noted in an earlier issue of the Electric Railway Review.

West Penn Railways Company, Pittsburg.—In connection with the acquisition by this company of control of the Pittsburg McKeesport & Greensburg Railway, it is reported that a line may be built from Greensburg to Latrobe, Pa.

Youngstown Park & Falls Street Railway, Youngstown, O.—An extension of the Elm street line, one mile, has been requested in a petition from employes of factories beyond the present terminus.

POWER HOUSES AND SUBSTATIONS.

Allentown & Reading Traction Company, Allentown, Pa.—It is stated that this company will install a new 300-horsepower engine at the Griesemersville power house. The former plan to concentrate all power at the Kutztown station has been abandoned.

Chippewa Valley Electric Railway, Eau Claire, Wis.—This company expects to purchase one 225 to 250 kilowatt 600-volt direct-current generator. G. B. Wheeler, general manager.

Hattiesburg (Miss.) Traction Company.—President H. A. Camp has announced that work will soon commence on this company's new power plant at Hattiesburg.

Southern Pacific Company.—Julius Kruttschnitt, director of maintenance and operation, is quoted as follows in regard to the plans for a power plant for the company's proposed electric suburban system which is to replace the steam trains between Alameda, Oakland, Fruitvale and Berkeley, Cal.: "We are soon to build up on the Oakland estuary on a block of land we bought for the purpose, one of the finest, most modern and up-to-date electric power plants in the United States. It will occupy the whole block, which is about 400 feet square. It will be quite a showy building, and high, because we shall have big coal bunkers there and mechanical stoking machinery for supplying the furnaces with fuel. The plans for this electric power house have been finished, and Electrical Engineer Babcock has started east to submit them to Mr. Harriman.

Personal Mention

Mr. A. J. White has been appointed traveling auditor of the Lima & Toledo Traction Company, succeeding Mr. F. D. Reilly, resigned to engage in other business at Detroit. Mr. White's headquarters will be in Cincinnati.

In connection with the changes announced in the personnel of the Cincinnati Northern Traction Company, Mr. C. E. Palmer will have charge of the Cincinnati Northern division of the company, with headquarters at Hamilton, O., and will have the title of superintendent; and Mr. B. M. Brown will have charge of the Dayton and Richmond division and the Dayton and Union City division, with the title of superintendent.

Mr. Charles H. Chapman, heretofore superintendent of the Consolidated Railway lines in Middletown, Conn., has been appointed superintendent of the lines in Bridgeport, succeeding Mr. R. H. Smith, whose recent appointment as manager of the Albany & Hudson Company was announced in a previous issue. Mr. Church of the Southington division will succeed Mr. Chapman at Middletown, and Mr. Robert T. Lee, superintendent of the Meriden lines, will have added to his jurisdiction the lines of the Southington division.

At a meeting of the board of directors of the Chicago City Railway on July 29 Mr. R. B. Hamilton was elected secretary of the company, with office at 1602 First National Bank building, Chicago, vice Mr. J. B. Hogarth. Mr. Hamilton will continue his present duties as purchasing agent. Mr. A. G. Mitten was elected auditor, with office at 1610 First National Bank building, vice Mr. J. B. Hogarth. Mr. Mitten is a brother of Mr. T. E. Mitten, president of the company, and has been connected with the claim department for about a month. He was formerly connected with the Chicago & Eastern Illinois Railroad.

Mr. M. L. Sperry has been appointed manager of the Savannah (Ga.) Electric Company, effective on August 1, succeeding Mr. L. R. Nash, who has been transferred to the Boston office of Stone & Webster, who own the Savannah property. Mr. Sperry was formerly connected with the Savannah company and has since been engaged in electric railway work in Minneapolis, Minn., and Ponce, Porto Rico. Mr. Nash has been with the Savannah company for 3½ years. Mr. George W. Rounds has been appointed superintendent of transportation in place of Mr. W. J. Haylow, resigned to accept a position with a steam railway.

Mr. William Seibert, superintendent of the eastern division of the Brooklyn Rapid Transit Company, has been appointed to the recreated office of superintendent of surface lines. Mr. Seibert enjoys the unusual distinction of having advanced from the position of horse-car conductor. He has been with the Brooklyn Rapid Transit Company 20 years. Mr. I. B. Clarke, supervisor of motormen of the elevated lines, has been assigned in addition to the duties of supervisor of motormen of surface lines. Mr. Clarke is the inventor of car No. 999, the instruction car for motormen. Mr. Albert Maxwell has been appointed chief clerk to the general superintendent, vice Mr. T. J. Cunningham, who remains with the company in another capacity.

Mr. Lucius S. Storrs, vice-president of the New England Investment & Security Company, New Haven, Conn., has been elected president of the Electric Express Company, which was recently incorporated to take over the express business on the electric lines in Massachusetts controlled by the New York New Haven & Hartford Railroad. Mr. James T. Harmer has been elected comptroller, and Mr. Leverett Candee, treasurer, of the company. They hold similar positions with the New England Investment & Security Company, the holding corporation of the New Haven's electric properties in Massachusetts. The headquarters of these officers will be in Boston. The management of the express business, however, will be under the direct supervision of Mr. C. V. Wood at Worcester, Mass., whose appointment to this position was announced in the Electric Railway Review for June 1.

Obituary.

John C. Henderson, for the past two years assistant to President Samuel Insull of the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company, at New Albany, Ind., died at his home in that city on July 23, aged 63 years. Mr. Henderson was a native of Scotland and has been engaged in several important engineering enterprises. About three years ago he was in charge of the construction of the approaches to the Cleveland Cincinnati Chicago & St. Louis Railway at Jeffersonville, Ind.

Financial News

Chicago Electric Traction Company.—On July 29 the property of the Chicago Electric Traction Company (the old storage battery line) was purchased by H. C. Bangs, an attorney representing interests of the Chicago & Southern Traction Company.

Interurban Railway & Terminal Company, Cincinnati, O.—This company has been authorized to increase its stock from \$2,500,000 to \$3,600,000. The new stock is to be 5 per cent preferred. Of this new issue \$900,000 will be exchanged for an equal amount of first mortgage 5 per cent bonds. The other \$200,000 of stock will be used to pay off outstanding obligations.

Kansas City (Mo.) Railway & Light Company.—It was announced on July 29 that Kuhn, Loeb & Co. are at the head of a syndicate which has purchased \$4,125,000 of 6 per cent 5-year notes of the Kansas City Railway & Light Company. The proceeds of these notes are to be used to retire \$3,000,000 of 5 per cent notes now outstanding and to pay floating indebtedness.

Louisville (Ky.) Railway.—It was announced on July 25 that the Louisville Railway Company would receive sealed bids for \$150,000 of short-term notes, these being part of an issue authorized some weeks ago. The notes are to run three years, dated June 1, 1907, and bear 6 per cent interest, payable semi-annually. The notes are secured by a deposit of \$600,000 forty-year 4½ per cent debenture bonds.

Newton (Mass.) Street Railway.—The Newton Street Railway and the Waltham Street Railway have petitioned the Massachusetts railroad commission for approval of the purchase of the Waltham Street Railway by the Newton Street Railway Company, and for the issue of an additional \$100,000 of the capital stock of the Newton company, which is to be exchanged share for share for the outstanding capital of the Waltham company.

Philadelphia Rapid Transit Company.—At the meeting of the board of directors of the Philadelphia Rapid Transit Company on July 29 it was decided to call the \$15 per share yet remaining unpaid on the capital stock of the company. Two calls for \$7.50 each per share were issued. The first payment is to be made on September 9, 1907, and the second payment September 7, 1908. There are 600,000 shares outstanding, so that the total covered by the two calls is \$9,000,000. The proceeds are to be devoted to general improvements, but most of it will be put into the work on the Market street subway.

Public Service Corporation of New Jersey.—In order to simplify its organization the company has petitioned for permission to consolidate the Plainfield Elizabeth & Central Jersey Street Railway Company and the Elizabeth & Raritan River Street Railway Company, and under the name of the United Street Railway Company of Central Jersey, to lease them, along with the Passaic Valley Street Railway Company, to the North Jersey Street Railway Company.

Scioto Valley Traction Company.—The report for the year ended April 30, 1907, shows results as follows: Gross earnings were \$329,213; operating expenses, \$165,477; net earnings, \$163,735; other income, \$866; total income, \$164,602. Deductions, interest, taxes, etc., were \$113,964; balance, \$50,638. The company has \$1,800,000 of common stock and \$1,180,500 of 5 per cent preferred stock outstanding, so that the balance for the year is \$8,387 less than the preferred dividend. The company carried 973,056 passengers and 16,413 tons of freight; passenger earnings were \$4,071 and freight earnings \$511 per mile. The average passenger fare was 29.072 cents.

United Railroads of San Francisco.—On July 24 the United Railroads of San Francisco filed a certificate completing the formalities necessary for the issue of 50,000 additional shares of stock at the par value of \$100 each. This increase was authorized by a vote of the stockholders on June 22, last. The new issue makes the total capital of the company \$45,000,000. In an interview on July 24 Patrick Calhoun, president of the company, was quoted as follows: "We have made the dividends on these first preferred shares 7 per cent because we recognize the financial conditions here at present. And we have specified that they may be redeemable at \$110 a share within six months, because we hope that before long financial conditions will have improved and we can reissue the shares at a lower dividend. The money from the sale of these shares is for the purpose of providing an additional sum for the general plans for the improvement of the company's service."

Manufactures and Supplies

ROLLING STOCK.

York County Traction Company, York, Pa., has bought two cars.

Hattiesburg Traction Company, Hattiesburg, Miss., is reported to have ordered cars.

Chippewa Valley Electric Railroad, Eau Claire, Wis., is reported to be in the market for two interurban cars.

Easton & Washington Traction Company, Easton, Pa., will buy five cars of the Wason Manufacturing Company.

Warren Electric Railway, Bisbee, Ariz., under construction, has ordered 10 cars from the St. Louis Car Company.

Illinois Tunnel Company, Chicago, has placed an order with the Bettendorf Axle Company for 500 all-steel flat cars.

Christchurch Tramways Company, Christchurch, New Zealand, has placed an order in this country for a sprinkler car.

Cincinnati Traction Company, Cincinnati, O., it is reported, has placed an order with the Cincinnati Car Company for 50 cars.

Toledo Railways & Light Company, Toledo, O., has closed a contract with the Kuhlman Car Company for 40 Brill semi-convertible cars.

Little Rock Railway & Electric Company, Little Rock, Ark., it is reported, has ordered seven semi-convertible cars, to be delivered in October.

St. Louis Monte Sano & Southern Railway, St. Louis, Mo., has ordered eight semi-convertible passenger cars, eight combination passenger and baggage cars and four express cars.

Railway Chemical Sprayer Company, Owensboro, Ky., previously mentioned in the Electric Railway Review, has received its first car from the Hicks Locomotive & Car Works.

Northwestern Elevated Railroad, Chicago, Ill., which was reported in the Electric Railway Review of July 13 to be in the market for 40 cars, has placed the order with the American Car & Foundry Company.

Pittsburg Railways Company, Pittsburg, Pa., we are officially advised, has placed an order with the St. Louis Car Company for 50 cars. This order was reported in the Electric Railway Review of July 27.

Portland Railway Light & Power Company, Portland, Ore., has contracted with the American Car Company for 90 car bodies. The trucks for these are to be furnished by The J. G. Brill Company and the electrical equipment by the General Electric Company.

La Crosse City Railway, La Crosse, Wis., as reported in the Electric Railway Review of July 20, has ordered four semi-convertible passenger cars of the American Car Company. The specifications call for the following details:

Seating capacity	Length, over all.....40 ft.
.....40 passengers	Width, inside.....8 ft. 2 in.
Weight	Over all
.....17 tons	.....8 ft. 4 in.
Wheel base.....8 ft. 2 in.	Body
Length of body.....28 ft.	Underframe.Wood and metal
Over vestibule .....	.....38 ft.

Special Equipment.

Axles	4 1/4 in.	Headlights	Neal
Couplers	Brill	Motors	2 GE-80
Fenders	McGuire	Sanders	Brill
Gongs	Brill	Trucks	Brill

Houston Electric Company, Houston, Tex., has ordered 10 28-foot semi-convertible, double-truck cars of the St. Louis Car Company. They are to be shipped in October, 1907. The specifications call for the following details:

Special Equipment.

Air brakes.....	Westinghouse	Interior finish....	Mahogany
Curtain material..	Pantasote	Motors	4 GE-81
Fenders	Pfingst	Seats.....	Hey-
Headlights	United States	wood Bros. & Wakefield Co	

Special Devices.

Gates	Wood's Safety	Roof....	Monitor, full length
-------------	---------------	----------	----------------------

SHOPS AND BUILDINGS.

Butler Saxonburg & Tarentum Railway, Butler, Pa.—This company will spend \$75,000 for car barns and repair shops at Saxonburg, Pa.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.—A new station, to cost about \$10,000, is being built by this company at Newcastle, Ind. It will be of pressed brick, with stone trimmings, and 92 by 40 feet.

TRADE NOTES.

Waterman Car Wheel & Foundry Company, Houston, Tex., has increased its capital stock from \$75,000 to \$100,000.

Philip Carey Manufacturing Company, Cincinnati, O., has opened offices at 2005 Second avenue, Seattle, Wash., under the management of Norman Tucker.

Northern Engineering Works, Detroit, Mich., has sold a 5-ton 3-motor electric Northern traveling crane, span about 72 feet, to the Atlantic Coast Line Railway.

Harbison-Walker Refractories Company, Pittsburg, Pa., has declared its regular quarterly dividend of 1 1/2 per cent on all preferred stock, payable on July 20.

Norton Grinding Company, Worcester, Mass., has found it necessary, on account of a rapidly growing business, to secure larger quarters for its Chicago branch at 48 South Canal street.

American Railway Tie Company, Portland, Me., has been incorporated with a capital stock of \$1,000,000. President, J. E. Manter; treasurer, C. E. Eaton; clerk, M. W. Baldwin; all of Portland.

E. W. Christie has been appointed western representative of the Wheeler Condenser & Engineering Company, with office at 1137 Monadnock block, Chicago, in place of Grant Beebe, resigned.

F. W. Roth, for the past seven years connected with the Sterling-Meaker Company, has resigned to become eastern representative of the Streeter Journal Bearing Company, with office at 2095 Pacific street, Brooklyn, N. Y.

Jones & Laughlin Steel Company has purchased 100 acres of land near its new steel plant at Aliquippa, Pa., and is taking steps to make a new industrial town. The company now employs more than 7,000 men.

P. H. Wilhelm, who has represented the American Steel & Wire Company of Chicago in the east since 1904, has been transferred by his company to the south, where he was in the railway supply business for a number of years.

W. E. Holloway has been appointed Pittsburg sales manager for the elevating and conveying machinery manufactured by the Jeffrey Manufacturing Company, Columbus, O. Mr. Holloway has heretofore been connected with the company's mining department.

Edge Moor Iron Company, Edge Moor, Del., has received a contract to furnish Edge Moor boilers to be installed in the 24 oil pumping plants which will be erected by the Southern Pacific Company to pump oil from the San Joaquin valley, California, to the sea.

Sargent Fender Company, Grand Rapids, Mich., has been incorporated with a capital stock of \$2,900, of which \$2,000 has been subscribed, to manufacture the Sargent fender for street cars and other vehicles. Those interested are John F. Sargent, John D. Adams and Irving L. Lee, all of Chicago.

A. Gilbert & Sons Brass Foundry Company has bought a lot 75 by 180 feet, on Forest Park boulevard, St. Louis, on which it will erect a 1-story structure, with 2-story front. The new plant will cost in all about \$25,000 and will be equipped with complete and up-to-date machinery for the manufacture of railroad brasses, etc.

W. Gerhardi, Lüdenscheid, Germany, wants complete catalogues in duplicate from manufacturers of woodworking machinery, machine tools and cranes. When represented by a European agent the name and address of that firm are wanted. All catalogues should be sent direct to W. Gerhardi from the home office of the manufacturer.

Westinghouse Electric & Manufacturing Company of East Pittsburg has received through G. & O. Braniff & Co., agents for the former company in Mexico, an order for one of the electrical equipments of the Vera Cruz tramways, built by the Vera Cruz Light Power & Tramway Company. Vera Cruz is the second city in Mexico to be electrified.

L. W. Jones, president and a director of the Pittsburg Filter Manufacturing Company, Pittsburg, Pa., resigned on

July 8. Mr. Jones has been associated with that company since 1903, during which time some of its largest and most successful plants were installed. In the near future Mr. Jones contemplates opening an office in Pittsburg as consulting engineer, taking up the line of municipal and industrial filtration plants, water softening and sewage disposal plants.

William A. Douglass of Chicago has become eastern manager of the Calkins Newspaper Syndicate, San Francisco, Cal., and will open offices in the Hartford building. He will represent Pandex of the Press, Pacific Miner, Orchard and Farm, Wholesalers' and Retailers' Review, Trade Journal, Pythian Chronicle and other California newspapers. For several years Mr. Douglass was connected with the David Williams Publishing Company.

Hewitt Manufacturing Company, C. M. Hewitt, president, 303 Railway Exchange building, Chicago, announces the appointment of D. W. Ross as managing director and W. H. Croft as manager of the sales department. Both Mr. Ross and Mr. Croft were recently appointed to similar positions with the Magnus Metal Company of New York, as reported in The Railway Age of July 26. F. H. Smith is appointed general manager of the Hewitt Manufacturing Company.

J. H. Wagenhorst & Co., Youngstown, O., manufacturers of electric blue print machines, report the following partial list of recent sales: University of Wisconsin, Madison, Wis.; General Fireproofing Company, Youngstown, O.; Pittsburg Bridge & Iron Company, Pittsburg, Pa.; Stone City Blue Print Company, Bedford, Ind.; Western New York Construction Company, Buffalo, N. Y.; Central Union Telephone Company, Indianapolis, Ind.; Chicago Indiana & Southern Railroad, Gibson, Ind.; Chicago & Eastern Illinois Railroad, Danville Junction, Ill.; Lands and Works Department, Victoria, B. C.

J. S. Hamlin, for the past 18 months sales agent of the car equipment division of the Ohio Brass Company, Mansfield, O., died suddenly at his home in Mansfield, July 20. Mr. Hamlin was in the prime of life, being 42 years of age. A wife, son and daughter mourn his loss. Mr. Hamlin was well known and well liked throughout the electric railway field. He commenced his railway career in Chicago in the days of the old horse cars and later was master mechanic of the South Side Elevated Railroad, Chicago. From there he went to the Indiana Union Traction Company as superintendent of motive power, and later to the Christensen Engineering Company of Milwaukee. While with the latter company Mr. Hamlin went abroad and installed its air brake system in London and Paris. Afterward he was Chicago agent for the St. Louis Car Company and later accepted a position with the Ohio Brass Company. As sales agent of the car equipment division he built up this line of business to a marked degree.



J. S. Hamlin.

National Brake & Electric Company of Milwaukee, as an indication of the extent to which traction companies are equipping rolling stock with air brake apparatus, reports recent orders from the following companies, the aggregate exceeding 1,100 equipments: Tacoma Railway & Power Company, Tacoma, Wash., 18 equipments; Georgia Railway & Electric Company, Atlanta, Ga., 12; Mexico Electric Tramways, Mexico, D. F., 25; People's Traction Company, Galesburg, Ill., 1; Washington Water Power Company, Spokane, Wash., 4; Spokane & Inland Railway Company, Spokane, Wash., 15; Louisville Railway Company, Louisville, Ky., 51; Pacific Traction Company, Tacoma, Wash., 9; Seattle Electric Company, Seattle, Wash., 28; Black River Traction Company, Watertown, N. Y., 3; Whatcom Railway & Light Company, Bellingham, Wash., 2; Cincinnati Milford & Loveland Traction Company, Cincinnati, O., 1; Grays Harbor Railway & Electric Company, Everett, Wash., 2; Roanoke Railway & Electric Co., Roanoke, Va., 4; Texarkana Light & Traction Company, Texarkana, Ark., 5; Norfolk & Southern Railway Company, Norfolk, Va., 7; Rhode Island Company, Providence,

R. I., 21; Consolidated Railway Light & Power Company, Wilmington, N. C., 2; Worcester Consolidated Street Railway Company, Worcester, Mass., 25; Newport News & Old Point Railway & Electric Company, Hampton, Va., 13; Toledo & Western Railway Company, Toledo, O., 3; Northern Ohio Traction & Light Company, Akron, O., 4; Chattanooga Railway & Electric Company, Chattanooga, Tenn., 10; York Street Railway Company, York, Pa., 2; Wason Manufacturing Company (car builders), 4; Nashville Railway & Light Company, Nashville, Tenn., 16; Jefferson Traction Company, Punxsutawney, Pa., 2; Chicago Union Traction Company, Chicago, Ill., 18; T. M. E. R. & L. Co., Milwaukee, Wis., 18; Chambersburg Greencastle & Waynesboro Street Railway Company, Waynesboro, Pa., 1; Galesburg Railway & Light Company, Galesburg, Ill., 1; Winnipeg Electric Street Railway Company, Winnipeg, Man., 95; San Jose & Los Gatos Railway Company, San Jose, Cal., 3; Illinois Valley Railway Company, La Salle, Ill., 4; Oakland Traction Company, Oakland, Cal., 5; Conneaut & Erie Traction Company, Girard, Pa., 2; Electric Railway Light & Ice Company, Junction City, Kan., 5; Chicago City Railway Company, Chicago, Ill., 322; Alabama City Gadsden & Attalla Railway Company, Gadsden, Ala., 1; Syracuse & Suburban Railway Company, Syracuse, N. Y., 1; Brown Hoisting Machinery Company, Cleveland, O., 3; Jackson Ann Arbor & Detroit Railway Company, Jackson, Mich., 3; Sioux City Traction Company, Sioux City, Ia., 28; Schuylkill Valley Traction Company, Schuylkill, Pa., 2; McGuire-Cummings Manufacturing Company (car builders), Chicago, Ill., 4; Lebanon Valley Traction Company, Lebanon, Pa., 1; Lacrosse Tramways, Buenos Aires, S. A., 32; Detroit United Railway Company, Detroit, Mich., 50; West Chester Street Railway Company, West Chester, Pa., 1; Louisville & Eastern Railway Company, Louisville, Ky., 1; St. Louis Car Company, St. Louis, Mo., 7; Chicago Refrigerator Company, Chicago, Ill., 1; Tri-City Railway Company, Davenport, Ia., 3; Duluth Street Railway Company, Duluth, Minn., 3; Memphis Street Railway Company, Memphis, Tenn., 15; South Chicago City Railway Company, Chicago, Ill., 1; Fruit Growers' Refrigerator Company, Anna, Ill., 1; Toledo Urban & Interurban Railway Company, Toledo, O., 1; Rio de Janeiro Tramways, Rio de Janeiro, S. A., 11; Birmingham Railway Light & Power Company, Birmingham, Ala., 5; International Railway Company, Buffalo, N. Y., 49; Columbus Railway & Light Company, Columbus, O., 11; Transit Development Company, Brooklyn, N. Y., 100; Knoxville Railway & Light Company, Knoxville, Tenn., 4; Oneonta & Mohawk Valley Railroad Company, Oneonta, N. Y., 2; Cincinnati Car Company, Cincinnati, O., 50; Louisville & Southern Railway Company, Louisville, Ky., 12.

ADVERTISING LITERATURE.

Warren Webster & Co., Camden, N. J.—A neat leaflet tells about the Webster grease and oil trap, designed for use in connection with oil separators and feed-water heaters in power plants.

American District Steam Company, Lockport, N. Y.—Bulletin No. 105 is devoted to "Underground Piping for Steam Distribution," and is of especial interest to traction and power companies selling steam heat.

The J. G. Brill Company, Philadelphia.—The July number of Brill's Magazine is made up of a large number of illustrated articles descriptive of recent shipments of new equipment to various traction lines throughout America. It is an unusually interesting and informative publication.

The Bryant Electric Company, Bridgeport, Conn.—A bound volume of handy size, consisting of 128 pages, describes the Bryant line of electrical supplies. A price list is included, which, by a unique method of binding, is changeable as new lists are received.

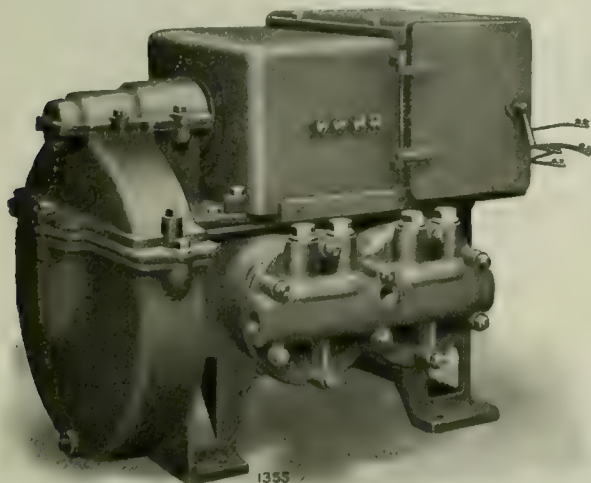
Vredenburg Company, recently established, with an office at 1332 Monadnock block, Chicago, furnishes advice in engineering and general technical advertising, being the only concern of the kind in the west. This company is prepared to render careful and expert service to engineering, contracting and manufacturing companies, desiring intensification of their advertising, the changing of copy weekly, bi-weekly and monthly, and the preparation of dignified, attractive advertisements. The company acts as a detached advertising department, and, by reason of organization, is able to render service at a rate far less than the cost of maintenance of even a small advertising department. Accounts are placed and selection of proper mediums advised discreetly. The manager, Clarence Vredenburg, was editor and manager of Engineering World from its inception until its recent sale, and has many friends in the technical field.

H. M. Foote has been appointed manager of the steel casting department of the Wellman-Seaver-Morgan Company, Cleveland, O., to succeed A. S. Blanchard, resigned.

NATIONAL ALTERNATING-CURRENT-DIRECT-CURRENT AIR BRAKE APPARATUS.

The National Brake & Electric Company, Milwaukee, Wis., has developed a class of alternating-current-direct-current air brake apparatus that compares favorably with its direct-current air brake equipment.

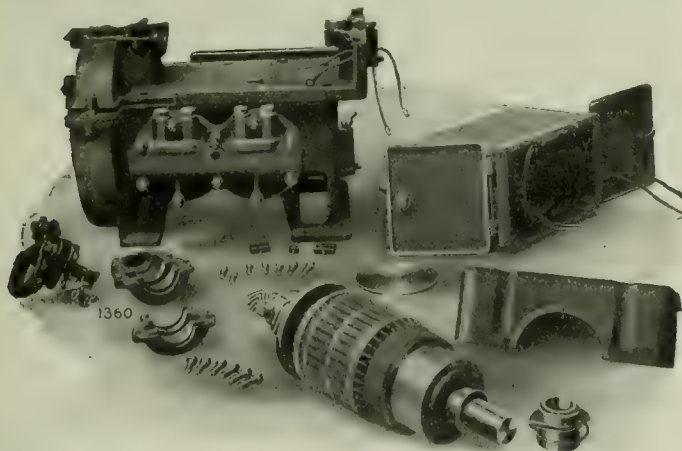
The compressor in general appearance closely resembles the standard direct-current machine and, as shown in Figure 1, is of the closed type. The motor and compressor are two separate units except that the motor bearing at the pinion



National A.-C.-D.-C. Air Compressor—Figure 1.

end of the motor base forms a cover for the upper part of the gear. The simplicity of design and construction is shown in Figure 2. The compressor and motor are separated by a $\frac{1}{2}$ -inch air space which carries off the heat radiated by the compressor and thus prevents the motor from becoming overheated. This method of construction strengthens and braces the compressor casing.

The compressor crank chamber and gear case are cast in one piece. This reduces the number of loose parts and permits the machine to be inspected or dismantled without removing the oil. The crank shaft is fitted with a third bearing in the center, which strengthens it at its weakest point and makes the operation of the compressor quieter with greater freedom from vibration than is the case with two-bearing compressors. Removal of the crank shaft and gear is accom-



National A.-C.-D.-C. Air Compressor—Figure 2.

plished by lifting them straight out of the crank chamber, it being unnecessary to remove the gear from the shaft. This feature enables the compressor to be dismantled and reassembled in a short space of time. The compressor is a standard two-cylinder, single-action type with trunk pistons. The piston rings are the Dunbar type. The piston wrist pin, on which the tail end of the connecting rod works, is of steel, hardened and ground.

The valve head is constructed with the discharge valve toward the center and the suction valve toward the outside of

the head. The discharge pipe runs straight from the valve head to the main reservoir. The suction has two openings, one on each side of the valve head; either or both can be used.

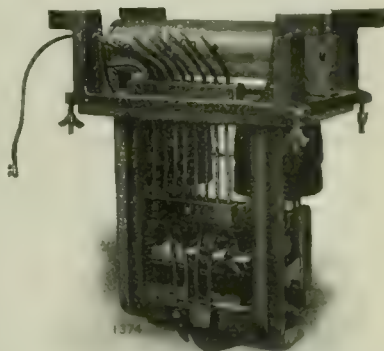
The suction and discharge valves are of the tubular type and are interchangeable, provided the seats have worn equally. They are seated by gravity, aided by air pressure.

The gear and pinion are a standard herring-bone riveted pattern with finely cut teeth, of open-hearth cast steel and high-carbon steel, respectively. The lower half of the motor magnet frame is a steel casting, which also carries the bearings and forms a cover for the upper half of the gear. Such construction possesses the advantages of insuring a permanent alignment of all parts and the accurate replacement of the armature when it must be removed. An oil deflector is provided just inside of the pinion end of the shaft so as to prevent the oil from the gear and pinion creeping into the armature bearing. An overflow device into the crank chamber is also added to the armature bearing at the pinion end to maintain the oil level constant.

The motor is of the four-pole commutator type with two consequent poles, and is designed for operation on voltages ranging from 500 to 600 volts direct-current circuits, and on voltages ranging from 280 to 340 volts alternating-current, 25-cycle, single-phase circuits. The motor has two distinct field windings, one for alternating current and one for direct current. Laminated sheet steel pole pieces are used. The pole faces are provided with a compensating winding, which consists of four separate coils, which are short-circuited upon themselves. Figure 2 shows the compressor partly dismantled, and shows the armature removed from the magnet frame.

The field coils are removed by first removing the armature and then taking out the cap screws that hold the pole piece on to the magnet frame. The pole piece can then be pushed in toward the center line of the shaft far enough so that the field coil can be removed. This can be done without disconnecting the compensating winding. So long as the adjusting shims and set screws are not disturbed the magnet frame can be put back into its original position without any further adjustment.

The brush gear is of the same construction as that used on the National direct-current compressors, and differs mainly in the manner of fastening and the number of brushes. The brush gear proper is fastened to a cast-iron yoke made in two halves, which is secured in a groove running around a projection of the armature bearing at the commutator end of the motor. Two sets of brush holders of two brushes each are used. The inspection of the armature, commutator and brushes is made by means of the inspection doors at the sides of the motor casing.



National A.-C.-D.-C. Air Compressor—Figure 3.

The compressor is started by throwing it directly on the full voltage, either alternating current or direct current. A relay is provided for automatically making the connections for running the motor either on alternating or direct current circuits, and is shown in Figure 3. When the direct-current circuit is closed the necessary connections for direct-current operation are made by the solenoids of the relay attracting plungers to which are secured the contact pieces. When operating on the alternating-current circuit these solenoids are not in circuit and the contact carrier drops by its own weight and makes the necessary connections for operating on alternating current. The relay, which is inclosed, is mounted under the car body with the compressor.

The capacity of the National alternating-current-direct-current type of compressors is 25 cubic feet of free air per minute. The standard type "N" oil pneumatic governor is furnished in connection with these equipments, and will operate equally as well on either direct or alternating current circuits.

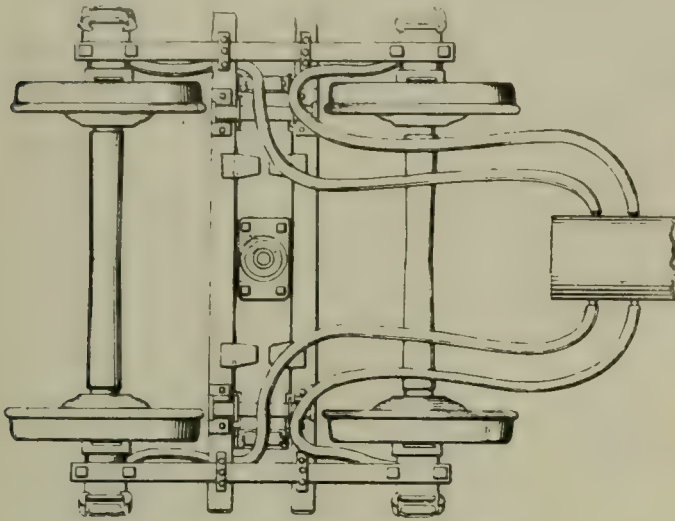
The National Brake & Electric Company has recently furnished 13 straight air brake equipments complete with compressors, described in this article, to The Milwaukee Electric Railway & Light Company for service on its new inter-urban lines.

The 12 interurban traction lines entering Indianapolis are reported to have handled 30,000 passengers on July 4 as compared with 12,000 handled by the 18 steam lines.

DUSTLESS JOURNAL BOX.

Israel Hogeland, the inventor of a noiseless car wheel, described in the Electric Railway Review of May 11, 1907, page 635, has recently patented a novel adaption of compressed air for excluding dust from journal boxes.

By referring to the accompanying illustration it will be



Hogeland Dustless Journal Box.

seen that the essential features consist of a small air tank and a line of $\frac{3}{8}$ -inch flexible tube to carry the air from the tank to the journal. The opening at the journal box is contracted to $\frac{1}{32}$ inch. If the tank is not used the air can be taken from a screened funnel on the car roof. When the car is in motion there will be enough air pressure to exclude dusty air and grit from the journal. Introducing a considerable amount of cool air into the journal box will decrease the journal temperature, reducing the danger of hot boxes. The inventor claims that this device is adaptable to all classes of boxes on steam coaches, electric cars and automobiles.

THE HODGE TROLLEY RETRIEVER.

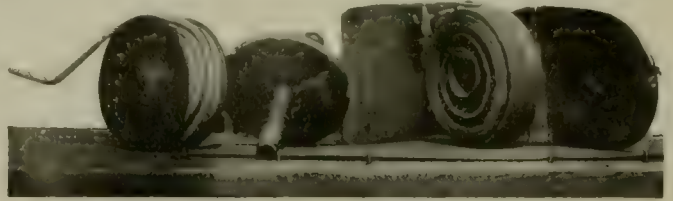
M. F. Hodge, Leavenworth, Kan., has recently secured patents on a trolley retriever that has withstood 17 months' severe service on the lines of the Kansas City Western Railway. The accompanying illustrations show the retriever as-



Hodge Trolley Retriever—Assembly View.

sembled and when taken apart. The essential members of the retriever include a rope sheave, winding spring and a clutch and dog, on the back side of which is the tension spring. When the trolley pole leaves the wire the clutch

on the rope sheave and a clutch on the ratchet engage. This forces a pin into a thread on the shaft shown in the illustration and draws the sheave along the shaft, so that it trips a trigger and allows the retriever spring to unwind. It should be noted that this operation throws no strain on the case. In winding up the rope the spring can be caught at any point and it is not necessary to wind it fully. When the retriever



Hodge Trolley Retriever—Rope Sheave, Shaft and Spring.

has acted, the dog can be reversed and all the slack in the spring saved so that it is only necessary to rewind about two feet of rope.

THE MANN STREET CAR INDICATOR.

An ingenious device for automatically announcing streets and points of interest when passed by a car is a recent invention of P. J. Mann, of The Mann Street Car Indicator & Advertising Company, Pittsburg, Pa.

The indicator is mounted in the center of the car where



Mann Indicator in Place on Car.

it can be seen by all the passengers. By referring to the illustration it will be noticed that the indicator gives the name of the street the car is approaching and also affords a large space that can be devoted to advertising. It is this advertising feature which gives the device its principal value. A series of ever-changing advertisements of business houses along the route is sure to attract and hold a large amount of the passengers' attention. Certainly, if fixed display cards can command attention, a moving advertisement that always mentions places in close proximity to the car would be more closely studied.

A no small advantage is always to have the name of the next street before the passengers. This saves much work for the conductor and not a little annoyance for the passengers. The indicator is operated by a small motor controlled by a small shoe placed just inside the rail at each block. The Mann indicator was recently given a satisfactory trial at Alliance, O., on the Stark lines.

Central Inspection Bureau, 17 State street, New York City, advises that it has resident inspectors at the works of the Cincinnati Car Company, Cincinnati, O., Southern Car Company, High Point, N. C., Jewett Car Company, Newark, O., Niles Car & Manufacturing Company, Niles, O., and also at the plants of The J. G. Brill Company. It is equipped to furnish inspectors for all types of street railway and inter-urban cars.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 6

CHICAGO, AUGUST 10, 1907

WHOLE No. 224

TABLE OF CONTENTS.

Editorial:		News of the Week:	
—Time-Points and Schedules.....	151	—Plans for Settlement of Detroit Franchise Controversy....	170
—The Devil-Strip in Chicago.....	151	—Aurora Elgin & Chicago Strike Averted.....	170
—Labor and Education.....	151	—Public Service Commission to Investigate Tunnels.....	170
—Troubles of the Conductor.....	152	—Forest City Railway Secures Amended Franchise.....	170
—Electrified Suburban Service for Boston.....	152	Construction News:	
—New York's Transportation Problem.....	152	—Franchises.....	172
—Standardization Progress.....	153	—Recent Incorporations.....	172
New Shops of the Bangor Railway (Illustrated).....	154	—Track and Roadway.....	172
President Beggs on Capital Issues of Milwaukee Companies.....	156	—Power Houses and Substations.....	174
Cleveland Meeting of Standardization Committee, American Street and Interurban Railway Engineering Association.....	157	Personal Mention.....	175
Communication:		Financial News.....	176
—M. C. B. Brakeshoe Committee Report, 1907.....	163	Manufactures and Supplies:	
Plan for Distribution of Chicago Railways Company Securities..	164	—Rolling Stock.....	176
Increasing Cost of Traction Service.....	164	—Shops and Buildings.....	176
An Early Type of Car (Illustrated).....	165	—Trade Notes.....	176
Interborough-Metropolitan Investigation.....	165	—Advertising Literature.....	177
Tester for Trolley Wire Supports.....	166	Steel-Wool Journal Packing.....	177
Piping and Power Station Systems—XLVIII. By W. L. Morris, M. E. (Illustrated).....	167	New Cars for Chicago & Milwaukee Electric Railroad.....	178
Recent Electric Railway Legal Decisions. By J. L. Rosen- berger, LL. B.....	168	The Milloy Trolley Retriever.....	179
		Kewanee Flange Unions.....	179
		A New Method of Catenary Construction.....	179
		Schwartz Metal Melting and Refining Furnace.....	180

A small operating detail, frequently a cause of dissatisfaction out of proportion to its real inconvenience, is that of allowing cars to run ahead of schedule. Even if a car leaves its terminal exactly on time it is often possible to gain a minute or more on the schedule. This may be done by fast running or by leaving waiting passengers.

The result is that the car in advance of schedule time does not take its portion of the waiting passengers. This causes the car following to carry more than its usual load and results in the second car often being late and badly overcrowded. It is not unusual under these circumstances to find an interval of 10 minutes between cars on a 5-minute headway. These conditions are usually brought about by a lazy car crew wishing to avoid a heavy load with its frequent stops or by the crew being overanxious to complete the trip on time. Such conditions are possible only on a system with time-points far apart. If the time-points were fairly close together it would be impossible to make any extraordinary gain over the regular schedule. It is a noticeable fact that those lines with most frequent time-points keep their cars loaded most uniformly. A frequency of time-points as afforded by a telephone dispatching system materially assists in preventing "off schedule" cars.

The clearance between the cars on the rehabilitated Chicago traction system will be 8½ inches if cars having a width of 9 feet are used. The Chicago Tribune in its issue of August 9 takes issue with the board of traction engineers and unadvisedly calls for a clearance wide enough to permit of a pedestrian standing between two passing cars. The present distances between track centers are 9 feet and 9 feet 6 inches, but with some of the older cars now in use on the narrower track centers the actual clearance space between cars is sufficient for a man to stand in. Bion J. Arnold, president of the board of supervising engineers, in explaining the necessity for using this narrow clearance between cars, points out that the streets in most cases are 60 feet wide with a roadway of 38 feet. Using a wider spacing would greatly increase the difficulty of loading and unload-

ing nearby wagons. Even where the streets are wide the 9-foot 8½-inch centers will be kept for the reason that a uniform close clearance will teach pedestrians not to get between moving cars. The necessity for a uniform clearance appears to be greater than the need of wide clearance. Under the present condition, with three different track spacings in use and several widths of cars, the variety in car clearance is quite large. It is this variation in clearance that is dangerous. With the new tracks on 9-foot 8½-inch centers and all of the cars 9 feet, giving a uniform clearance of 8½ inches between cars, there should be fewer accidents than with the present varied clearances.

Without labor there can be no real values. Labor makes the necessities of life valuable, while the raw material before labor has been expended on it has practically no value. Inasmuch as labor is of first importance and because better results can be obtained by united efforts, it is unionized. A union should not exist as an

arbitrary means with which to enforce justice, but rather, when intelligently managed, as a factor for the general as well as the individual good of its members. Here, therefore, appears the value of education in connection with unionism. Education and knowledge which open and broaden the mind for a higher usefulness are needed in place of ignorance which eventually gropes in the dark. Such arguments are far from being antagonistic to labor unions, but they are against the improper organization of a body of men for the purpose of arbitrarily obtaining wages higher than their services are worth. Men holding positions of trust and responsibility should receive higher wages than those who do not, and it is not just that unions should insist upon the uneducated employee receiving the same wages as does his more educated and experienced neighbor. Men should be paid for the services they render, and it depends on one's own ability how much this pay shall be. The practical application of these thoughts to electric railway operation is that more care should be used in investigating the past history of applicants for employment. Schools for the education of employes should greatly assist

in building up the efficiency of any organization and the scale of wages should be such that an employee shall have an inspiration for educating himself to be of greater service to his employer. Many companies find it profitable to pay close attention to the welfare of their employees, and it is thought that a more thorough application of these suggestions would result in better service to the public, fewer accidents and a reduction of operating costs.

The New York Times in a recent editorial comments on the relations existing between the street car conductor and the public, in part as follows: "Among the 3,200 conductors in charge of the surface cars of Manhattan, which carry more than 1,500,000 passengers daily, there are generally some rude, surly, dissatisfied men, who do not control their speech. The wonder is, perhaps, that so many of the conductors are unobjectionable, and that a few of them are positively good-humored and courteous. Their work is very hard, and we must all understand the difficulty the company has to secure good men. There is much less to complain of in the conduct of the employees in the subway and on the elevated roads, for obvious reasons." A conductor comes in contact with all sorts and conditions of people. He must listen to their criticisms, questions and sneers, yet through all he must be patient and only answer in a polite way. The usual passenger requires a definite answer to his question, no matter how trivial it may be. It is on account of these reasons that trainmen's schooling is made valuable. However, there are two sides to the question and very often the public served by a street railway corporation needs educating as to how to behave when riding, as well as the platform men.

ELECTRIFIED SUBURBAN SERVICE FOR BOSTON.

The recent announcement of Vice-President Byrnes of the New Haven system that Boston is to have an electric suburban service as soon as the change from steam shall become physically and mechanically possible means that the practical solution of several engineering problems is the only obstacle to a greatly needed development around the New England metropolis. It has for some time been apparent that the extension of the New Haven's electric zone eastward from New York terminates logically at Boston, and this confirmation of a broad policy electrically on the part of President Mellen augurs well for the lasting benefit of what is perhaps the most striking example of a combined metropolitan and suburban community in this country.

It is needless to emphasize at this time the benefits of electrified service in relation to the public; these are being demonstrated in New York on a scale never before attempted, and for the most part the most sanguine expectations of the electric railway expert are being attained. There is no question that a city like Boston, with an immediate suburban population actually exceeding in numbers the residents of the business municipality at its center, will benefit beyond estimate by the elimination of the steam locomotive from one or more of the great railroad trunk lines terminating therein. Whether the actual cost of operation be somewhat greater or slightly less with electricity will make little difference as to the desirability of such service from both the public and the railroad standpoint.

Mr. Byrnes' statement that the abolition of grade crossings and the testing of the physical system adapted outside New York are the two principal results to be secured before pushing the Boston plans suggests that a reasonable time is the only requisite for the complete electrification of the New York-Boston trunk line and eventually the whole New Haven system for both passenger and freight service.

The company is already abolishing grade crossings at a rate faster than the state authorities ask. From the com-

pany's standpoint it is impossible to predict the precise physical appliances which will be standardized until the work at New York proves the soundness or unsoundness of detailed features in rolling stock and distributing system designs. This is natural and right, but the indications are that there will be very little delay on this score.

The first cost of electrification over a rather limited distance is, of course, high in proportion to the mileage of track affected, and Mr. Byrnes cannot be criticized for going slowly in the matter of standardization. Until the electrified section reaches the regular length of run of the steam locomotive before it is the best economy to run it into the roundhouse—150 to 200 miles—it is clear that the full benefits of the electric motor cannot be enjoyed. These considerations, however, are in the main incidental in the broad problem of the advisability of electrification. It is certain that the electrification of one of the trunk lines leading into Boston with its suburban tributary traffic would lead to the same improvement on all the other roads entering the city, and the final result will be of far-reaching benefit to everyone in eastern Massachusetts.

NEW YORK'S TRANSPORTATION PROBLEM.

The new public service commission of New York City, which assumed office on July 1 with such drastic powers to investigate and regulate the public service corporations of the city, has lost no time in getting to work, and those who viewed with alarm the passage of the law under which the commission was created will be interested in the workings of the commission in its present investigation of the Interborough-Metropolitan Company, a brief account of some of the testimony of which will be found on another page of this issue of the Electric Railway Review.

The commission had hardly perfected its organization when it announced the appointment of William M. Ivins as special counsel to conduct a thorough investigation of the two companies which control practically all of the local transportation lines of the city, the Interborough-Metropolitan Company and the Brooklyn Rapid Transit Company. The Interborough company was selected as the first victim. Now, no one who has had any experience in traveling about New York City will deny that the situation presents opportunities for an investigation. The problem of handling the enormous and rapidly growing traffic of a city of the size and geographical peculiarities of New York, in which more passengers are carried than by all the steam roads of the United States, is such that the more capable minds that can be brought to bear on its solution and the more suggestions for improvement that are offered, the better.

But the criticisms offered must be constructive or they will be far worse than useless. A situation of such complexity demands the utmost co-operation between the corporation and the public and a commission such as the one just created, with almost unlimited authority, is particularly suited to be the medium of such co-operation. The company has not opposed the investigation; on the contrary, it has offered every facility to the agents of the commission, opening its books without question and supplying all the data requested. But the investigators have not manifested the same spirit. The attitude of the counsel appointed to conduct the examination has been rather that of a prosecuting attorney, and it is announced that certain officials of the company will not be called as witnesses for fear of giving them an "immunity bath."

The testimony thus far presented by President Shonts of the Interborough-Metropolitan Company and General Manager Hedley of the Interborough Rapid Transit Company, has brought forth little that is new and only serves to emphasize facts that are already well known, that the congestion of traffic is increasing much more rapidly than the facilities of the company for dealing with it and that the company is increasing its equipment as fast as cars can be turned out of the shops and its trackage as fast as a slow-moving city government

will grant the permits. Mr. Shonts showed that the company now has under construction 445 cars. The company and the citizens affected have long sought for permission to increase the capacity of the Second and Third avenue elevated lines by the construction of an additional track, without avail. Contracts have been let for the electrification of 15 miles of the old horse car lines and still more contracts would have been let had not the permits been withheld by the city.

Mr. Ivins, special counsel for the commission, showed that the number of passengers carried by the street railways of New York annually amounts to 1,259,000,000, as compared with 800,000,000 carried by all of the steam roads of the United States, and then complains that antiquated cars are operated on the surface lines. At a time when every car that can be propelled along a track is required to transport the population to and from its daily work, the witnesses are asked why they have not scrapped between 400 and 500 cars of the highest type known when they were put into service, three years ago, and approved by the rapid transit commission of the city at the time. Because the company has seen fit to safeguard its revenues by adopting a system of transfers between the elevated and the subway cars at One Hundred and Forty-ninth street, which will prevent their being sold on the streets, the company is charged with being more interested in making money than in accommodating the public. Because an official of the company admitted that he would not consider it necessary to add more cars to a train if a few passengers were obliged to stand the company is accused of considering its earnings when making up its schedules and determining the number of cars in a train.

This is not the spirit of intelligent co-operation. A commission entrusted with the control of public service corporations must recognize the fact that an exceedingly important function of such a corporation is to make money for its stockholders; that schedules must be arranged with some regard to expenses and earnings, and that cars cannot be scrapped as soon as an improved type is invented. Moreover, it is inevitable that when large numbers of people are going to the same place at the same time they must expect to be crowded.

STANDARDIZATION PROGRESS.

The problem of choosing standards for electric railways operating under all manner of conditions is indeed a difficult one. That this fact is well recognized by the "Standardization" committee of the American Street and Interurban Railway Engineering Association was evidenced by the vigor with which that body pursued its work at the recent meeting in Cleveland. Elsewhere in this issue is an abstract of the proceedings of that meeting. Special attention is called to the large amount of valuable information appearing in the discussion of the various subjects. Only at such meetings and in the course of verbal discussion is it possible to adjust so well the minor details of mechanical construction. The presence of a large number of manufacturers' representatives aided to a marked degree in establishing a foundation on which satisfactory standards can be established.

Probably no other subject brought forth such valuable discussion as that of axle dimensions. The axles recommended by the "Standardization" committee of the Central Electric Railway Association were considered as a basis for discussion. The trend of the arguments for suggested changes in these recommended axles illustrated how thoroughly the committee of this Central association had performed its task.

Representatives of motor manufacturers suggested that the following dimensions might afford axles that would approximately fit the sizes of motors as stated:

Motors of 25 to 40 horsepower, 4½-inch linings, 5½-inch gear fit and 48 inches between finished hubs.

Motors of 45 to 65 horsepower, 5-inch linings, 6-inch gear fit, 48 inches between hubs.

Motors of 70 to 100 horsepower, 5½-inch linings, 6½-inch gear fit, 48 inches between hubs.

Motors of 105 to 150 horsepower, 6-inch linings, 7-inch gear fit, 50 inches between hubs.

Motors of 155 to 225 horsepower, 6½-inch linings, 7½-inch gear fit, 50 inches between hubs and 6 11-16 length of gear fit.

This made five sizes. In each case the gear fit was 1 inch larger in diameter than the lining fit. The Central Electric association had recommended only four axles for standard practice and each with 48 inches length between finished wheel hubs. The manufacturers' representatives were not in a position to make a definite recommendation, but they felt that 50 inches at least was necessary for the distance between wheels for motors having capacities of from 125 to 200 horsepower. Wherever a 6-inch or larger lining was used at least 50 inches distance between hubs was thought necessary.

As a result of continued discussion of the subject of axles it was suggested that the recommendations of the Central Electric association could stand as they were, with the exceptions of axles "C" and "D" (6½ and 7½ inches, respectively). On axle "C" the committee would increase the distance between hubs to 50 inches in place of 48, and on axle "D" reduce the diameter at the center from 7½ to 7 inches. In this instance it was wisely deemed best to recommend as standard practice axles a little larger than the actual factors of safety demanded, thus taking into account the requirements of the future.

Discussion with the wheel makers brought forth the suggestion with regard to axles "C" and "D" that it would be well for the committee to take under favorable consideration the question of the lengthening of those two axles sufficiently to meet the requirement that the length of the wheel seat should at least be equivalent to the bore of the wheel, taking into consideration the journal box length, so as to have the proper clearance between the back of the journal box and the hub of the wheel.

After considerable discussion regarding journal box details it was found acceptable to standardize on 5½ inches as the width between pedestal guides for all boxes. The Master Car Builders' Association has considered this subject of interior fits very thoroughly. That body provides a set of test gauges fixing the widths with which to test journal bearings and wedges. It was the idea as far as possible to take advantage of the practice of the Master Car Builders. The commercial value of that feature is easily apparent.

Definite conclusions were not drawn as to what width of wheel tread and its complementary brakeshoe should be determined upon as recommended practice. The Central Electric wheel flange and tread were considered very thoroughly and very few objections made to their acceptance as a compromise wheel contour for both street and interurban equipments. Recognizing, however, the importance of this subject, it was decided to appoint a subcommittee which should be instructed to obtain detailed information on wheel matters that could be used at a later meeting. Inasmuch as the brakeshoe is so closely dependent for its dimensions on those of the wheel this subject will also be discussed at the the September meeting of the committee.

To one reading a report of the Cleveland meeting of the "Standardization" committee it might seem, at first thought, as though little was accomplished, because of an apparent lack of definite conclusions. Such, however, was not the case. The most important part of the successful completion of any task is the marshaling of the forces which are to carry on the work. At the Cleveland meeting the best methods for executing the work of perfecting standards that may be depended upon were thoroughly discussed. As a result it may be expected that the report of this committee to the Engineering association at Atlantic City will be worthy of the most careful consideration by both the operating and manufacturing interests.

NEW SHOPS OF THE BANGOR RAILWAY.

The Bangor Railway & Electric Company has recently completed new repair shops at Bangor, Me. About 80 cars are maintained, 60 of these being used for passenger service. The new shops are of interest on account of their being built of concrete blocks, and also because of the arrangement of their equipment and methods of dealing with the problems of maintenance.

A general view of the shops is presented herewith. In common with good concrete building practice, very large provision was made for natural lighting through windows and

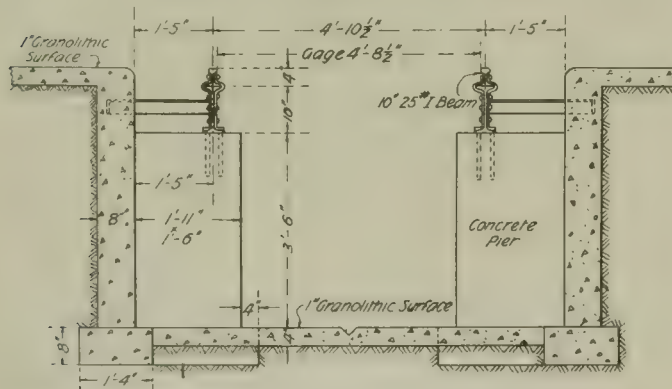


Bangor Railway Shops—General View of New Building.

skylights of ribbed glass. A general plan of the shops is also presented.

Main Shops.

The main shop building is 183 feet 3 inches long by 130 feet wide. It is served by 10 tracks leading from a yard which connects with the main street double-track line passing the buildings. All the sections into which the shop is divided are 1-storied, with the exception of a small storehouse not shown in the illustration, which is provided with a basement for the keeping of scrapers and heavy material. About half



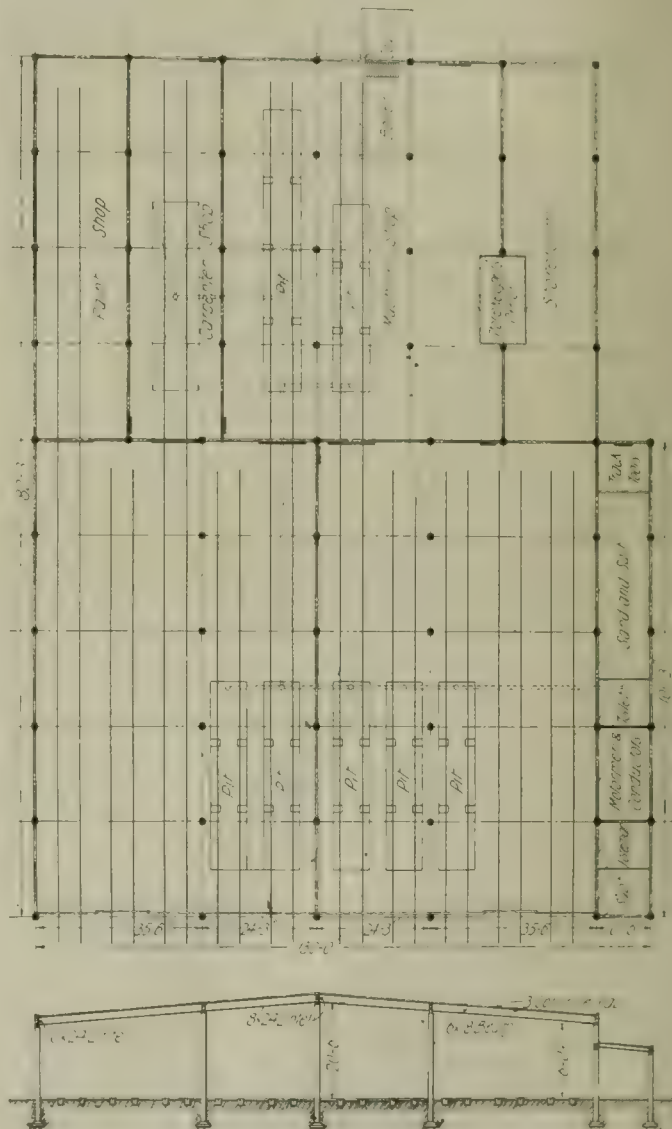
Bangor Railway Shops—Details of Pit Construction with Supporting Beams.

the car shop building is used for the storage of cars, with facilities for daily inspection provided by five pits, each 40 feet long and 7 feet 9 inches wide. The shops are divided into five bays, four of these being provided with track entrances and the fifth with offices and other quarters. The building walls are of concrete blocks, placed between reinforced concrete columns and girders supported on the usual concrete foundations. Kinnear rolling doors are provided at the front. The main girders of the structure are 10 inches wide by 30 inches deep. The concrete blocks are 8 by 8 by 16 inches in dimensions, the window sills, 8 by 10 inches by 9 feet 8 inches, the lintels 10 by 24 inches in section, and the roof beams 6 by 18 inches. The columns are in general 12 inches square in cross section, with chamfered corners. Each

is reinforced by four 11/16-inch vertical steel rods. The foundations of the columns are reinforced by twelve 1/2-inch steel rods. The roof beams and lintels are also well reinforced. The shops are provided with a 6-inch granolithic floor, this floor being reinforced by a 12 by 16 inch deep concrete pier beneath rails, except in pits; the construction of the latter is illustrated. In general the column spacing is about 20 feet.

Pit Construction.

In the pit construction the track rails are supported on 10-inch 25-pound I-beams, anchored into 1-foot 11-inch by 1-foot 6-inch concrete piers, 3 feet 6 inches high, the latter being 14 feet apart on centers. The rails are held to gauge by 3 by 3 inch angle irons, spaced 5 feet apart and riveted to the I-beams. The track rails are clamped to the I-beams.



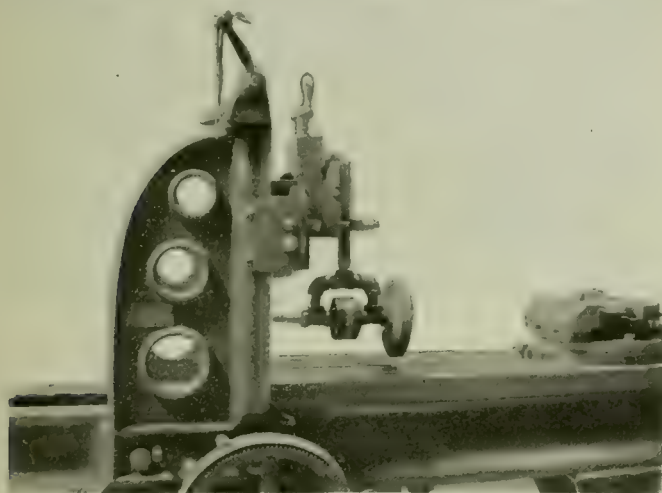
Bangor Railway Shops—Plan and Section of Shop Layout.

A special feature of these pits is their convenience. As there is a space of about 17 inches between the center of the rail and the nearest concrete wall supporting the floor, there is room for a man to sit on the car shop floor and swing his legs into the pit in making truck repairs or adjustments, and on the other hand, a man in the pit finds plenty of room to work on the inside of the truck or the lower outside, as the case may be. All pits are drained to the sewer and can be washed out at any time, while heating is provided by steam coils running parallel to and below the rails. Pit lighting is taken care of by special 104-volt plugs and sockets wired with iron conduit into all the columns of the shops, flexible leads

being run as needed when night work is in progress. Illustrations show the forms used in the concrete construction. Much of the timber consumed here was later utilized in the building of the storeroom wall bins. The roof is of concrete and slag construction, the maximum height being 20 feet 6 inches from the floor to the girder.

General Arrangement.

The general arrangement of the shops is as follows: The storage and inspection division is 119 feet 6 inches long by 101 feet 3 inches wide. It is divided longitudinally into two parts by a fire wall and separated from the rest of the building by a transverse fire wall, all tracks being 11 feet apart on centers. The five inspection pits are placed in the middle, the two most central of these being extended into the machine shop. In this house are two stub-ended storage tracks used for operating purposes. Beside these tracks are an extra superintendent's office, 10 feet long; foreman's office of the same size; lobby for motormen and conductors, 20 feet long; toilet room for the latter, 10 feet long; sand and salt room, 40 feet long, with floor 4 feet below the car house floor, and a track tool room, 10 feet long. All these rooms are in a bay about 10 feet 6 inches wide. One stub-ended track



Bangor Railway Shops—Attachment for Sharpening Buzz Planer Knives.

without pit is provided in the last half of the storage and inspection division.

The southern half of the shops consists of a storeroom, general machine shop, office for the storekeeper, superintendent and master mechanic, carpenter shop and paint shop. The carpenter and paint shops are each served with a single spur track, without pits. Beneath the machine shop is a boiler pit, 9 feet wide, 18 feet long and 10 feet deep, connected with a coal storage, 9 by 10 by 10 feet, outside the buildings, covered with a 3-inch concrete and slag roof.

Storeroom.

The storeroom is 81 feet long by 19 feet wide. One man devotes his whole time to the work of the stores department. On three sides of the room are the bins for the segregated storage of repair and other materials, the general scheme being to separate truck parts from motor and control parts, line fittings and car fittings.

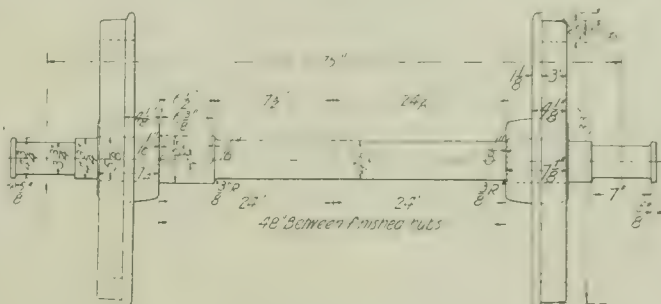
About 600 pounds of scrap copper is sold by the road each month. At each end of the storeroom is a gallery about 20 by 10 feet, hung 10 feet above the floor. Shovels, brooms and heavy tools are stored upon one of these and incandescent lamps in boxes on the other.

The company uses 4-inch trolley wheels with Newell bushings and secures an average life of about 3,000 miles. The wheels weigh about three pounds when new and approximately 2.5 pounds when scrapped. Bar iron for the blacksmith shop is stored in this department on a rack five tiers high and 14

feet long. Excellent lighting of the storeroom is provided by skylights of ribbed glass.

Machine Shop.

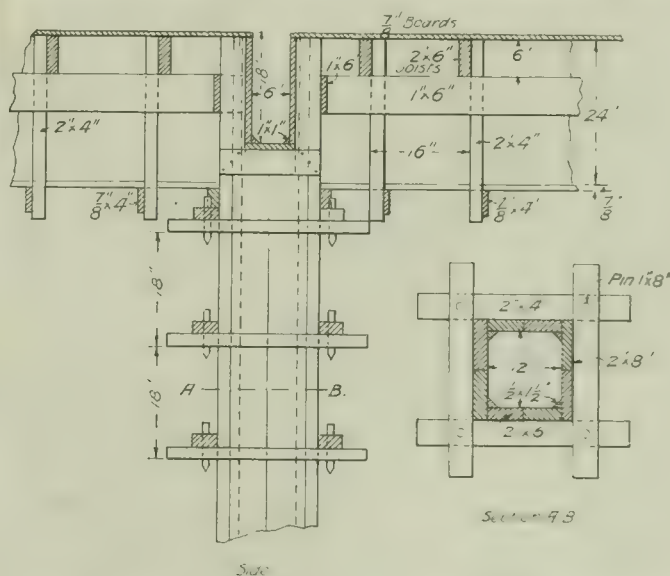
The main machine shop, 80 feet 4 inches long by 59 feet 7 inches wide, is unusually well provided with tools for so small a road. Each of the two pit tracks is served by a radial hoist, which facilitates swinging work from the track to the adjacent tools. All the power-operated machine tools in the room are driven from a single line shaft by a 10-horsepower three-phase 550-volt 60-cycle General Electric induction motor, mounted overhead. This motor is provided with a starting resistance



Bangor Railway Shops—Standard Wheel and Axle.

in the rotor circuit, and to enable it to be started from the floor a pair of levers are installed to connect the resistance short-circuiting handle to be operated without climbing to the motor platform.

The principal tools operated are a 42-inch Niles driving-wheel lathe, used for turning steel tires and equipped with double tool posts; a 20-inch Flather engine lathe; an 18-inch Prentice Bros. drill press; a 1½-inch Reliance tapping and threading machine; a 36-inch vertical Niles-Bement car wheel



Bangor Railway Shops—Details of Forms for Molding Concrete Beams.

borer; a Niles 100-ton hydraulic press; a 20-inch Wood engine lathe; Washburn twist drill grinder; a 17 by 17 by 48 inch Draper planer; a 10-inch emery wheel, and an Ohio Brass gasoline pot for melting babbitt and heating large soldering irons.

Car Wheels.

In turning the car wheels they are revolved in the lathe by pin drives through the space between spokes. This gives a positive drive from the face plates, without springing of the shaft and the uneven cutting had with the usual plan of driving through the axle. In turning the tires a small shoulder is left on the wheel tread close to the flange, and this often saves the loss of $\frac{1}{4}$ inch of stock on the tire. High-speed steel tools are

used in tire turning. These are made by the Midvale Steel Company. The size of the tool is 1 by 1¼ inches, held in a 3 by 2½ inch tool holder. Cast-iron wheels are used on the city lines and steel-tired wheels on the suburban cars. An illustration shows the standard steel-tired wheel and axle arrangement. The axles are 4½ inches in diameter at the center and 5½ inches at the wheel seat, with 33-inch wheels, 7 by 3¼ inch M. C. B. journals, and tires 2½ inches thick, with 3-inch tread and 1½-inch flange when new. The tires are allowed to wear down to ¾ inch before they are scrapped. The wheels weight about 500 pounds when new. Two sets of wheels are turned in each 10-hour day, and the average life of the tires is 120,000 miles. The company has decided to adopt a solid gear instead of a split gear, on account of the breakage of bolts in the latter type. In summer the cast-iron wheels give a life of about 50,000 miles, and in winter 20,000 miles, the winters being very severe in Bangor.

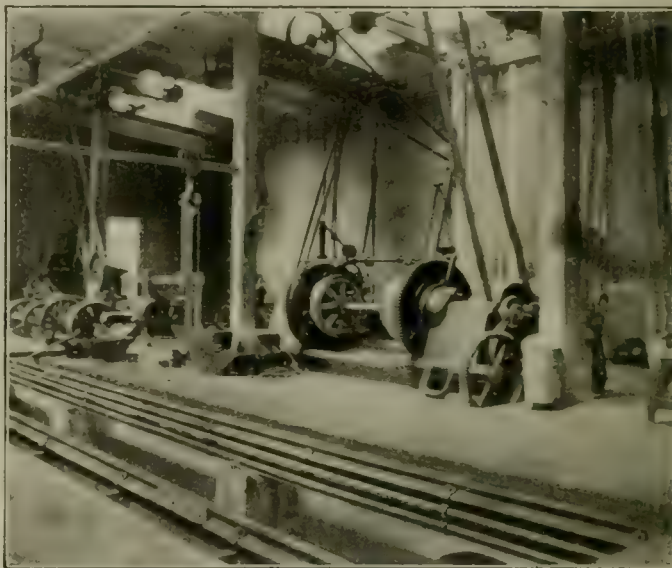
Tires are expanded for shrinking upon the hubs and for removal by a simple home-made device, consisting of a ring of 1¼-inch standard wrought iron pipe, 3 feet in diameter, on the inside of which are bored ½-inch holes, 1½ inches apart, around the entire circumference. The two halves of the ring are joined by a right-and-left coupling and by a plain T. At the outside of the T a short length of 1¼-inch pipe terminates in a side outlet elbow, from which two ¾-inch branches lead, with cocks at their ends. These branches are supplied one with illuminating gas and the other with air under 25 pounds pressure. The heat of the jets will drop a tire off a wheel in five minutes' time, yet the whole device may be held in the hand without discomfort.

Carpenter and Paint Shops.

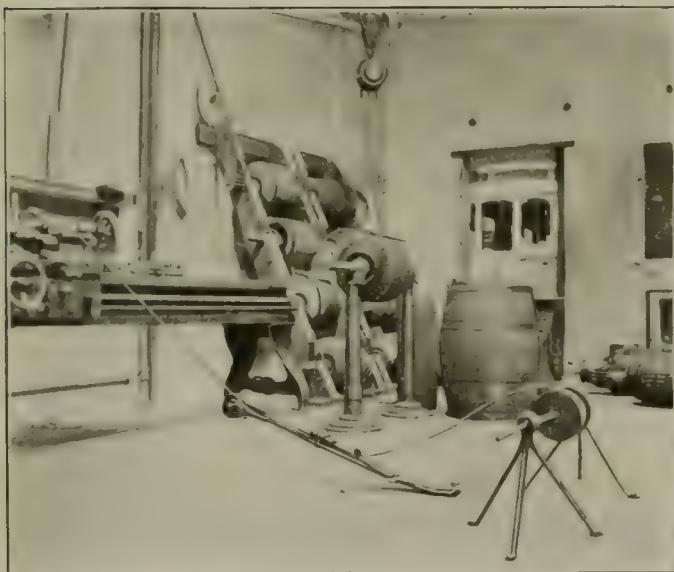
The carpenter shop is 80 feet 4 inches long by 19 feet 3 inches wide and it is equipped with one combined 15-inch White cut-off and rip saw, a 36-inch band saw and a 12-inch buzz planer of the same make, all driven in group by a 5-

ing department. In the foreground of one illustration is shown a device used for holding wire taut when winding coils at the lathe. It consists of a trolley wheel and clamp fastened to an iron bar, which is hinged to an iron strap bolted into the concrete floor, and a reel holder consisting of a rod and pair of bushings supported on two tripods. The adjustment of the clamp and the weight of the trolley holder furnish the desired degree of tension. The rack for armature storage is shown in the background, with a jib crane serving it. The power and lighting service of the shop is metered separately.

One illustration shows a device for sharpening buzz planer knives. It consists of a number of simple pipe fittings and an



Bangor Railway Shops—Repair Shop Showing Wheel Lathe, Jib Crane and Pit.



Bangor Railway Shops—Simple Tension Device for Winding Coils.

horsepower 550-volt General Electric three-phase induction motor. Sashes and signs are stored on a platform 10 feet above the floor and the machines are arranged side by side to enable them to be fed with lumber lengthwise of the shop, without mutual interference. The paint shop is of the same dimensions as the carpenter shop. Signs and outside windows are stored on a platform here on account of the limited floor space.

Miscellaneous.

The four jib cranes in the machine shop have arms 7, 8, 10 and 13 feet in radius. Two of these serve the armature-wind-

iron strap, which constitute a frame holding a grinder, pulley and shaft, the outfit being clamped into the tool rest of a planer like any tool. The shaft runs in two babbitted Ts, with very little friction, and is driven by belt connection from a small motor, which is set on an adjacent barrel. The knives are clamped upon the planer bed and are fed back and forth across the face of the grinder.

The shops are protected throughout by a 6-station Holtzer-Cabot watchman's recorder and clock system.

The master mechanic of the shops is M. E. McCormick, who is responsible for many of the labor-saving methods in use. J. V. Morrill is storekeeper, and the superintendent of the street railway system is W. H. Snow.

President Beggs on Recent Capital Issues of Milwaukee Companies.

President John I. Beggs has made the following statement with regard to the recent large increases of stocks and bonds which were filed just before the passage of bills intended to regulate public service corporations: "There was really no occasion for the howl which went up when the Milwaukee Light Heat & Traction Company and the Milwaukee Electric Railway & Light Company filed their increase in capital and bond issue. As a matter of fact, not a dollar of the increase in capital stock or bonds has been issued, and may not be for some time. We were simply compelled to plan in advance for extensive improvements that have for some time been under contemplation. Further than that, the issue of new capital and additional bonds will be subject to the approval of the public utilities department of the rate commission, just the same as though the filing of new capital intentions had been delayed until the passage of the laws for the regulation of corporations."

CLEVELAND MEETING OF STANDARDIZATION COMMITTEE, AMERICAN STREET AND INTERURBAN RAILWAY ENGINEERING ASSOCIATION.

A meeting of the "Standardization" committee of the American Street and Interurban Railway Engineering Association was held at the Hollenden hotel, Cleveland, O., on Friday and Saturday, July 26 and 27. The sessions were open and the large attendance of representatives of manufacturers indicated how closely they are following the subject of standardization. Preliminary reports of these meetings appeared in the Electric Railway Review, June 27, page 97, and August 3, page 128. The various subjects were considered as follows:

1. Standard axles, journals, journal bearings and journal boxes.
2. Standard brakeshoes, brakeshoe heads and keys.
3. Standard section of tread and flange of wheels.

and the gear-fit size, together with the distance between the wheel hubs which was 48 inches.

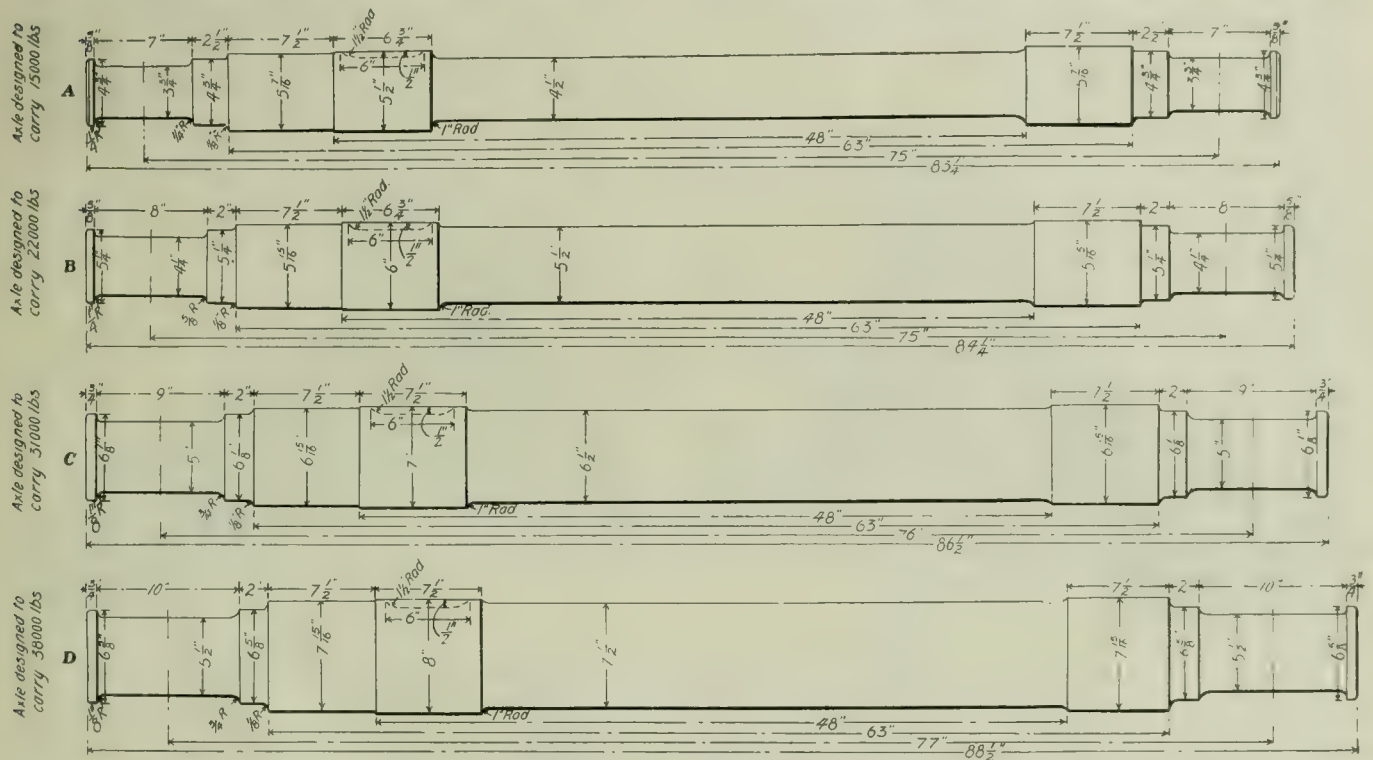
There first was considered the $4\frac{3}{4}$ by 7-inch journal and axle to carry 15,000 pounds. The gear-fit was $5\frac{1}{2}$ inches in diameter with the wheel-fit 5-7-16 inches, to permit of a solid gear slipping over the wheel-fit.

E. D. Priest (General Electric Company) felt that a $4\frac{1}{2}$ -inch axle would perhaps be rather small for a 50-horsepower motor but all right with one of 40 horsepower. Modern tendency seemed to be to increase the size of the axles. If a 50-horsepower motor were used a 5-inch axle would be used.

The chairman explained that the "A" axle was intended to take care of the lighter equipment.

Mr. Priest stated that in fixing the diameters one placed more or less restriction on the motor design because it was always a more difficult matter to design a motor for a large diameter of axle than for a small one, on account of the gears.

The wheel-base was a question to be considered by the manufacturers because it anticipates pitching the motor forward as the axle diameters increase, and on a $7\frac{1}{2}$ -inch axle for a 200-horsepower motor, he thought, off hand, that any



Standardization—Axles Recommended by Central Electric Railway Association.

4. Discussion of standard rail section and special track work as directly affecting the wheel tread and flanges.

Friday Morning Session.

The meeting was called to order by Chairman W. H. Evans, master mechanic of the International Railway Company, Buffalo, N. Y. Mr. Evans was recently appointed chairman of the committee, as announced in the Electric Railway Review of July 13, 1907. The minutes of the May meeting were approved.

H. H. Adams (president Engineering association) said that Mr. Wallerstedt had found his time so occupied with his duties in connection with Ford, Bacon & Davis that he resigned as chairman. Therefore as president Mr. Adams appointed Mr. Evans chairman of the committee. The manufacturers were requested to present their side of the question.

Axles.

The chair announced the subjects for discussion to be axles, journals, journal bearings and journal boxes and suggested that the committee could possibly facilitate its work by considering the suggestions of the Central Electric Railway Association. [Illustrations of the axles recommended by the "Standardization" committee of the Central Electric Railway Association are reproduced herewith for reference.—Eds.] This latter association had considered four axles varying in capacity and had also decided on the wheel-fit size

less than $6\frac{1}{2}$ -foot wheel-base would not do. He noted that the key-way, as shown, for the gear was evidently designed to be milled with a circular cutter, leaving a curve in the corner. He favored using an end mill.

Mr. Adams asked if a key were necessary at all. He had found that the gear would stay if it were put on right. The particular type of key recommended by the Central Electric committee was suggested at the St. Louis convention, and a great many of the roads had adopted it.

Mr. Priest stated that on larger-sized motors it was the practice to use a $1\frac{1}{4}$ -inch key and on the smaller sizes 1-inch and on some still smaller ones $\frac{3}{4}$ -inch.

The chairman stated that one key-way in the gear would be standard for all motors.

Mr. Priest noted, in regard to the distance between the wheel-hubs, that 48 inches was given for all sizes of motors. General Electric practice had been to use 50 inches on the large motors and 48 inches on the small ones. It was necessary to use every available fraction of an inch and 48 inches between the hubs seemed too narrow for large motors.

Mr. Adams said that was a point that the committee had evidently been endeavoring to avoid, viz., giving a sufficient wheel seat in order to get the length of hub on the wheel that would be good practice. This practice had been rather severe on the wheel maker—he had had to reduce the length of his hub in order to accommodate the width of the motor.

Mr. Priest thought it had been the universal practice to use the 50 inches, and if the motor manufacturers had

to take two inches less he felt confident that it would be a very severe restriction on the design of the motor, which the manufacturers would hardly be able to meet successfully. He saw nothing in the "A" axle but could be used by the motor manufacturer. The diameter was right. The distance between the wheel hubs would be satisfactory.

R. C. Taylor (Indiana Union Traction Company) had GE-57 motors operating on $4\frac{1}{2}$ -inch axles. The "A" axle was designed particularly to accommodate the 50-horsepower motor. His company had some of these $4\frac{1}{2}$ -inch axles operating successfully.

The chairman stated that it was the intention that the "A" axle should take care of all motors up to a 50-horsepower maximum. With the wheel-fit and the gear-fit $5\frac{1}{2}$ inches, it would take care of the maximum strain at the point where the most trouble was usually had, that is, where the axle enters the wheel. Where the condition would absolutely require, it would be easy for the railroad company that found it necessary to increase or reduce these dimensions. Mr. Evans stated that when he was connected with the Twin City Rapid Transit Company they had adopted as standard a $4\frac{1}{4}$ by 8 inch axle, which was practically the "B" axle, but in order to accommodate "57" motors and also some of the other types, they adopted $4\frac{1}{2}$ to $4\frac{3}{4}$ by 8 inch axles, the "B" axle, and never had experienced any trouble with the reduction at the motor-fit.

E. S. Lewis (Standard Steel Works) when questioned said that the elements which governed the length of the hub were the relation which the motor clearances and the journal box bearings bear to each other: the greater the length of motor clearances the less distance for the hubs. Hubs varied from $4\frac{1}{2}$ inches to 7 inches in old work. In new work they were very largely 6 and 7 inches. As regards the diameter, the steel-tired wheel took care of that; they used practically the one pattern. The Standard Steel Works had standardized that up to a 7-inch wheel-fit, using two diameters of hub, which ranged as maxima at $5\frac{1}{2}$ inches and 7 inches, and all wheel-fits up to $5\frac{1}{2}$ inches took one size hub and up to 7 inches another size. That length was 6 inches.

Mr. Taylor stated that the report had provided space on the axle for a $7\frac{1}{2}$ -inch hub.

W. S. Adams (The J. G. Brill Company) stated that his experience had been to make the length of the hub at least equal to the diameter of the hole. In reference to the diameter of the axles, the $4\frac{1}{2}$ -inch axle had been used more, he thought, for 50-horsepower motors than any other, and the key seat had been cut into the $4\frac{1}{2}$ -inch diameter. This made a weak point where axles usually broke. By enlarging the gear seat, he thought that a $4\frac{1}{2}$ -inch diameter axle would be ample for that size motor. The weight of the car body should be considered. He presented for consideration the check-plate type of journal for city service. This had been used for 25 years and had given very satisfactory service. It limited the side play of the wheels in regard to the journal boxes. In regard to some of the larger axles, where the motors required 50 inches on the axle, this would make the wheel seat $6\frac{1}{2}$ inches long. In one case it would be bored out very nearly seven inches and in the other nearly eight inches. He thought this would be rather a short hub for an 8-inch bore.

A. H. Weston (T. H. Symington Company) said that from the manufacturer's standpoint he preferred the M. C. B. type of box.

Mr. Taylor stated, in reference to the design of the key seat in the gear, that this subject was very carefully discussed when the axle was designed. This design was really the result of experience had in practice.

Mr. H. H. Adams favored the recommended key seat.

Mr. Evans had found that that style of key was much easier to use, so far as the shop practice was concerned. It very materially reduced the trouble from the axle breaking off at the key seat. He had never experienced a great deal of trouble in pressing on the gear with that style of key seat.

Mr. Taylor said it was the idea that when solid gears were generally adopted, possibly a key seat would not be required at all, and for that reason keys were made one length and all one size. If this standard was adopted the gear manufacturer would not only have standard gears and standard bearings, but also a standard key seat.

Mr. Lewis said that it was the practice of the Standard Steel Works to use in mounting 10 tons for every 1 inch of diameter. That gave satisfactory results as far as the question of loose wheels was concerned with all lengths of hubs, particularly in case of the rolled-steel wheel where, structurally speaking, the metal was so dense that it took care of the wheel fit, provided the axles were turned smooth and the wheel seats were bored smooth.

Mr. Priest remarked that nearly all of the larger size motors were being made of the box-frame type and the axle line projected a little beyond the end of the motor. That fixed

the length of the gear fit. If $7\frac{1}{2}$ inches could be lessened then it would not in any way affect the design of the motor, but if it had to be $7\frac{1}{2}$ inches in each case it might possibly more seriously affect the design. On the heaviest motors designed for interurban service the width of the face of the gears was $5\frac{1}{4}$ inches.

When questioned Mr. Lewis stated that his firm never used a key on any wheel work. With the fits as specified and proper mounting it had been their experience never to have any trouble in regard to loose wheels.

Mr. Taylor said that a rolled steel wheel bored out and put on at a pressure of 80 tons required about 300 tons to press it off.

Mr. Lewis had found in some experiments that under pressures running to 130 tons sleeves turned down to $\frac{5}{8}$ inch thick had a permanent setting over a thousandth of an inch on these fits.

The chairman had found it very desirable to roll the wheel fit to practically the same finish that was put on the journal. The steel wheel was bored as smooth as possible.

Journal Boxes.

The chairman stated that he had enlisted the services of Mr. Weston to complete the detail of the journal boxes according to the dimensions recommended by the Central Electric Railway Association, following in exact detail, so far as possible, the dimensions already standard with the Master Car Builders' Association. The interior of the box took the regular Master Car Builders' journal-bearing wedge.

Mr. Weston suggested that in adopting a standard it would be well to get the maximum amount of wearing area between the guides of the box and the face of the pedestal. Guides $3\frac{3}{4}$ by 7 inches and $4\frac{1}{2}$ by 8 inches would be permissible and give a greater area of wear, and possibly one of $5\frac{1}{2}$ inches might be furnished. The Baltimore Locomotive Works and the T. H. Symington Company finished all boxes with the idea of getting a uniform clearance between the box and pedestal and a uniform clearance between the brass and wedge. The box on the inside allowed a $1/32$ -inch play on the side between the box and the guides. It might be desirable to recommend the standard construction of the top of the box for a peculiar type of truck. The trucks most generally used had a spring at the top. A great many boxes were identical with respect to the fit of the pedestal, but varied from an inch to two inches in the spacing of the equalizing beams. The same was true with respect to the diameter of the core for the helical spring. It seemed feasible to make a box standard on the top for a particular type of truck, as well as to make a standard with regard to the fit of the pedestal.

The chairman said that the dimensions of the pedestal fit were arrived at principally from boxes and trucks already in service, and with respect to the $3\frac{3}{4}$ by 7 inch it was thought that it would be possible to apply that particular box to a great many trucks which had been in service for some time. The wider bearing would be very desirable. There were a large number of trucks in service which had not the pedestal shoe where the width of the pedestal was considerably smaller than four inches.

W. S. Adams said that The Brill Company aimed to give the box a $1/16$ -inch play on the pedestal. The journal boxes furnished were 7 inches wide and $7\frac{1}{16}$ inches between the pedestals. They met the condition of the $3\frac{3}{4}$ and $4\frac{1}{4}$ inch journals.

After considerable discussion by members present the chairman stated it would be acceptable to standardize on $5\frac{1}{4}$ inches as the width between pedestal guides for all boxes. The Master Car Builders' Association had considered the subject of interior fits very thoroughly and provided a set of test gauges with the widths to test the journal bearings and wedges. It was the idea as far as possible to take advantage of the practice of the Master Car Builders. The commercial advantage of that feature of it was very decided.

Discussion of Axles.

The chairman advised that it had been suggested that the width of the gear fit be cut down from that shown on the Central Electric drawings and also a fraction be taken off the wheel fit, thus making a distance of 50 inches between hubs without seriously affecting the design of the gear.

N. W. Storer (Westinghouse Electric & Manufacturing Company) thought that could easily be done, since $7\frac{1}{2}$ inches was a pretty long length of gear fit. He felt that a $7\frac{1}{2}$ -inch axle was larger than necessary to standardize at that time. A large axle increased the center distance of gears and cut down available space for bearings to an extent which was not advisable on smaller motors. He believed that the length of gear face could be cut down somewhat. The largest motors used $5\frac{1}{2}$ -inch gear faces, and $5\frac{1}{4}$ inches could easily be standardized for the largest motor for car service. A number of new processes had been introduced which increased the length of the gear

life very materially with these larger equipments, and he believed a $5\frac{1}{4}$ -inch gear face would give very good service. He believed the 1-inch radius was abnormally large for the fillet on the journal. It seemed that a $\frac{5}{8}$ -inch radius would be amply large. The "A" axle would accommodate any Westinghouse motor up to the "93-A." It seemed to him that the length of gear fit could be cut down to $6\frac{1}{8}$ inches. That corresponded fairly well with the General Electric motors of 40 horsepower.

The chairman stated that the "A" axle corresponded from center to center with the Master Car Builders' axle. All of the centers were identical with the lengths which the steam roads used.

Afternoon Session.

The meeting was called to order by the chairman at 2 o'clock, who introduced the discussion on brakeshoes.

Brakeshoes.

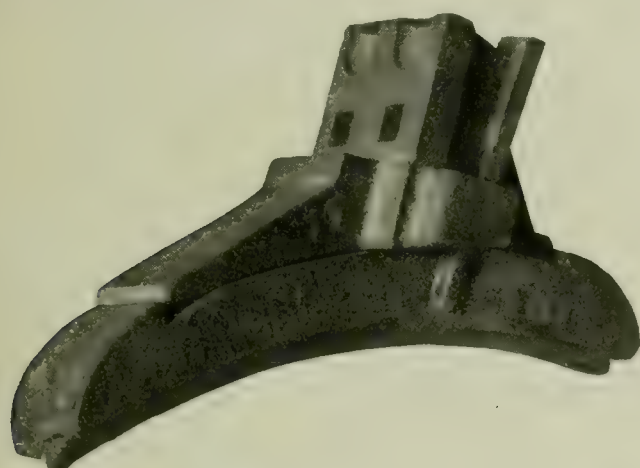
The chairman stated that the brakeshoe which had been suggested by the Central Electric Railway Association was one which could be as readily adapted for service on city trucks as on interurban. It was also planned that this shoe would, to some extent, be interchangeable with the Master Car Builders' shoe; in other words, the shoe could be applied to a Master Car Builders' head, and vice versa, although the Master Car Builders' standard brakeshoe would be wider than the tread of the electric car wheel. The shoe was particularly

interchangeable with the M. C. B., but he did not see how it could be done with the shoes for narrow-tread wheels; hence his design was modified for these narrow wheels by narrowing the width of the brakehead and the end guides, thus offering a common shoe which would accommodate all the wheels not covered by the Central association standard. This narrow head and shoe had been found to be very satisfactory.

The shoe was adapted to any tread from $2\frac{3}{4}$ inches wide down. It applied to everything not covered by the Central association or the Master Car Builders' standards. There would be practically three standards that would not interchange, with the idea that just as soon as the railroads would change its trucks and adopt the wider tread wheel, this small shoe would be abandoned.

A. G. Oberding (Columbia Brake Shoe & Foundry Company) agreed with the suggestion that it was wise to do away with the right and left features without abandoning any part of the old equipment. Three types of shoes would be necessary with the present equipment, according to the width of the tires and the wheel tread. This would eliminate, as Mr. Sargent had said, having three or four hundred types of patterns. If the consumer overlooked ordering shoes for this month's requisition, and found in the course of 10 or 12 days that he needed shoes before the next requisition, they could be taken right from stock. In other words, the manufacturer would become the storekeeper for the roads.

H. H. Adams thought that the Engineering association, which had to deal with possibly a broader problem than the



Standardization—Present Shoe and Head at the Left, with Flanged Shoe and Attachment Conforming to Recommended Practice at the Right—Central Electric Railway Association.

intended to take the place of a number of patterns of shoes which had been in service for a good many years and required a right and left shoe for each pair of wheels, and also to provide for a separation between what was the combination shoe and head. That seemed very desirable as a saving in original cost, percentage of scrap and in the labor of making renewals. From the manufacturer's standpoint it seemed to be very desirable to have a shoe of this character, which followed the practice of the Master Car Builders' Association. The Central Electric Railway Association had particularly recommended a shoe without a flange, where it could be used, but also furnished plans for a flange shoe which was necessary on trucks that did not have brakebeams.

F. W. Sargent (American Brakeshoe & Foundry Company) desired most to see settled the question of a standard brake-shoe pattern, and the elimination of the multiplicity of patterns existing. The ideal simplicity of the Master Car Builders' brakeshoe and brakehead had saved the steam railroads much labor and money; the same advantages could be secured by the adoption of a similar design. Electric railway equipment as regards wheels, varied from the M. C. B. tire, $5\frac{1}{2}$ inches wide, to the narrow-tread wheel of horse car days, which was $2\frac{1}{2}$ inches or less in width. It was wise to do away with this narrow tread and to use the 3-inch tread wheel. He had found at one of the eastern plants about 500 live patterns of street car brakeshoes, which were in constant use in filling orders. Of these 70 per cent were for shoes on wheels with $2\frac{1}{4}$ -inch tread or less; 20 per cent were for shoes on wheels with $2\frac{1}{4}$ to $2\frac{3}{4}$ inch tread; and 5 per cent for shoes on wheels with treads more than $2\frac{3}{4}$ inches.

Mr. Sargent submitted for consideration a blue print showing three designs of brakeshoes, to cover the range of wheel treads from the M. C. B. standard of steam service to the narrow tread of the street car lines of the east, with the idea of changing from one to the other, as the equipment changed. It was wise for the Central association to make its standard

Central association, would have to adopt a shoe and a corresponding shoe head suitable for the narrower tread wheels. A number of roads were using wheels that had treads $2\frac{3}{4}$, $2\frac{1}{2}$ and 2 inches wide. Mr. Sargent's design would meet that condition.

The chairman did not think it a wise policy to advocate a standard which would be an invitation for the railroads to continue what was known to be a very bad practice. They were not placing any hardship on the company that could not use the 3-inch tread wheel. They were simply saying that this was recommended as the very best possible practice for electric traction service. He did not think Mr. Sargent would recommend the narrow shoe as being the best practice for electric railroads.

Mr. Sargent recommended that simply as a supplement, where no other could be used.

Mr. Simmons suggested that the efforts of the association should be twofold; the adoption of the best practice for the guidance of those who could adopt it; also to extend all the help possible to roads which at the present time, and probably for some time to come, would have to get along with certain local conditions. The Milwaukee Electric Railway & Light Company had adopted for standard city practice a rail with a 3-inch head, and would be able, as fast as that was substituted for the present types of rail in the streets, to take care of the 3-inch wheel tread.

At the request of the chair, J. S. Thompson (American Brake Shoe & Foundry Company) described in detail the Central Electric association brakeshoe and head. His description was illustrated by models and sample shoes. The chairman then, after listening to an extended discussion of the relative merits of several types of shoes, suggested that the details of the shoe to be recommended be left to a committee of the manufacturers present to be worked out on the plan of one head for all shoes. He named H. W. Blake (Street Railway Journal) as the chairman of the subcommittee

on brakeshoes and W. S. Adams and R. C. Taylor as other members.

Mr. Taylor agreed with the chairman that only one type of head, either the Master Car Builders' or Central Electric, should be used. He had M. C. B. standard wheels on his freight cars and traffic that he interchanged with on other roads. He thought the head should be the same for all three types of shoes. The matters under discussion would be settled when the head was chosen.

Motors and Axles.

The subject next considered was the dimensions of the axle as controlled by the motors. This brought up the question of whether or not the largest ("D") axle should be recommended.

Mr. Taylor had 5½ by 10 inch journal bearings now on some equipments, and on smaller-sized bearings had axles as large as 7½ inches.

G. N. Dow (president Master Car Builders' Association) stated that on steam roads the breakage of axles had been more in the journal than anywhere else, owing to heat. The larger axles broke quicker after being hot than did the small ones. The Master Car Builders, in anticipation of increasing the size of journal, had appointed a committee this year to recommend a design larger than that now in practice or in use.

Mr. Priest advised that he and Mr. Storer had come to the conclusion that some of the following dimensions seemed perhaps to meet the requirements, although this was not a final conclusion, merely a suggestion.

Motors of 25 to 40 horsepower, 4½-inch linings, 5½-inch gear-fit and 48 inches between finished hubs.

Motors of 45 to 65 horsepower, 5-inch linings, 6-inch gear-fit, 48 inches between hubs.

Motors of 70 to 100 horsepower, 5½-inch linings, 6½-inch gear-fit, 48 inches between hubs.

Motors of 105 to 150 horsepower, 6-inch linings, 7-inch gear-fit, 50 inches between hubs.

Motors of 155 to 225 horsepower, 6½-inch linings, 7½-inch gear-fit, 50 inches between hubs and 611-16 length of gear-fit. This made five sizes. In each case the gear-fit was 1 inch larger in diameter than the lining-fit.

Mr. Storer thought such axles would about fit the sizes of motors as stated; the distance between hubs would fit the motors where required.

Mr. Priest and Mr. Storer were not in a position to make a definite recommendation. They felt that 50 inches at least was necessary for the distance between wheels for a motor of capacity from 125 up to 200 horsepower. Wherever a 6-inch or larger lining was used at least 50 inches distance between hubs was necessary. Single-phase motors had been built with 4 feet 3¾ inches between hubs.

Mr. Storer anticipated no trouble at all in putting a small motor on an axle having 50 inches between hubs.

Hub Dimensions.

N. B. Trist (Schoen Steel Wheel Company) advised that the length of hub required to be perfectly safe on the dimensions of axles which were recommended would be 6½ inches for steel wheels.

Mr. Taylor explained in connection with the recommended standards of the Central Electric Railway Association, that the method of going about the design of these motors was first to choose journal bearings adapted to carry different loads, 15,000, 22,000, 31,000 and 38,000 pounds. After the journal bearings had been chosen the wheel seat was considered and in each case a wheel seat was recommended just a little in excess of the recommended practice of the Master Car Builders' Association. This was done for the reason that the street railway axle was a driving axle, while the axle recommended by the Master Car Builders merely carried the load.

The chairman suggested that as the result of the discussion the recommendations of the Central Electric association could stand as they were, with the exceptions of axles "C" and "D," on which they would increase the distance between hubs to 50 inches in place of 48, and on axle "D" reduce the diameter at the center from 7½ to 7 inches. He thought it better to keep a little above than to recommend something that was possibly going to be a little bit small.

A long discussion then followed regarding the relative diameters and lengths of gear and wheel-fits for the various axles. The chairman then suggested that the topic again be considered on Saturday.

Saturday Morning Session.

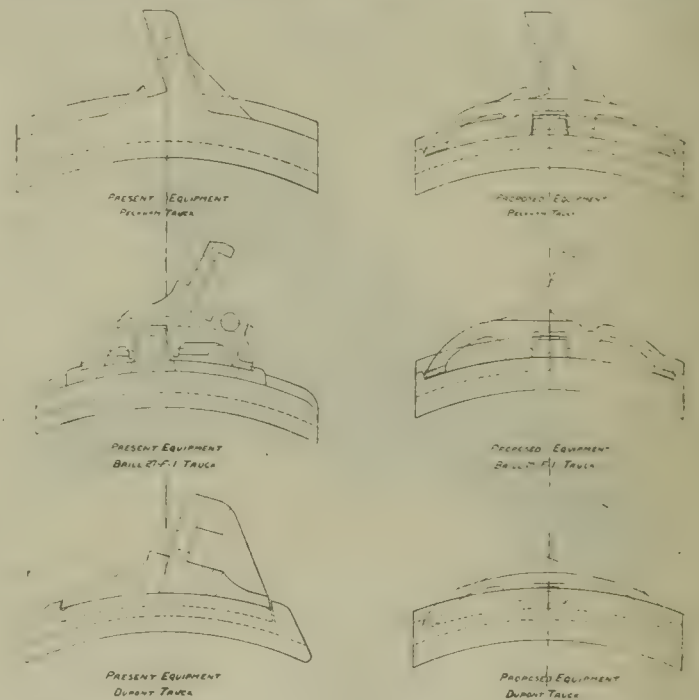
The chairman announced that the programme for the session was assigned to the consideration of wheel treads and flanges; also rails, sections and special track work as affecting wheel treads and flanges. Representatives of the wheel

manufacturers and special work and rail manufacturers were present to assist in the design of a wheel tread and a flange that could be made standard for both street and interurban railways.

He suggested referring to the sections recommended by the Central Electric Railway Association as a basis for discussion. This was a joint meeting of the "Standardization" committee and the committee on the "Maintenance of Way," of which F. G. Simmons, as vice-president of the association, was in charge. Julian Griggs (Scioto Valley Railway) was the chairman of that particular committee. P. H. Griffin (chairman "Wheel Manufacturers'" committee) was there to render assistance.

Wheel Tread and Flange.

Mr. Griffin had sent out blue prints of a tread and flange section and received acknowledgements from nearly all of the members of the "Wheel Makers'" committee on the subject. Some of them had some suggestions to make and some variations of the tread and flange to meet particular cases, but in the main the present flange met with no opposition on the part of the wheel makers, except that it might be necessary to take sufficient time to bring it about. The distance



Standardization—Present and Proposed Equipment with Central Electric Railway Association Standard Shoes.

overall of the tread and flange and the length of the hub was so small that it would not be possible for the car wheel makers to immediately use a very much wider tread and flange without a very much longer hub. They could alter their patterns without very much trouble.

The flange section that was recommended was a good one. Beginning with the point outside the line of tread, the flange, as shown on the section, perhaps might be thickened about one-eighth of an inch; he would thicken it above the line where the back of the flange came in contact with the rail except in the special work. Most of the car wheel makers made the throat a trifle smaller than the one shown. There would be no special objection to having it ½ inch; that could be brought about if new chills were made.

The question of width of tread was one that must be regulated entirely by the railway companies. It would be a very simple matter to widen the pattern of the present design of wheel by adding to the present extension of the tread, but that would not be a very wise thing to do because it would leave that part of the tread without a sufficient support.

The question of the length of the hub was a serious problem. He knew of a number of cases where the diameter of the axle was greater than the length of the hub. That was a very dangerous practice.

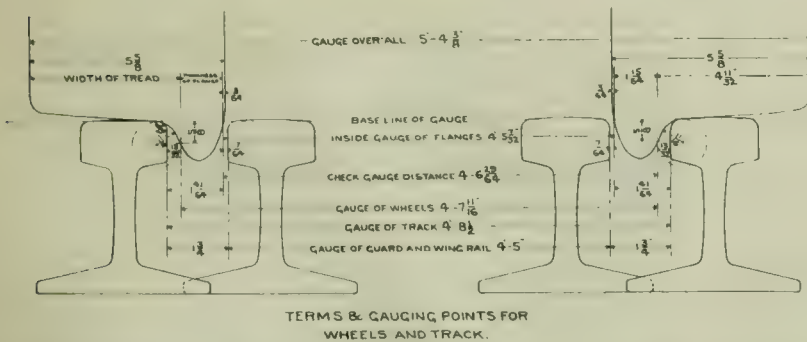
The question of the service of the wheel was an important matter. Questions arose between the railroad companies and car wheel makers as to whose fault it was that the flanges chipped. The fault was because of the increase in the groove or rise in the special work where the switch point

fitted. That had been done to decrease the replacement cost of switch points. It was a question as to whether the economy in that direction was not gained at a very much greater cost in the matter of the wheels themselves, because as the wheel ran along and struck this stubby switch point when it was closed the blow was bound to chip a little piece off the flange sooner or later. Some railroads had tried to remedy that by making some of the flanges thicker. That simply increased the blow that was struck and must have a very serious effect on all motor equipments on the car, jarring it, and was bound to produce the chipping of the flange. Some middle ground should be arrived at and carried out in practice.

J. D. Rhodes (National Car Wheel Company) saw the principal difficulty in the length of the hub on the wheel seat. He furnished some wheels with 4-inch axles with only $3\frac{3}{8}$ -inch wheel-fit, less than the diameter of the axle. The wheels in some cases had to be put on with 50 to 55 tons pressure. He shouldn't have to put on a wheel for city service over 40 tons pressure. He had investigated in a number of places where they had chipped flanges and found many pieces of flanges near different parts of special work.

Subcommittee on Rails.

Mr. Simmons introduced the subject from the track standpoint. When in the course of negotiations it had been advisable to take the matter of rail standard from the "Standardization" committee and turn it over for consideration to the "Way" committee, all the data that had been collected by the "Way" committee and by Mr. Swenson of the parent association was forwarded, under the direction of President Adams, to him. The "Way" committee was somewhat in the position of the "Standardization" committee. It had too much work for three men to accomplish. After considerable correspondence it was decided to appoint a subcommittee to take up this subject. He appointed Julian Griggs, chief engineer Scioto Valley Railway Company, Columbus, O., as chairman of the committee, which would particularly take charge of rails. Charles H. Clark, International Railway, Buffalo, and E. O. Ackerman, Columbus Railway & Light Company, were associated with Mr. Griggs in this work. Mr. Simmons believed that both in the matter of wheels and of rail sections, something should be worked out and recommended by the Engineering association as the best practice which it should be endeavored to attain some time in the years to come. The committee could make recommendations to the coming convention at Atlantic City that would tend to eliminate the multiplicity of designs and sections that are now in use. He believed that the recommendations of the local associations



Standardization—Master Car Builders' Terms and Gauging Points for Wheels and Track.

should be taken up by the main association, as representing the entire country, and all of them given consideration. If a standard were adopted it simply would be a guide to those people who had other conditions. When the time came for them to scrap obsolete equipment or renew their special work, they could make renewals with this final point in view. In Milwaukee they had been for several years past placing in city construction a rail with a 3-inch head, with the view of being able to accommodate ultimately this wider tread which the Central Electric association had recommended. They were doing that at very considerable expense at the present time, operating considerably narrower treads, some of them very much narrower. The 3-inch rail was wider than the wheels and it wore in a peculiar manner; but in rebuilding track they put in new rail. The time would arrive very shortly when they would have a sufficient amount of large rail installed so that they could take up and adopt a standard wheel of a wider tread than they were using.

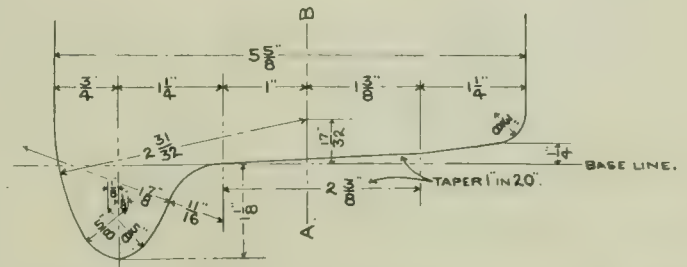
Mr. Griggs reported that at a meeting in Columbus, at which the "Standardization" committee was represented by

J. M. Larned, and the subcommittee by Messrs. Clark, Ackerman and Griggs, there had been a tentative agreement as to a section of rail to be considered best practice. The rails were divided into two heights, the 9-inch and the 7-inch, as covering what was necessary, and then otherwise divided into the T, the groove and the girder rail. With reference to the T-rails the committee thought at that time that the 3-inch head was proper, and that the existing rails would meet the conditions very well without any new sections. The rail section used in Milwaukee was probably the best.

The committee was not prepared to make any recommendations.

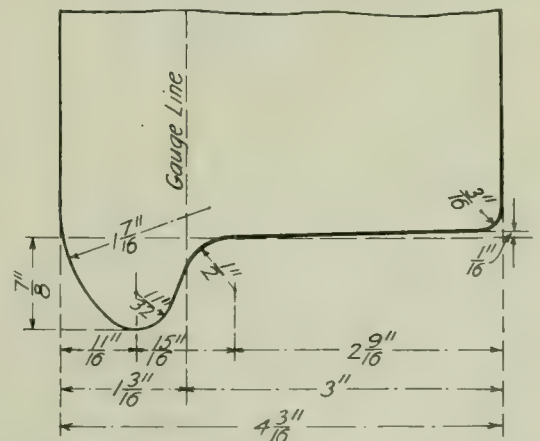
The grooved rail followed the more modern sections that were in use in Boston and Philadelphia and more recently in Chicago, with the slope to the outside of the head and a

DIAMETER OF CHILL MOULDS FOR 33 WHEELS TO BE $33\frac{1}{2}$, FOR 30 WHEELS TO BE $30\frac{3}{8}$ MEASURED ON LINE A-B.



Standardization—Master Car Builders' Standard Tread and Flange.

groove of $1\frac{1}{4}$ inches in depth. The lip was a half inch below the head and the groove was somewhat down at the point of contact with the wheel flange in order to give more room than any of the existing sections, which were designed particularly for city service. It was the intention, when agreed as to what sections were considered advisable to discuss, to send



Standardization—Wheel Tread and Flange of Central Electric Railway Association.

those to the different companies and ask for criticism, also to the rail makers and to the city officials of the larger cities.

Mr. Larned did not consider that the committee at the present time should recommend one single wheel-tread or one single flange. There were too many different conditions.

At the last meeting of the "Standardization" committee in New York there were three different depths of wheel-flange recommended for consideration, three different widths of wheel-tread. It was not decided at that time as to where the diameter of the wheel was to be measured from. That ought to be covered. The thickness of the flange was decided upon for the various depths. It was not clearly covered where that thickness of flange should be measured from. That also should be covered.

Flanges and Special Work.

V. Angerer (William Wharton, Jr., & Co.) spoke about the wheel and wheel treads from the standpoint of the special work maker. It was extremely desirable that one standardized flange only should be adopted, one that would take care

flanges $\frac{7}{8}$ inch high and $1\frac{1}{4}$ inches thick, to take them out when they wore $\frac{1}{4}$ inch. The flange had that thickness on the tangent of the tread. That was done to give the maximum amount of margin with minimum amount of wear, or a reclaim value of the tread; in other words, the flanges would be turned out to their original thickness, with the minimum amount of metal taken out of the treads.

Mr. Griffin suggested that it would be necessary to arrive at some standard as to wear, when a wheel should be removed, the same as obtained on steam railways.

Mr. Griffin suggested appointing some particular members as a committee to take up the wheel question, and to have the manufacturers of special work and wheels represented, this committee to see what it could recommend to the special committee, and then bring the matter before the association.

After a general discussion on the advisability of allowing further time for the consideration of wheels and axles, it was decided that the committee should meet again in New York at the association headquarters, September 12 and 13.

Saturday Afternoon Session.

The discussion of the subjects considered at the previous session was continued.

Mr. Griffin, when questioned, advised that the prevailing practice on steam railroads up to the time they began the use of larger axles, had been to use a $6\frac{3}{4}$ to 7 inch wheel hub for a bore of not to exceed 6 inches, and sometimes less than that. At that time the length on the axle was appreciably longer than the diameter of the bore, and that was for wheels that carried the load instead of driving the load. As to how much a chilled wheel would stand in the way of driving burden in the length of the hub in proportion to the diameter, that was, of course, to a certain extent a matter of pressure which was put on it; but he thought that if under present circumstances it was decided to use a $6\frac{1}{2}$ -inch hub, that that would answer the needs.

The spoke pattern admitted of the use of a larger or

ardizing the actual dimensions so that it would not be indefinite.

W. S. Adams stated that it was the custom of the Brill company to gauge its wheels $\frac{1}{4}$ inch less than the track gauge, measuring from the point that he had given. It would be hard to determine the distance between the backs of the flanges unless there was a specified thickness.

With regard to coning Mr. Lewis had had a number of experiences. On several roads where the cone was originally $1/16$ inch, there was excessive flange wear; he changed the cone to $1/10$ inch and the wear disappeared.

As a result of further discussion it was decided that the subcommittee, which would be appointed should propound to the manufacturers the various questions on which it required enlightenment. The manufacturers would then be able to discuss those different questions from their standpoint, and forward their suggestions. From their replies the committee could then arbitrarily fix standards, so that they would meet with no inconsiderable obstacles.

COMMUNICATION.

M. C. B. Brakeshoe Committee Report, 1907.

To the Editors:

The very interesting table and diagrams presented in the report of the standing committee on "Brakeshoe Tests" of the Master Car Builders' Association at its recent meeting, while clear to many of those who have followed closely the work and reports of the committee, do not, in the opinion of the writer, give sufficient information to enable comparisons to be made between the various shoes tested.

The table which I submit herewith is part of my discussion on the subject, and is intended to supply some informa-

M. C. B. BRAKESHOE COMMITTEE REPORT, 1907.

Wear of brakeshoes on cast-iron wheels. Speed constant at 20 miles per hour. Pressure of shoe on wheel, 2,805 pounds. Resolutions of wheel during application. 190. Equivalent distance run during application, 1,641.5 feet.

No. of shoe	Trade name of shoe	Description of shoe	Area of shoe face in sq. in.	Percentage of shoe face—		Comparative durability, million foot-pounds	Shoe tested made by	Shoe tested by	Mean coefficient of friction, Per cent
				Inserts.	Unchilled cast iron of shoe wear.				
175	Plain cast iron	Unfilled soft cast iron—no inserts	47	0	0	80.8	Griffin Wheel Co.	W. & L. P.	26
285	Plain cast iron	Unfilled soft cast iron—no inserts	47	0	0	92.0	Am. Brake Shoe & Fdry. Co.	L. S. & M. S.	22.5
178	Pittsburg (malleable)	Malleable iron shell—composition filling	47	0	0	114.3	Pittsburg Brake Shoe Co.	W. & L. E.	26
161	Streeter	Cast-iron body—white iron inserts	51	32	0	68	Am. Brake Shoe & Fdry. Co.	H. V. R. R.	18
156	Congdon	Cast-iron body—wrought steel inserts	47	13	0	87	Am. Brake Shoe & Fdry. Co.	L. S. & M. S.	24.7
208	"D"	Cast-iron body—tapered ends—billet	54	0	13	87	Am. Brake Shoe & Fdry. Co.	L. S. & M. S.	24.7
152	Pittsburg (steel)	Pressed steel shell—composition filling	43	0	0	128.8	Pittsburg Brake Shoe Co.	D. M. & N.	27
178	Plain cast iron	Unfilled hard cast iron	47	0	0	100	Am. Brake Shoe & Fdry. Co.	W. & L. E.	22.7
172	Hard insert (Seaton)	Cast-iron body—wrought steel inserts—bolder plate punchings	15	12	0	88	Seaton Fdry. Topeka, Kan.	A. T. & S. F.	22.8
212	Congdon	Cast-iron body—wrought steel inserts	47	16	0	84	Am. Brake Shoe & Fdry. Co.	D. S. S. & A.	20.9
167	"C" Diamond "S"	Cast-iron body—ends chilled—soft steel inserts	51	20	13	57	Am. Brake Shoe & Fdry. Co.	A. T. & S. F.	21
208	Streeter	Cast-iron body—white iron inserts	51	32	0	63	Am. Brake Shoe & Fdry. Co.	L. S. & M. S.	22.5
156	Congdon	Cast-iron body—white iron inserts	47	13	0	87	Am. Brake Shoe & Fdry. Co.	H. V. R. R.	24.7
229	Congdon	Cast-iron body—wrought steel inserts	47	13	0	75	Am. Brake Shoe & Fdry. Co.	C. & A.	26.5
194	Congdon	Cast-iron body—wrought steel inserts	47	40	0	60	Am. Brake Shoe & Fdry. Co.	L. S. & M. S.	26.5

longer hub; but if one put a longer hub on a spoke or single-plate pattern, he did not gain so much as he would with the smaller length of hub on a double-plate pattern. If the practice of the interurban railroads could be brought to the point, so far as chilled wheels were concerned, to use a double-plate wheel, it would be a good thing, for that was something they must ultimately come to. But as all the work must be more or less progressive, and since all the railroads had in use the spoke wheel, he thought the length of $6\frac{1}{2}$ inches for the heaviest type of chilled wheel that was used on interurban service would be all right.

President Adams suggested in regard to axles "C" and "D" that it would be well for the committee to take under favorable consideration the question of lengthening of those two axles sufficiently to meet the requirements of the wheel manufacturer, in that the length of the wheel seat should be at least equivalent to the bore of the wheel, taking into consideration the journal box length, so as to have the proper clearance between the back of the journal box and the hub of the wheel.

W. S. Adams thought the matter of the wheel gauge measurement should be established. The Brill company had established a point of measurement $\frac{1}{4}$ inch above the tread where it intersected with the flange and measured the wheel gauge from that point. They also measured the tread from that point.

Mr. Priest questioned regarding the allowance for pressing fit, whether it should be made in the axle or in the gear. He thought it usual to make the bore of the gear a little less than the axle, the axle being made in this dimension.

The chairman thought that had been the practice in regard to pressing on wheels for a long time. The allowance for the shrinkage was generally made in the bored hole and the shaft was preserved to the standard dimensions. So the allowance for fit had to be made on the gear.

Mr. Priest suggested that that point be covered in stand-

tion in detail to supplement the committee's report.

I realize the committee's report is in the nature of a preliminary one intended to show what the brakeshoe testing machine can do in regard to defining the relative durability and wearing qualities of brakeshoes.

It is important in the study of the question to take into account not only the surface of insert and hard metal on the face of the shoe, but also the volume of each, realizing that the durability of the brakeshoe depends largely on the percentage of hard and tough material in the insert rather than upon the surrounding body metal, which may be soft cast iron acting as a holder for the inserts, and that 90 per cent of the life of the shoe may be comprised within the period necessary to wear out the insert.

In the case of the records in question, some of the tests were made on shoes in which inserts had been worn through or had fallen out, and, of course, such records are not true indications of the performance of the original shoe; for that reason this new table has been prepared, which takes into consideration the actual conditions on the face of the shoe during the test. With this clearly understood, the column of comparative durability can be fairly considered.

The column of "Mean Coefficient of Friction" is obtained from tests of the various shoes in question on chilled wheels under a load of 2,808 pounds, stopping the wheel from a speed of 40 miles per hour.

Will you kindly publish this explanation table for the information of those interested? F. W. SARGENT,

Mahwah, N. J., July 30, 1907.

Chief Engineer.

PLAN FOR DISTRIBUTION OF CHICAGO RAILWAYS COMPANY SECURITIES.

In the Electric Railway Review for July 20 was published in detail the scheme of G. W. Wickersham and L. C. Krauthoff, according to which it was proposed to apportion the securities of the Chicago Railways Company among the various interests of the Chicago Union Traction Company and its subsidiary companies. On August 8 Judge P. S. Grosscup announced the views of himself and Prof. John C. Gray as arbitrators, which involved sundry modifications, along the lines suggested in the statement by Judge Grosscup published in connection with the details of the original plan.

Referring to the tabulation showing proposed distribution of the bonds as published in the Electric Railway Review for July 20, page 72, the revised plan made changes as follows:

We leave the consolidated mortgage bonds in two series, A and B.

We cut down series A collateral bonds from \$6,617,200 to \$5,867,200, but make it a 5 per cent bond, not having any priority except as series A gives it priority.

We make the balance of the bonds, series A and B, 4 per cent for the first five years, and 4½ per cent thereafter.

We transfer one-half of the tunnel bonds from series B to series A.

We transfer the one-half Passenger consols now in the debentures to series B.

We transfer the Passenger stock now in debentures to series B.

We reduce the bonds for the North Chicago City stock from \$499,800 to \$449,820.

We reduce the bonds for the West Division stock from \$1,249,200 to \$499,680.

This makes a total consolidated bonded indebtedness as follows: Series A, \$15,000,000; series B, \$16,900,000; total, \$31,900,000.

We leave the debenture issue at five millions, 4 per cent, and with the transfers already made this leaves them as collateral security to the extent of \$4,801,200 to the junior collateral reserve.

Having taken care of the North Chicago City and West Division stock in another way, this whole junior collateral reserve is collateral to the floating indebtedness of \$4,812,126.

The plan must provide that unless the creditors otherwise consent, the whole of the notes constituting the junior collateral reserve, shall be paid before dividends are paid on the stock.

The participation certificates of series A are to be divided, three-quarters to the North Street stock and West Street stock, in the proportions contained in the present plan. And the other 25 per cent to go as follows:

	No. of participation certificates.		
	Series A.	Series B.	Series C.
North Chicago City Railway Company stock at \$71.....	9,271.29		
Chicago West Division Railway Company stock at \$39.....	21,173.94		
Chicago Passenger Railway Company stock at \$43.....	2,624.29		
North Chicago Street Railroad Company stock at \$1.50.....	48,248.00		
West Chicago Street Railroad Company stock at \$1.....	50,943.90		
Chicago Union Traction Company stock, preferred, at \$50.....		60,000.00	
Chicago Union Traction Company stock, common, at \$25.....			50,000.00
Junior collateral and reserve purposes.....	238.58		
Total.....	132,500.00	60,000.00	50,000.00

We understand that it is desirable that the North and West Side companies have the controlling interest in the property, so that participation certificates C can be modified accordingly.

Wherever the committee is named in the plan for carrying out this plan, it shall consist of Messrs. Wickersham and Krauthoff and three members, one to represent the bondholders, one to represent the North Chicago City and West Division depositors, and one to be disinterested, such committee to be named by the arbitrators.

The participation certificates are to have no stated or face valuation—the certificates representing merely shares and not stated values.

A voting trust is to be created, composed of the present trustees of the Chicago Railways Company and their successors, to vote the stock of the companies for five years and until the notes mentioned in the junior collateral reserve are paid.

The provision of \$250,000 for receivers' allowances to be stricken out, such allowances being transferred to next paragraph.

The cash to be paid for organization, legal and other expenses to include also costs and allowances in the receivership, such expenses, together with organization, legal and other expenses, to be paid out only by the trustees of the Railways company, approved by the circuit court.

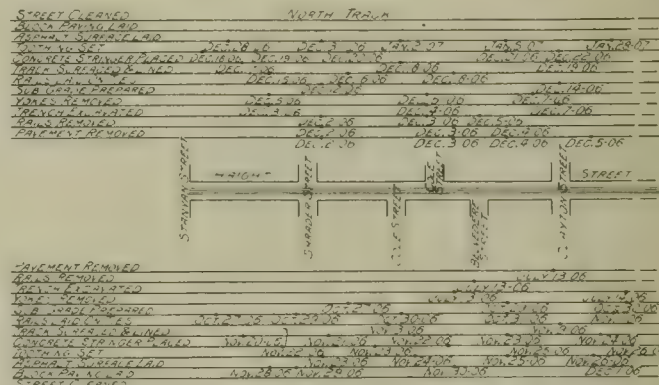
"For the general possession of the Railways company" to be stricken out.

Any of the consolidated bonds, series A or B, which may be used as collateral under this plan, and where not required to be sold to pay the collateral notes or obligations, may after the payment of such notes and discharge of such obligations, be held in the treasury of the company, to be applied only for the purchase of additional property for the corporate use of the company, for which no other bonds have been or can be, issued to reimburse the company.

Further hearings were had on August 9, and it is probable that some other modifications in the plan may be made. It is expected that the court's order as to the receivership will be entered early next week.

RECORDING THE PROGRESS OF TRACK CONSTRUCTION.

A large amount of especially interesting track construction work has been carried on during the past year by the United Railroads of San Francisco. Some of the unique features of this were described and illustrated in the Electric Railway Review for June 1, 1907, page 704. As a means of recording the progress of this work a chart similar to that of which a portion is shown in the accompanying engraving, is used for each street. It will be noted that these charts bear a continuous map of the streets on which the track is laid. Above this map are ruled lines for indicating the progress of the different parts of the work, such as removing pavement, excavating the trench, preparing subgrade, surfacing and lin-



Portion of Chart, Showing Progress of Track Construction.

ing of track, repaving and cleaning the street. A similar set of lines for the southbound track occurs below the map. It will be noted that the means of record is to place dots on the lines. These dots are opposite the points on the map to which the particular part of the work represented by their lines has been completed on the day of record. By also indicating the date along with the dot it is seen that information is recorded from which the construction engineer can determine the stage of each part of the reconstruction work for any day desired. This simple and efficient method of record was devised by A. J. Grier, assistant engineer United Railroads, San Francisco.

Increasing Cost of Traction Service.

The increasing cost of traction service in this country is the subject of an editorial in the New York Commercial. An abstract of the article follows:

Along with the problem of increased cost of equipment and material goes the problem of wages. Wages on the traction lines have probably not increased in as rapid a ratio as the cost of equipment and material. In so far as they have been kept near their original level, however, the result has been injurious in many ways to the traction companies and the public. In spite of the number of men who are always out of work, the traction companies in the large cities, especially in New York, find difficulty in obtaining competent men

to run the cars. To meet the difficulty by a marked increase of wages means an increase in operating charges that can ill be borne when the rate of charges for service to the public remains within rigid lines.

How to remedy this accelerating convergence of the line of expense with the line of receipts—how even to prevent the line of expense from going above that of receipts, when fixed charges are taken into account—is likely to prove the most serious problem confronting the traction manager in the near future. He may obtain a slight respite from anxiety by a check to general business activity, which will postpone the further rise of prices and wages.

It does not seem possible, in the present state of public feeling, that the public would consent to an increase in the charge for service from five cents to a higher amount. On the contrary, the demand is constantly for a lower rate, in spite of the increase in other elements in the cost of living.

To one factor in the problem the traction manager may perhaps look for a certain degree of relief. This is the progressive improvement in physical science, which may reduce the cost of producing power and of carrying passengers. He will also benefit by the fact that the volume of receipts is not greatly impaired in periods of depression, for those who have ridden in carriages are driven to the use of the traction lines, and those who are out of work perhaps use the lines in seeking work or in killing time quite as much as when employed. The steady growth of population also in most American cities is a factor in which our traction managers have a decided advantage over those of Europe. But these factors are only mitigations of a danger that seems likely to be acute in the future—that the constant increase in cost of operation cannot be met from an absolutely rigid rate of payment for the service rendered.

AN EARLY TYPE OF CAR.

The car shown in the accompanying illustration was operating over about a mile of track in Omaha during the year 1868. It, however, remained in service for only a short time and then was replaced by what was at that time a standard 16-foot horsecar. It will be noted from the illustration that the car closely resembles an omnibus mounted



The First Car Operated in Omaha.

on four wheels. A seat on the top and a footrest for the driver are arranged as with the usual form of omnibus. The car body is directly connected with the running gear by a single king-pin so that at the ends of the routes it was not necessary to build a loop or Y, but when it was desired to change the direction of operation, the driver turned the horses and thus by means of the stiff iron pole the car body was swung around on the trucks so that it could be driven in the opposite direction.

This historical exhibit is stored in one of the car houses of the Omaha & Council Bluffs Street Railway Company at Omaha, Neb.

There are 60,000,000 atoms in one cubic inch of copper, according to an English scientist.

INTERBOROUGH-METROPOLITAN INVESTIGATION.

The investigation by the New York public service commission of the Interborough-Metropolitan merger and its effect on New York transportation conditions, which was begun on Thursday afternoon of last week, has been continued throughout the present week. The first witness was President Theodore P. Shonts of the Interborough-Metropolitan Company. An abstract of Mr. Shonts' testimony at the Thursday afternoon session was published in last week's issue of the Electric Railway Review, page 135. The first stages of the inquiry have been devoted to learning the company's methods of handling the traffic and to ascertaining what steps it has taken to relieve congestion. At the first session William M. Ivins, special counsel for the commission in charge of the investigation, brought out the fact that the elevated, surface and subway lines in Greater New York carried about 1,259,000,000 passengers during the last calendar year, while the steam railroads of the United States carried about 800,000,000 passengers.

Mr. Shonts' Testimony.

Mr. Shonts said the company was preparing a new set of traffic regulations which it would ask the city to put into effect to remedy the surface congestion. In regard to the subway he said that there were in operation 791 cars, of which 300 were of steel. He admitted that the steel cars were safer but said that to replace the wooden cars with steel would cost about \$3,250,000. He said that the 50 new steel cars ordered for the subway would probably not be used to replace the wooden ones because the extra cars were needed. He said that the subway express trains were operated at a speed of 25 miles an hour, which means a developed speed of 43 miles an hour between stations, and that to increase the speed to 30 miles an hour, as desired by the city, would require a developed speed of 56 miles an hour, which would be unsafe. He said that more cars could be operated on the elevated lines as soon as they could be secured.

Mr. Hedley's Testimony.

At the resumption of the inquiry on Friday afternoon Frank Hedley, general manager of the Interborough Rapid Transit Company, stated that nothing had been done to comply with the resolution passed by the old rapid transit commission insisting that no cars containing inflammable material be used in the subway and calling upon the company to remedy defects in the water hydrant system. E. P. Bryan, vice-president of the company, said that no change in the cars had been made on account of the resolution; that they had been approved by the commission when first put into service, less than three years ago. When asked his opinion as to the Illinois Central type of side door cars, Mr. Hedley said he thought the system would not work well in New York because of the danger to passengers in opening and closing all the doors at once by a lever operated from the platform. Mr. Hedley also testified that some of the cars ordered from the St. Louis Car Company had been delayed by a strike.

Cost of Construction.

Mr. Shonts was then recalled and was directed to have prepared as soon as possible a table showing the values of the physical and intangible properties of the company. Mr. Ivins read a list of the different subsidiary lines with the mileage and cost per mile as reported to the state railroad commission. Mr. Shonts was asked to explain the reasons for the wide variance in the cost per mile of the different roads, but said he was not sufficiently familiar with the history of the lines to do so. The figures for the different lines as placed on the records are as follows:

Dry Dock Railroad,	8.47 miles,	\$594,251 a mile.
Forty-second Street Railroad,	12.25 miles,	\$950,446 a mile.
Fulton Street Railroad,	4.1 miles,	\$2,553,750 a mile.
Kingsbridge Railroad,	3.19 miles,	\$700,255 a mile.
New York City Railway,	1.57 miles,	\$3,254,484 a mile.
Twenty-eighth & Twenty-ninth Street Railroad,	2.83 miles,	\$1,214,274 a mile.
Southern Boulevard Railroad,	3.5 miles,	\$163,439 a mile.
Tarrytown & White Plains Railroad,	21.58 miles,	\$42,863 a mile.
Union Railway,	40.33 miles,	\$207,167 a mile.
Westchester Electric Railroad,	27.97 miles,	\$82,383 a mile.
Yonkers Railway,	25.24 miles,	\$122,532 a mile.
City Island Railroad,	1.8 miles,	\$44,518 a mile.
New York City Interborough Railway,	8.19 miles,	\$610,600 a mile.

Pelham Park Railroad, 1.4 miles, \$39,229 a mile.
 Bleecker Street & Fulton Ferry Railroad, 4.74 miles, \$380-
 920 a mile.
 Broadway & Seventh Avenue Railroad, 8.27 miles, \$1,808-
 780 a mile.
 Central Park North & East River Railroad, 9.55 miles,
 \$555,656 a mile.
 Central Crosstown Railroad, 1.8 miles, \$1,311,550 a mile.
 Christopher Street & Tenth Street Railroad, a fraction
 under two miles, \$766,211 for two miles.
 Eighth Avenue Railroad, 10 miles, \$166,143 a mile.
 Ft. George & Eleventh Avenue Railroad, .82 mile, \$3,638-
 258 a mile.
 Forty-second & Grand Street Railroad, 3.33 miles, \$775-
 563 a mile.
 Metropolitan Street Railway, 23.86 miles, \$2,303,279 a
 mile.
 Second Avenue Railroad, 13.69 miles, \$664,002 a mile.
 Sixth Avenue Railroad, 11.4 miles, \$2,303,822 for the total.
 Third Avenue Railroad, 13.19 miles, \$3,360,162 a mile.
 Twenty-third Street Railroad, 1.93 miles, \$1,690,165 a
 mile.

Bronx Traction Company, 6.91 miles, \$47,239 a mile.
 Mr. Shonts stated that the company had about 80 miles
 of track in Manhattan not electrified and that contracts had
 been let for the electrification of about 15 of these. He said
 that the Twenty-eighth and Twenty-ninth street lines would
 have been included if the permits had not been delayed.

Deficit on Surface Lines.

Mr. Ivins then reverted to the question of finances and
 asked whether the lines were making a profit. Mr. Shonts
 replied that the elevated system was showing a profit and
 that the individual lines operated by the New York City
 Railway, with the exception of the Third Avenue line, were
 operating at a profit, although the system as a whole had a
 deficit of \$2,886,305 for the year ended June 30, 1906. Paul D.
 Cravath, general counsel, explained that the deficit indicated
 the amount by which the net earnings of the system failed to
 pay the guaranteed dividend of 7 per cent on the stock of
 the Metropolitan Street Railway.

Another matter of interest which was brought out in the
 testimony was that the stock of the New York & Long
 Island Railroad Company, which is building the so-called
 Belmont tunnel under the East river at Forty-second street,
 is owned, not by August Belmont, as generally supposed,
 but by the Interborough Rapid Transit Company. Residents
 of Queens have shown considerable interest in this matter,
 as on it depends to some extent the question of whether an
 extra fare will be charged for the ride through the tunnel.

Labor Scarce.

Mr. Shonts was then questioned as to what had been done
 in the way of reorganizing the operating department since he
 took office and replied that there had been no substantial
 changes. He said they were considering some increases in
 the service as soon as they could get men. He said that in
 the last 18 months it had been so difficult to get men that
 the educational requirements had hardly been lived up to
 and that the employees were hardly up to the standard of former
 years. Mr. Shonts was unable to give the number of cars
 operated on the subway and elevated lines before and after
 the merger, but promised to secure the figures and report.
 He said the company had never considered the plan of at-
 tempting to distribute the traffic by giving transfers between
 the elevated, surface and subway lines, and he did not think
 they would ever favor such a plan. He added that it was
 the desire of the company to foster the use of the surface
 lines for short-haul traffic and to use the elevated and subway
 lines for the long hauls. He said that negotiations are now
 in progress with Police Commissioner Bingham for the
 restoration of uniformed special policemen in the subway sta-
 tions to help handle the crowds.

Congestion on Elevated Lines.

The hearing was resumed on Tuesday afternoon with Mr.
 Hedley on the stand. Mr. Hedley agreed that congestion was
 caused at the One Hundred and Forty-ninth street station by
 the method of transferring from the elevated to the subway.
 Passengers leaving the elevated receive a slip as they go out
 the gate and this must be exchanged at the ticket office for
 a subway ticket. He admitted that it would be more con-
 venient for the passengers to receive a ticket in the first
 place and drop it in the box, but that the method was re-
 quired to protect the revenues by preventing the sale of
 unused transfer tickets on the streets. Commissioner Eustis
 tried to make the witness admit that the company cared
 more about protecting its revenues than for accommodating
 the public, and stated that the delay in exchanging tickets
 often obliged a line of 40 or 50 passengers to wait and miss
 a train.

The greater part of the day's proceedings was taken up
 by inquiring into the basis upon which the schedules of the
 elevated trains are made up. Mr. Ivins sought to force from
 Mr. Hedley an admission that the schedules were compiled
 so that every train should be run at a profit, but the witness
 would not concede this. "Well, are you prepared to swear,"
 insisted Mr. Ivins, "that your schedule is made up for the
 purpose of accommodating the entire traffic without reference
 to the profit of the train trip, without consideration at all of
 the profit per train trip?" "Of course there must be some
 consideration to the cost of running our trains," Mr. Hedley
 answered, "and it is a fact that there is consideration given
 to the cost of running the trains when the schedule is being
 prepared." Mr. Hedley asserted that the reason why the ele-
 vated roads were not being operated to their full capacity was
 for the want of equipment. He explained that it had been
 expected when the subway was opened that there would be a
 falling off in the elevated traffic, but that the business, con-
 trary to the company's expectation, did not fall off. He added
 that in order to increase the elevated service the company
 had 200 new cars under construction and that plans were
 being considered for altering the elevated structure at the
 junction at Fifty-third street and Ninth avenue so as to permit
 more trains to cross. When asked what he considered a full
 train Mr. Hedley said he would not consider it necessary to
 put on additional cars because a few of the passengers were
 obliged to stand. He said:

"What I mean is that if trains are leaving One Hundred
 and Fifty-fifth street or One Hundred and Thirty-fifth street
 going down to South Ferry, when those trains get down to
 One Hundred and Fourth street there are five or six passen-
 gers standing in each of the cars. When that same train
 gets down to Sixty-sixth street enough passengers have got
 off so that there are some vacant seats and we do not think
 it necessary to have additional cars attached to that par-
 ticular train."

It is stated that Mr. Ivins does not contemplate calling
 either August Belmont or Thomas F. Ryan as witnesses for
 the reason that if the inquiry should lead to developments
 which might warrant the infliction of penalties they would
 not be able to reach them if they had been called as witnesses.
 The public utilities law provides for immunity to persons who
 have testified or given documentary evidence, but does not
 exempt corporations.

TESTER FOR TROLLEY WIRE SUPPORTS.

A tester for trolley wire supports is in use in England.
 It is used to detect leakage from the supported wires through
 to ground. The regulations of the British Board of Trade
 specify that each insulator supporting overhead con-
 ductors for electric railways shall be tested not less often
 than once a month, defective insulators being immediately
 removed and efficient ones substituted.

Owing to the fact that two instruments are in use in
 series at each testing point, the daily test of the entire line
 from the central station does not give sufficient means for
 detecting faults in the overhead insulation. It would be a
 tedious proposition to test each insulator separately with a
 pole and contact, or from a tower wagon.

The tester in question has been designed for application
 to the trolley pole of a testing car, and affords a rapid means
 of detecting faulty insulators. It consists of a light aluminum
 frame which is clamped at the top of the trolley pole and
 carries a wooden crossarm pivoted at the center. At each
 end of this crossarm is a light bow or spring, and as the
 wheel passes under the span wire each of these springs
 makes momentary rubbing contact against the underside of
 the span wire. There is a device which operates auto-
 matically to keep the crossbar always at right angles to the
 trolley wire, regardless of the position of the trolley pole.

In operation the device is used in connection with a
 moving coil voltmeter scaled to 600 volts. It will be readily
 understood how the connections may be arranged so that
 when a faulty insulator is struck and the span wire found
 to be electrified, the voltmeter will show a deflection at the
 instant of contact. The sensitiveness of the voltmeter may
 be increased by pressing a key wired for that purpose, and
 the meter is also arranged with a direct reading insulation
 scale with a range of 10 megohms.

During the test the car is run at about seven miles per
 hour, so that it requires but a short time to test the overhead
 insulation of the entire system.—Engineering News.

PIPING AND POWER STATION SYSTEMS—XLVIII.

BY W. L. MORRIS, M. E.

Fire protection for power stations, shops, etc., can be divided into two separate classes: interior and exterior service. The conditions encountered in each case should be thoroughly studied and understood before attempting to design either service. The interior service is the proverbial "stitch in time" which "saves nine." It is the quick use of water in small quantities applied to a fire at its beginning that makes the well-provided interior protection so valuable. A room 50 by 100 feet may have only two 1½-inch hose reels on the wall, but if they can be put into use without delay and are so located that they can be readily reached and will cover the entire room, there will be but little chance of a fire getting beyond the control of the interior fire protection.

It is the interior fire protection which has led to the invention of so many forms of chemical fire extinguishers. Some of the latter are dry chemicals thrown on the fire and others liquids thrown on the fire by breaking bottles, or applied by means of a hose and the pressure resulting from the generation of carbonic acid gas in the interior of the extinguisher. Some shops are fitted with barrels of water and pails. Automatic sprinkler systems are installed in others, but all of these have been found insufficient at some time and they are then supplemented by some other means of protection.

A study of the necessities in fire fighting, by those who make this their sole occupation, are: First, a system of water supply adequately covering the territory to be protected. Second, an alarm system covering the territory to be protected. Third, an organization of men who have been trained and understand their duty in case of fire. Fourth, apparatus for pumping water to the highest and most remote parts of a building. Fifth, means of egress when the building is no longer tenable. Sixth, auxiliary apparatus for extinguishing smaller fires without using large quantities of water, and thus causing serious losses through damage by water.

If an institution wishes to equip itself on the same basis as a city fire department it will follow similar precautions. The first requirement of fire fighting demands a water supply for each room, or at least some means of bringing water to the room. The second would demand an alarm system which would immediately sound an alarm if any one room was on fire. The third would require a fire drill in order that the employees might be perfectly familiar with what is expected of them in case of fire. The fourth requirement would probably necessitate a fire pump to give the necessary pressure. The fifth requirement is fulfilled by the installation of fire escapes that can be reached by a man holding a hose nozzle in his hand. Lastly, portable chemical fire extinguishers would be required in buildings in which water might cause considerable damage.

A point which requires the most careful consideration is the selection of fire hose, a subject which has caused the city fire departments unlimited trouble. Any article containing rubber depreciates with age and still rubber is essential in the manufacture of water-tight hose. It certainly seems wasteful to buy high-grade hose and allow it to lie until it is useless, but there is no method of avoiding this. It has in many instances been the unfortunate experience of fire departments that it is impossible to put out fires with old weak hose. Fire departments cannot afford to take chances with old hose past its useful life and companies and individuals cannot better afford to take such chances. The hose question is too often entirely or seriously neglected, although it is one of the most important parts of fire protection system, as firemen can do nothing with rotten hose. Insurance companies realize this point and for this reason recommend tanks and pails, as they know that the hose is frequently unfit for use when it is required.

Alarm systems receive little or no attention, fires usually being first reported when some one discovers smoke or flames coming from a window and reports it to the engineer. Buildings should be fitted with a fire alarm in each room. This can be accomplished in a very simple manner, as shown in Figure 300 (M 1-5). The alarm consists essentially of two wires twisted together and insulated from each other by a compound which melts at a comparatively low temperature. These twisted wires are run under benches, around walls, along the ceiling, at stairways and any other exposed point. The number of circuits which can be thus connected is unlimited. There can be any number of circuits in a room, each having a marker at B, which becomes discolored as soon as the current flows and rings the bell, C, in that particular room, and also operates the light or annunciator and sends in an alarm to the fire station. The batteries may be placed at E and the entire system operated on low voltage. The lamps or the voltmeter, F, show the voltage of the batteries at all times. The fireman (or the engineer, if he is in charge of the fire system) then sees where the wires, A, have been heated, and if the location is not easily found he can look at the markers, B, to locate the short-circuit, and, if caused by an accident, it can easily be repaired by rewaxing. This device has the advantage that it can be set low down and in dangerous locations without the dangers accompanying the use of automatic sprinklers. This device would set off the alarm before the sprinklers would have time to work and firemen

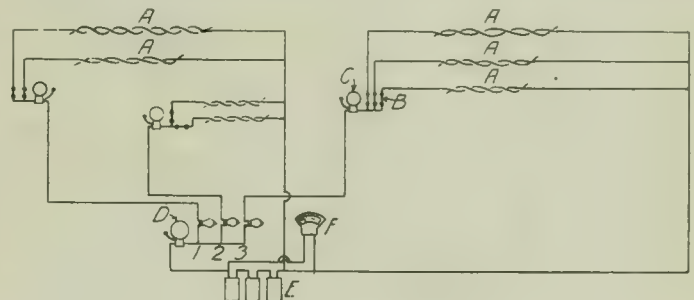


Figure 300 (M 1-5).

would be on hand long before the fire had gained much headway. The wires would be quite small and the cost of the installation would be very slight, as it could easily be installed by the resident electrician or one of the engineers. Instead of running separate positive and negative leads, double conductor wire could be used, the wires being separated where the twisted wires are attached.

The inside fire service should be a branch from the fire main, as shown in Figure 298, with an indicator valve, C, for each building, as it is desirable that the inside fire service be used in each building until it is no longer tenable. The main shown at A would be used to supply all services other than the fire service.

With such an alarm system and the pump pressure device shown in Figure 299, it would be good practice to give an alarm whenever both are caused to operate together, showing that heat has made the wires, A, come in contact, and that water is being drawn from the fire system. In each room at the alarm, C, there should be a spring-closed switch, which should be opened or closed, giving an alarm for the city fire department or for additional help, without necessitating leaving the room where the fire is found. This general fire system, if arranged in similar manner to that of the city fire department and adaptable to private institutions, would be installed as follows:

1. Fire mains installed on the loop plan as shown in Figure 298.
2. Fire pumps installed and isolated with door and windows opening outside.
3. Fire pumps having an individual indestructible steam line from not less than two boilers.

4. Fire pump having pressure raising device, shown in Figure 299.

5. Fire lines to individual buildings with valve at C, as shown in Figure 298.

6. Hose provided for all rooms and connected ready for instantaneous use.

7. Hose tested at regular intervals.

8. Alarm system as shown in Figure 300.

9. Employees drilled at least once a month.

10. Chemical extinguishers in locations where water would cause considerable damage, but hose also installed in these locations.

11. Fire escapes placed so that a man with a fire hose can remain the longest possible time and know that he can get out.

12. Standpipes extending to the roofs of all buildings.

If buildings are thus properly protected, and in addition suitable fire walls, fire doors, etc., are provided, the fire risk will be greatly reduced, resulting in lower insurance rates and making the possibility of loss a minimum if it is impossible to carry insurance.

Fire Service to Hydrants, Class M 2.

The hydrants, D, shown in Figure 298 would ordinarily have two openings for 2½-inch hose, and have an inlet not smaller than the size of the main. In determining the depth to bury the fire main, the length of the hydrant that will be used should be known. The standard depth is five feet from the pavement to the bottom of the pipes. In placing the hydrant a flat stone well rammed down should be put under it to prevent settling. Old bricks, stone, etc., should be placed around the drain hole to permit the water to seep away and also to prevent sand and gravel from entering the hydrant. The hose connection should point toward the building.

Standard hydrants require a special wrench to open the valve, and as these wrenches are also necessary to remove the hose caps and also to attach the hose, little would be gained by having a handwheel fixed to the hydrant, even though it were in a position where it would not be tampered with. In some installations the hose and fire tools are kept in a house surrounding the hydrant. A better plan, however, is to have a central fire station where all hose for the hydrants is kept, and have hose carts to carry it. By having a central station it serves as a meeting point in case of fire and the chief has therefore better control of the men.

The men outside at the hydrants have difficult work to do and should be under the orders of the chief engineer or his assistant who may be on duty. There should be a fire cart kept at the fire station for carrying six or eight 50-foot lengths of 2½-inch hose, three or four nozzles, two hydrant wrenches, axes, picks and saws, all in readiness to be pulled out and run to the hydrant at which they are to be used. This cart should be double ended, so that it can be run in either direction. There should be handles at each end of the cart to permit lifting it over obstructions and it should have guide wheels at the front and back to prevent it from being tipped over.

Long-Distance Transmission.

A report from Goldfield, Nev., says that a project is on foot in Ely to relieve the fuel situation which Ely must soon face. A large corporation is now being formed, the purpose of which will be to supply the motive power for the mines and factories of Ely. It has been estimated by conservative engineers that when the smelters, mines and other enterprises needing power in one form or another are in active operation, it will require a railroad with the present facilities of the Nevada Northern to keep them supplied with coal alone. It is the plan of the new company to acquire the right to take power from a large stream in southern Idaho and transmit it over 300 miles to Ely. Engineers have already estimated the cost of the installation of the entire plant, and it ranges from \$2,500,000 to \$3,000,000. Surveys will soon be sent over the route and the most feasible one selected.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Care Required of Those Riding or Walking on Tracks.

Hamlin v. Pacific Electric Railway Company, 89 Pacific Reporter, 1109.—The supreme court of California thinks that the correct rule is that one riding or walking along the tracks of a street railway company must use reasonable care in the exercise of his faculties of sight and hearing to watch and listen for cars going in either direction. A failure to hear or see the car is not by itself proof of negligence in all cases. Whether such exercise of the faculties as, under all the circumstances of the case, was reasonable, would have averted the injury, is a question of fact. The degree of vigilance to be exercised by the person on the track is to be determined by the jury and not laid down as matter of law, wherever the question of contributory negligence is proper to be submitted to the jury at all.

Two Feet Outside of Each Outside Rail to be Repaired.

City of Amsterdam v. Fonda Johnstown & Gloversville Railroad Company, 104 New York Supplement, 411.—The supreme court of New York, appellate division, third department, says that the decision of this case depended on the proper construction to be given to Section 98 of the railroad law, which requires the company to keep in repair that portion of the street "between its tracks, the rails of its tracks and two feet in width outside of its tracks, under the supervision of the proper local authorities, and whenever required by them to do so, and in such manner as they may prescribe." It says that the ties upon which the defendant's tracks are laid are eight feet in length, and the track is five feet wide, outside measurement. We may fairly assume that the tie is about the standard length tie for railroads, and that the object of this section was to require the company to keep in repair that part of the street which it more particularly occupies, and which it is liable to disturb in laying, changing, improving or altering its tracks. Assuming a track to be about five feet wide on the outside, two feet each side of this would make the total width to be repaired by the company nine feet, and in putting in an 8-foot tie it is very probable that at least nine feet of the roadway would be disturbed and require attention. The situation, therefore, fairly seems to indicate that the intention was to cover a space two feet outside of each rail, and the language of the statute, requiring the company to repair that portion of the street two feet in width outside of its tracks, seems to indicate that the two feet to be kept in repair is a continuous two feet measured from the track, and not two strips, one foot in width, measured from each outside rail. The court thinks that the language of the statute, as well as its evident purpose, shows that the part of the street to be repaired by the company is two feet in width, measured from the outside of each outside rail.

Changing from Double to Single Track for Repairs—Unpublished Change of Running Time.

Baldwin v. Schenectady Railway Company, 103 New York Supplement, 514.—The supreme court of New York, appellate division, third department, says that while in the company's service as a motorman the plaintiff was injured in a collision with a work car where, for a distance of a little more than half a mile, one of the company's tracks had been removed for the purpose of making repairs, and consequently at such time and place cars were being operated in both directions over one track. When the company began to operate its cars in opposite directions over the same track, a new situation was created, fraught with additional dangers to its employees. It then became the duty of the company to take reasonable precautions to protect its employees commensurate with such unwonted danger. It was incumbent on the company either

by the promulgation of timetables or by other suitable methods or regulations to operate its cars with a view to the safety of its employees.

In this case it appeared that before the plaintiff was assigned to this car, which was known as an "all-night car," it had been, between 12:45 and 6:45 a. m., making what was scheduled at an hour run in 45 minutes. The rules of the company provided that conductors and motormen should receive their instructions from the superintendent. The plaintiff asked the assistant superintendent about the car making trips in 45 minutes, and was by him referred to the conductor of the car for instructions, who told him to make the trips between the hours stated in 45 minutes. The collision in question occurred between 4 and 5 o'clock in the morning. The court thinks that the question of the company's negligence should have been submitted to the jury. It says that the company could be subjected to no unfavorable criticism because of the inadequacy of the rules. Its culpability rested in the fact that it disregarded and violated its own rules, if, as the jury might have found, the company changed the schedule time of the plaintiff's car while not publishing such change or giving notice thereof in any manner to its employees. Plaintiff, of course, knew that no change had been made in the schedule time as published; but he had a right to assume that in some other way the company was observing the duty which it owed him.

Ordinance Authorizing Moving Buildings over Tracks.

Indiana Railway Company v. Calvert and others, 80 *Northeastern Reporter*, 961.—The supreme court of Indiana says that this action was brought to recover damages occasioned to the plaintiff by the moving of a house along one of the streets used by the plaintiff. The city had undertaken to regulate the matter of house moving for a limited distance along street railway tracks, and to secure the privilege an applicant was required to obtain a license from the city clerk, and, on the granting of the same, to give a 24-hour notice to the local agent or manager of the company affected of what was to be done. Upon the applicant complying with these requirements, the ordinance declared it to be the duty of the company so to raise or remove the wires as to allow the building to pass. The defendants, being desirous of moving a house along the street in question, obtained the license required, and gave a 24-hour notice to the company of their purpose. Upon the expiration of the time they proceeded to move said house, which was 18 feet wide, along the north side of the street to an intersecting street, a distance of 200 feet, and at that point the house was moved over the plaintiff's tracks. The plaintiff refused to comply with the requirement of the ordinance relative to its duty, and, in moving the house, the defendants were compelled to loosen four span wires, in order to push the north trolley wire to one side, and, when the house was moved across the tracks, they lifted the trolley wires to pass under. The defendants promptly reattached the span wires, and moved the house without any unnecessary damage to the plaintiff. The time occupied in doing the work was reasonable. The court holds that the ordinance in question, if valid, was a sufficient justification to the defendants, and that, as it is unable to say that, as applied to the circumstances of this case, there was a transcending of the city's powers, it followed that the judgment of the court below in favor of the defendants must be affirmed.

The court says that such a regulation is not wholly one which relates to private interests. It affects the rights of real estate owners generally throughout the city, and it may be said to be of importance to the municipality. The ordinance in this case merely called on the company temporarily to raise or remove its wires so as to allow the building to pass, and, as a consequential effect, to submit, with the rest of the public, to a disturbance of traffic in some degree. It is clear that this did not constitute a technical taking of property, as that term is used under the law of eminent domain, and, as the damage

was a minor and inconsequential one, done under the police power, the court is of opinion, so long as the interference could not judicially be said to be unreasonable, that there was no right to damages, as it was a case wherein the company was merely controlled in the use of its property by a governmental regulation.

The mere fact that the plaintiff enjoyed contract rights in the street was not controlling. The regulation operated on the property, and it must always be understood that those who enter into such contract relations with the public as render their property reasonably subject to control do so with a knowledge that the police power is an inalienable and continuing authority.

Liability of Directors Under Statute for Debts and Judgments When Capital Stock is Not Paid In.

Savage v. Shaw, 81 *Northeastern Reporter*, 303.—The supreme judicial court of Massachusetts says that Chapter 112, Section 19, of the revised laws of that state provides that "the directors of a street railway company shall be jointly and severally liable, to the extent of its capital stock, for all its debts and contracts until the whole amount of its capital stock as originally fixed by its agreement of association, or if a chartered company, by its directors, shall have been paid in, and a certificate stating the amount thereof so fixed and paid in shall have been signed and sworn to by its president, treasurer, clerk and a majority of its directors, and filed in the office of the secretary of the commonwealth." This statute must be construed as if the liability which it creates were declared to be for "all debts and contracts made by the company."

It is settled that this liability does not extend to torts (wrongful acts) committed by the corporation. *Child v. Boston & Fairhaven Iron Works*, 137 *Mass.* 516; *Heacock v. Sherman*, 14 *Wend. (N. Y.)* 58. Whether it includes a judgment recovered in an action of tort, was expressly left undecided in the case first cited. The question has, however, arisen in other jurisdictions; and it frequently has been held that such words as "debts" or "debts and contracts" of corporations, in statutes imposing a personal liability upon the directors or stockholders, cannot be construed to include judgments for torts of the corporation. Cases in which the judgment relied on was founded upon a claim under a contract, though unliquidated, are not in conflict with these decisions.

The conclusion of the court is that the statute quoted cannot reasonably be construed to include among the "debts and contracts made by the company" judgments like one recovered by the plaintiff in an action of tort for injuries received by him while a passenger on one of the defendant's cars. It says that the word "debt" is indeed one of large import, and ordinarily may be taken to include all that is due under any form of obligation, as well as under any promise. But in this statute the words "debts and contracts" are qualified by the limitation "made by the company." The enactment is one of a penal character, imposing upon the defendants liabilities which they never agreed or intended to assume, and must be construed with some strictness. The natural import of the language of the statute is that it contemplates ordinary debts or obligations voluntarily contracted by the corporation, rather than involuntary obligations imposed upon it by law in consequence of the negligent or tortious acts of its agents or servants.

The judgment does establish a legal obligation on the part of the defendant therein to pay the amount recovered; and in this commonwealth, as in most jurisdictions, the judgment against the corporation is conclusive in the suit against the directors and stockholders of the existence and amount of the debt or demand as declared on. But it never has been held to be conclusive upon the question of law whether the original cause of action was such as to create an individual liability in the officers or stockholders, and it manifestly cannot be so held.

News of the Week

Recent Accidents.

One person was killed and 10 were injured in the head-on collision of a freight and a passenger car on the Norwich & Westerly Electric Railway line near North Stonington, Conn., on August 1. The wreck occurred on a curve at Avery's Crossing, four miles north of North Stonington. Both cars were of the large and heavy type, and were running at a high rate of speed. The accident is said to have been caused by a disregard of orders by the crew of the passenger car. Both cars were wrecked.

One man was killed and seven injured in a collision of two cars on the Bloomington Pontiac & Joliet Electric Railway, one mile south of Odell, Ill., on August 4. The cause is said to have been the failure of the air brakes on one of the cars to work, and the fact that the hand brake was out of order. James Hessin, general manager of the company, was among the injured.

Photographic Contest of Ft. Wayne & Wabash Valley.

The Ft. Wayne & Wabash Valley Traction Company has announced a photographic contest. The following information concerning the contest is from a circular issued by John B. Crawford, superintendent of transportation, Ft. Wayne, Ind.:

The prizes are: For the best photograph, \$50; for the second best photograph, \$30; for the third best photograph, \$20. The following conditions must be strictly adhered to: (1) Picture must be a view of scenery on some portion of the company's lines or of one of its parks. (2) One mounted photograph must be sent to Mr. Crawford's office with name and address of sender and the name of the place the scene represents written on the back. (3) The negatives of the views submitted must accompany photograph submitted and remain the property of the company. (4) All other points being equal, photographs showing one of the company's cars or a part of its track will be given preference.

The contest will close on October 15 and the award will be made on or before November 1.

The judges will consist of the general manager and the superintendent of transportation of the company, together with three prominent citizens whose appointment will be announced later.

Plans for Settlement of Detroit Franchise Controversy.

The franchise committee of the Detroit city council, pursuant to a resolution of the council on July 30, held a meeting on Friday morning, August 2, at which General Manager F. W. Brooks of the Detroit United Railway was present and began negotiations looking to an amicable settlement with regard to reduced fares and franchise for new extensions. Mr. Brooks expressed the desire of the company for a settlement of the controversy, which has for some time prevented needed extensions. He stated that the company was willing to grant the cheapest fare possible which would allow it to make a fair profit, and suggested that a committee of non-partisan experts be appointed to investigate the conditions in Detroit and other cities and to recommend to the council what would be a reasonable rate of fare. He said that the company stood ready to build the desired extensions as soon as a franchise could be secured. Alderman Korte then gave an outline of a tentative franchise, which he will offer next week as a basis for a settlement. This franchise will provide for eight tickets for a quarter after the expiration of the present franchises on November 14, 1909; company to make needed extensions at once, with 5-cent fares on extensions to present 5-cent lines and 3-cent fares on extensions to 3-cent lines; and the company to grant immediately eight tickets for a quarter, good on 3-cent lines at all times and on 5-cent lines in workmen's hours.

Aurora Elgin & Chicago Strike Averted.

The officials of the Aurora Elgin & Chicago Railway and the Amalgamated Association of Street and Electric Railway Employees on Wednesday of this week signed a new wage scale, which puts an end to all talk of a strike, which has been threatened for several weeks. Under the new scale, which was ratified by the union at a meeting in Aurora on Tuesday night, the motormen and conductors on the third-rail line will receive 24 cents an hour for the first year, 27 cents for the second and 30 cents thereafter, instead of 22, 25 and 27 cents, as at present. On the surface lines in Aurora, Batavia and Elgin the men will receive 20, 21 and 23 cents, instead of 20 and 21 cents. Substation employees will receive an increase of \$5.00 a month, inspection

and station men will receive a 10 per cent increase and the pay of unclassified employees will be taken up at once. The agreement stipulates that a 10-hour workday will be adhered to as closely as possible, that there shall be no discrimination against union men, that all grievances shall be submitted to arbitration, that lockers shall be provided for the men at the barns and stools for the motormen, and that the vestibules shall be heated.

The progress of the negotiations has attracted considerable attention because of charges made by C. O. Pratt, chairman of the executive committee of the union, that he had been paid a \$5,000 bribe by representatives of the company to procure the appointment of a third arbitrator favorable to the company, after one arbitrator had been chosen by the company and one by the union. The company officials deny all knowledge of the alleged bribe and promise to investigate the charges. At the meeting on Monday, at which the final negotiations were made, the bribery charges were set aside by mutual consent and the terms of the agreement were decided upon without the aid of the arbitrators.

Public Service Commission to Investigate Tunnels.

The New York public service commission on August 1 appointed Commissioner Maltbie to investigate and report on the status of the so-called Belmont tunnel, being constructed under the East river at Forty-second street by the New York & Long Island Railroad, and to ascertain what rights and franchises are held by the company. The validity of the franchise has been questioned by the city authorities and litigation has been begun to test the right of the Belmont company to operate the tunnel without first applying for a franchise and paying compensation. It is also contended by the city that in any event the original charter has lapsed because August Belmont has been unable to comply with the clause it contains, providing that the tunnel should be completed by January 1, 1907. Some days ago a delegation of residents of Queens waited upon the commission and made the statement that knowledge had come to them that Mr. Belmont did not intend to use the tunnel for the transfer of passengers between the Manhattan subway and the trolley lines in Queens, which are controlled by Mr. Belmont, without an extra fare, but that it was intended to charge an additional three cents to travel through the tunnel. The commission has been unable to obtain any satisfactory information concerning the system under which the tunnel is to be operated, although it was brought out at the investigation of the Interborough-Metropolitan Company on Friday that the tunnel stock was owned by the Interborough Rapid Transit Company.

The commission also requested Chief Engineer Rice to report to what extent he has heretofore inspected the tunnels and subways of the Hudson & Manhattan Railroad Company and the New York & Jersey Railroad Company (the so-called McAdoo tunnel lines), what portions the city of New York has the privilege to purchase, and what means, if any, are adapted to ascertain the actual cost thereof.

Forest City Railway Secures Amended Franchise.

The Forest City Railway Company on August 3 secured the passage by the Cleveland city council of an ordinance intended to remedy the alleged defects of its present grants on account of Mayor Johnson's financial interest in the company. The ordinance, which was introduced by Councilman Koch on August 1, amends the 12 original ordinances granting franchises to the company and re-enacts them as so amended to regrant to the Forest City Railway all of the rights conferred by the original ordinances. Accompanying the ordinance was a communication signed by Fred C. Albers, secretary of the company, which admits the claims of the Cleveland Electric Railway in regard to the mayor's financial interest. The communication states that the company has already constructed about 13 miles of street railway under these franchises and proposes to construct additional lines, but that the validity of the various grants has been attacked on the ground of the mayor's financial interest in the company. It is then stated that Mayor Johnson has guaranteed certain stock sales and payments for consents and for material bills, without the knowledge or solicitation of the company, but that the company has now procured the cancellation of all such obligations, so that the mayor is no longer under the least liability to loss on account of any of the guarantees. Therefore it has caused the curative ordinance to be introduced and stands ready upon the passage of the ordinance to proceed with the construction of its lines.

The ordinance was passed by the council at a special meeting on August 3. The Cleveland Electric Railway Company's attorneys ridiculed the ordinance, stating that if the original ordinances were invalid, as admitted, the defects could not be cured by a simple re-enactment. It is believed that they will apply for an injunction as soon as the Forest City Company resumes work on Central avenue and Quincy

street, which cannot take place until the ordinance goes into effect on August 14. Although the Forest City attorneys hold that consents are not necessary for the re-enactment of the ordinances, the Cleveland Electric has been active in securing revocations of consents from property owners along the lines in question.

Inland Empire Timecard.—We have received from the Spokane & Inland Empire Railroad a large timecard for all divisions, including freight as well as passenger train schedules.

Fender Ordinance.—The Menasha (Wis.) city council has passed an ordinance requiring the use of suitable fenders or pilots on all street or interurban cars operated in the city under penalty of \$100 fine.

Pacific Electric Reduces Fare.—The Pacific Electric Railway of Los Angeles, Cal., has reduced the round-trip fare from Los Angeles to Compton Beach from 40 to 30 cents, and the single-trip rate from 25 to 20 cents.

Shreveport Traction Company Issues Paper.—We have just received Volume 1, No. 1, of *The Trolley*, a new 4-page paper, published monthly by the Shreveport (La.) Traction Company. The publication is devoted to brief news items of interest to the employes and patrons of the company, short items about electric railways in other cities, etc.

Suit over Grade Crossings.—The Northern Ohio Traction & Light Company of Akron, O., has raised the question of the constitutionality of acts passed by the legislature providing for the abolishment of grade crossings in municipalities. The question is brought up in an answer and reply filed to a pleading on behalf of the city of Akron in the contest over payment for the Mill street viaduct.

All-Steel Cars for Milwaukee.—President John I. Beggs of the Milwaukee Electric Railway & Light Company has announced that the company is planning to build all-steel passenger cars for its own use when the proposed new car shops are built, but no date for beginning the erection of the shops has yet been given out. The company is now using several steel passenger cars on its suburban lines.

Economical Electric Service.—In connection with the electric operation of the New York Central terminal, it is interesting to note that at this time the entire service is performed by one 5,000-kilowatt generator, and that this is scarcely ever loaded to its full capacity. The service now covers 14 miles of 4-track road, which is equal to about seven-eighths of the service which it is proposed to operate in this manner.

Limited Service from Ft. Wayne to Lafayette, Ind.—Officials of the Ft. Wayne & Wabash Valley Traction Company believe that by September 1 the new Logansport-Lafayette extension will be in sufficiently good shape to permit of limited service from Ft. Wayne through to Lafayette. The limiteds now run as far as Logansport. Arrangements are now being made for through freight service on the extension, though the date upon which it will be started is uncertain.

Denies Injunction Against 3-Cent Fare.—Judge McCall of the federal court at Memphis, Tenn., has denied a petition of the Central Trust Company of New York, holder of the bonds of the Memphis Street Railway, asking for an injunction to restrain the city of Memphis from enforcing a 3-cent fare ordinance. The case had been appealed to the state supreme court from the state circuit court, the issue being the constitutionality of the city ordinances. The suit for a federal injunction was entered pending a decision from the state supreme court.

San Francisco Car Service Increasing.—Thornwell Mullaly, acting general manager of the United Railroads of San Francisco, announced on July 30 that the company now has in service 315 cars and is employing about 1,400 men, including 198 of the former strikers. Mr. Mullaly also stated that not only were the receipts increasing regularly, but the increase in the number of passengers indicates a considerable weakening of the boycott. The service on many of the lines has been extended and a still further increase has been announced for this week.

New Haven Electric Service.—As previously stated, the New York New Haven & Hartford introduced its electric service on July 24 by the operation of five trains in each direction between New York and New Rochelle. This service has been gradually increased until at this time there are about 12 trains in each direction so operated, and it is understood that as rapidly as the electric locomotives are received, about 60 per cent of them having been already delivered, the number of trains will be increased. On August 5 the service was extended to Port Chester.

Public Service Commission Asks for Data.—The New York public service commission of the first district on August 2 issued an order to the railroad companies of the city calling for the filing of documents with the board covering practically every detail of the organization of such companies and of their operations and management. The order directs the companies to supply the commission with detailed information of their affairs, which is to be made use of by the commission in the supervision of the companies. All the information demanded must be original documents or sworn copies of the originals.

Full Fare for Children over Five Years.—The Utah Light & Railway Company, Salt Lake City, Utah, has issued an order to the effect that in future children over five years of age shall pay full fare. When a car is crowded and paying passengers are standing, children of any age occupying seats must pay full fare. No charge shall be made, under such conditions, for children not over the age limit if they vacate seats for paying passengers. When a car is not crowded children can occupy seats without any charge. Uniformed employes must vacate seats for paying passengers. This applies also to policemen and firemen when passed free on account of uniforms or badges.

Advertising Literature of the Illinois Traction System.—B. R. Stephens, general traffic manager of the Illinois Traction System, with office at Springfield, Ill., has recently issued some attractive advertising literature, which includes a blotter showing a colored picture of the "Illinois," one of the Corn Belt Limited cars running between Springfield and St. Louis, and a map of the system; a 4-page folder entitled "Summer Travel Suggestions," containing a large map of the system and timetables and rates of fare; and a 20-page folder for the entire system, containing a large map, complete timetables, a list of the officers, a large number of half-tone illustrations of points of interest on the lines, and miscellaneous information for the use of travelers.

Will Not Object to Examination.—E. K. Stewart, vice-president and general manager of the Columbus Railway & Light Company, says there will be no effort on the part of his company to prevent the city auditor complying with the provisions of the resolutions introduced in council by City Solicitor George S. Marshall, calling for an examination of the records of the company to ascertain whether the people are now entitled to eight tickets for a quarter, under the agreement that such a rate be established when the gross receipts from fares shall amount annually to \$1,750,000. However, he states that there will be objection to the city including the receipts of the Central Market Street Railway, which has been acquired recently and which was not included in the franchise granted to the Columbus Railway Company, which contains the agreement relating to fares and gross receipts.

Des Moines Employes Ask Shorter Hours.—The members of the Des Moines branch of the Amalgamated Association of Street and Electric Railway Employes on August 4 voted to instruct the executive committee to present a formal demand to the Des Moines City Railway for a reduction of working hours. The men claim that the company is not living up to the contract which provides that the runs shall be made as near 11 hours as possible and that some of them are forced to work 13 and 14 hours at a stretch. They ask that the working day be divided into two shifts of nine hours each. The men assert that under the present long hours the health of many of the men is breaking down. They will not ask for an increase of wages at the present time. The present contract does not expire until February. Two of the officials of the company have gone to Omaha to investigate the system of dividing the runs as practiced there.

To Abandon Steam Locomotives.—The Portland Railway Light & Power Company, Portland, Ore., is making preparations to abandon the use of steam locomotives for freight handling on the Oregon Water Power division by the first of next year, and will replace them with electric locomotives, which have been ordered. Two electric locomotives weighing 40 tons each are now being built in the east for delivery this fall. Two other similar machines of 35 tons each are being built in the local shops. The 35-ton engines are of 300 horsepower and the 40-ton locomotives will have 400 horsepower. In addition the Portland Railway Light & Power Company will receive a large number of passenger and freight cars during the summer and fall. Orders are in for 94 passenger coaches, 34 of which will go to the O. W. P. division and 60 to the allied lines, and for 10 box cars, 40 flat cars and two cabooses. Expenditures during the present year for new equipment on the lines of the company will amount to over \$520,000. In addition a very large sum will be spent for trolley wire and other material necessary to change the freight system on the O. W. P. from steam to electrical power.

Construction News

FRANCHISES.

Billings, Mont.—Yegen Brothers have petitioned the city council for a franchise to build a street railway in the city of Billings, and also for contemplated lines to Laurel and Columbus, Park City, Bridger, Bear Creek and Huntley.

De Witt, N. Y.—The town board has granted a franchise to the Syracuse Rapid Transit Company from Eastwood to East Syracuse, N. Y. The board also granted a franchise to the Syracuse & Chittenango Railway for a line to East Syracuse.

Dothan, Ala.—William Crawford has applied for a franchise for an electric railway, about three miles long, to a park which he proposes to build, just outside of the city.

East Moline, Ill.—A 50-year franchise has been granted to the Moline Rock Island & Eastern Railway.

Ft. Worth, Tex.—The Northern Texas Traction Company has applied for a franchise for an extension of the Main street line north from the stock yards to a point in Washington Heights.

Hillsboro, Ore.—The city council has granted franchises to the United Railways Company and the Oregon Electric Railway of Portland, Ore.

Indianapolis, Ind.—The Indianapolis board of public works has withdrawn its permission given a few days ago to the Indianapolis Newcastle & Toledo Electric Railway Company to construct an independent line into the city as far as Tenth street. The Indianapolis Traction & Terminal Company objected to the independent line, claiming that it had the exclusive right to build such road for the traction company, and exhibited to the board of public works a contract with the interurban traction company to construct such line for its entrance into the city.

Ludlow, Mass.—The Springfield Street Railway has applied for a franchise in Ludlow for an extension about three-fourths of a mile long from Indian Orchard across Ludlow bridge.

Paris, Ill.—The city council has granted a 50-year franchise to the Terre Haute & Western Railroad for its line from Terre Haute, Ind., which is now nearing completion, and is expected to be in operation by September 1. All but one mile of tracklaying has been completed.

Shelbyville, Ky.—The city council has declared forfeited the franchise of the Louisville & Eastern Railroad, granted in May, 1906, and has ordered the company to remove its tracks and other appurtenances in Main street. The franchise provided that the line should be in operation through Shelbyville by August 1 and the work is not entirely completed.

Streator, Ill.—The amended franchise applied for by the Chicago Ottawa & Peoria Railway, which would give it a more direct route through the city than the present franchise, and which also included freight privileges, has been refused by the city council. The company desired a direct route for its line to Chicago. It is stated now that the company may build to Peoria from Princeton, the present terminus of the Illinois Valley Railroad.

Traverse City, Mich.—The J. B. Carter Construction Company of Chicago and Indianapolis has applied for a franchise for a street railway system eight miles long. The company also proposes to build an interurban line from Traverse City to Elk Rapids at once and to extend the line later to Petoskey.

Union, S. C.—The city council has issued a franchise to the South Carolina Public Service Corporation, which proposes to build an electric railway from Charleston to several towns in the Piedmont section.

RECENT INCORPORATIONS.

Chelan Electric Company.—Incorporated in Washington to build an electric line from Wenatchee to the western part of Washington. Capital stock, \$500,000. The officers of the company are: J. T. McChesney, president; and E. C. Mony, secretary. Other trustees are: H. P. Scott of Wilmington, Del.; J. A. Coleman and F. H. Brownell. The route starts at a point near Wenatchee, following the Columbia river to Lake Chelan, thence north to the Okonogan river and from there to the state line. Lighting and water privileges for all towns along the Chelan river are included in the articles. There are reports that this is part of the Great Northern Railway Com-

pany's plan for the electrification of its system in the Chelan country, west of Spokane.

El Reno (Okla.) Railway.—Incorporated in Oklahoma to build a steam or electric railroad from Oklahoma City to Geary, via El Reno, 60 miles. Incorporators: J. W. Maney, Oklahoma City; John Maney, H. K. Shafer and Herman Mittler of El Reno.

Greenville & Interurban Railway.—Incorporated in South Carolina to build an electric railway between Greenville and Williamston, about 20 miles; capital stock, \$100,000. President, H. H. Prince; secretary, C. C. Good.

Greenville & Spartanburg Railway, Greenville, S. C.—This company will apply for a charter in South Carolina for an electric railway from Greenville to Spartanburg, S. C., via Butler, Chick Springs and Beech Springs, 31 miles. Incorporators: A. A. Gates, C. C. Wood, H. H. Prince and O. K. Mauldin, all of Greenville, S. C.

Interurban Railway, Wheeling, W. Va.—Incorporated in West Virginia to build an electric road from Wheeling to Bethany. Capital stock, \$10,000. Incorporators: W. D. Pinson, J. R. Caldwell, A. H. Werden, J. H. Brennen, Wheeling, and James Pinson of Warewood.

Midcontinent Traction Company, McAlester, I. T.—Incorporated in Indian Territory to build an electric line connecting Red Fork, Tulsa, Sapulpa and the Glenn Pool oil fields, 20 miles. E. C. Reynolds is one of the promoters.

Minneapolis Kansas City & Gulf Railway, Minneapolis, Minn.—Incorporated for the purpose of building an electric line between Minneapolis, Minn., and the gulf. The proposed route is via Des Moines, Kansas City, Wichita, Guthrie, Oklahoma City, Dallas, Waco, Houston and Galveston, with branch lines connecting Topeka, Omaha, St. Joseph and Lawrence, Kan. Capital stock, \$50,000,000. The stock of the company is in the hands of the Northern Securities Company of Minneapolis, which is acting as the fiscal agent for the company. C. B. Holmes, former president of the Chicago City Railway, is chairman of the board of directors.

Northern & Southern Railway, Waterville, Wash.—Incorporated in Washington with \$7,000,000 capital by A. L. Rogers, M. B. Howe, I. W. Matthews and A. E. Case. The object is to build a railroad, either steam or electric, or both, from the city of Waterville, Douglas county, Washington, in an easterly and southeasterly direction and over the easiest and most practical grades from Waterville to Pasco in Franklin county, Washington, 175 miles, together with a feeder for the line in Douglas county, 66 miles.

Quitman & Blue Springs Street Railway, Quitman, Ga.—Incorporated in Georgia to build an electric railway and resort at Blue Springs.

Russellville & Ozark Mountain Traction Light & Power Company.—Incorporated in Arkansas to build an electric railway connecting Russellville and nearby towns. Incorporators: Adam J. Robinson, president; J. C. Wilson, assistant president; James Gould, secretary; W. N. Langford, treasurer; Tom D. Brooks, A. S. Hays, A. B. Plaston, E. Stoneker, M. M. Bruce and J. C. Wilson.

South Memphis Traction Company, Memphis, Tenn.—This company has applied for a charter to build five new electric lines from Memphis to South Memphis. Capital stock, \$50,000. The incorporators are: W. E. Gage, K. D. McKellar, James F. Hunter, W. G. Thomas and C. W. Edmonds.

Youngstown Alliance & Akron Electric Railway, Alliance, O.—Incorporated in Ohio to build an electric railway connecting the towns named in the title. Right of way has been secured from Alliance to Akron and work is to begin at once to secure the right of way from Alliance to Youngstown. Capital stock, \$10,000. Incorporators: T. H. Given, Henry Shaffer, V. K. McMullin, E. H. Brosius, Hugh Bleakley and R. S. Kaylor. The officers are: President, T. H. Given; vice-president, J. D. Callery of Pittsburg; secretary, J. S. Miller; treasurer, V. K. McMullin.

TRACK AND ROADWAY.

Anderson (S. C.) Traction Company.—It is stated that this company expects to begin work about September 1 on its proposed extension from Belton to Greenville, S. C., 25 miles. F. G. Brown is vice-president.

Baltimore Halethorpe & Elkridge Electric Railway.—It is reported that this company has secured the right of way for its proposed lines from Baltimore to Halethorpe, Md. It is the desire of the promoters to begin work this fall, but owing to financial conditions it is probable that the work will not be

begun until spring. It is the intention to ultimately extend the line to Elkridge.

British Columbia Electric Railway, Vancouver, B. C.—This company is reported to be considering an extension of its line at Ft. Langley. R. H. Sperling, general manager.

Butler Saxonburg & Tarentum Street Railway, Butler, Pa.—Surveys have just been completed for the proposed line from Butler to Saxonburg and Tarentum, Pa. It is expected that contracts will be awarded in September. William McDowell of Saxonburg is one of the promoters.

Canyon City & Royal Gorge Electric Railroad, Canyon City, Colo.—It is reported that the Ross Construction Company of Chicago has taken the contract for building the proposed line from Canyon City to the top of the Royal Gorge, Colorado, and that construction will begin at once. Several carloads of material have been shipped. F. D. Heath, president.

Carolina Valley Railway, High Point, N. C.—Materials are being delivered and work is in progress in High Point on the construction of this company's line which is projected to connect Greensboro, High Point, Winston-Salem and Thomasville, N. C.

Central California Traction Company, Stockton, Cal.—General Manager S. B. McLenegan has announced that the extension to Lockford will not be built until the main line to Sacramento and Modesto is completed. The surveys from Lodi to Sacramento are now being completed, and this line will be built as soon as the Stockton-Lodi line is completed some time this month. The Sacramento line will then be extended to Modesto.

Chicago Indianapolis & Terre Haute Railroad.—This company, recently incorporated in Indiana to build an electric railway from Indianapolis, Ind., to Decatur, Ill., is reported to have secured the right of way between Terre Haute and Rockville, Ind. It is stated that plans are being made for beginning construction within 90 days. R. F. Stuart and Charles M. Kiler of Indianapolis are interested.

Columbus, Ga.—A number of citizens of Crawford and Columbus recently met at Columbus in the interest of the proposed electric line to be built to connect Columbus with those towns.

Columbus (Ind.) Street Railway & Light Company, Columbus, Ind.—Work has been started on the extension to East Columbus, one mile. The company will establish a park in East Columbus next spring.

Crookston, Minn.—William A. Marin of Crookston, A. H. Poehler of Minneapolis and J. W. Wheeler of Crookston are interested in a project for an electric railway from Crookston to Grand Forks, N. D., 27 miles. A franchise has been applied for in Crookston, but it cannot be voted on until September. If the franchise is granted construction work is to begin in the spring.

Dallas (Tex.) Interurban Electric Railway.—It is reported that this company is preparing to begin construction work in a short time on its line from Dallas to Greenville and Sherman, Tex. Some of the material has been delivered. The company proposes to build about 73 miles in all, including about 30 miles of street railway in Dallas. The American Engineering Company of Indianapolis has the contract. D. D. Waggoner of Dallas, president.

Denver & Greeley Railroad, Denver, Colo.—This company, which proposes to build an electric railroad between Denver and Greeley, has filed with the county clerk at Greeley a map showing the principal towns which will be included in the route.

Detroit & Adrian Traction Company, Detroit, Mich.—The officers of this company, which, as announced in last week's issue of the Electric Railway Review, proposes to build an electric railway from Detroit to Adrian, Mich., are as follows: President, David Meginnity, Detroit; vice-president, Charles R. Miller, Adrian; secretary, John T. Cauley, Detroit; treasurer, Willis E. Case, Detroit; attorney, Adolphus W. Weir, Detroit; directors, the officers, Frank D. Taylor and Mason L. Brown of Detroit and John C. Cahalan of Wyandotte. Surveys have been started.

Detroit United Railway.—This company has recently completed an extension on Lamartin avenue, from Woodward to Oakland avenue.

Helena (Mont.) Light & Railway Company.—This company will within a few weeks build an extension on Central avenue, from Second street to Ninth street.

Hueneme Malibu & Port Los Angeles Railway, Los Angeles, Cal.—General Manager N. D. Darlington is quoted

as saying that this company expects to build about five or six miles of track during the next three months. Work has been started.

Illinois Traction Company, Champaign, Ill.—Bids for five stone and concrete piers for the bridge across the Mississippi river at St. Louis will be opened on August 15.—It is reported that the company has abandoned its project of building from Springfield to Jacksonville, Ill., on account of the high price of land demanded by property owners and that instead the company will build a line from Jacksonville to New Berlin.—The work of construction on the line from Lincoln to Mackinaw, 27 miles, is progressing rapidly. The grade has been established and tracklaying has commenced.

Indiana & Michigan Electric Company, St. Joseph, Mich.—This company proposes to build a railway from St. Joseph to Grand Rapids, Mich., either via Kalamazoo or South Haven and Saugatuck. It is proposed to extend the line ultimately around the south end of Lake Michigan to Chicago.

Johnstown & Ebensburg Railroad, Johnstown, Pa.—It is reported that a contract will be let shortly to Umbenhauer & Co. for the grading of a 10-mile section, which will connect Ebensburg and Johnstown, Pa. This work will include all excavating, the necessary concrete and masonry construction at culverts, etc., and the spanning of Elk Lick creek with a bridge.

La Crosse (Wis.) Water Power Company.—Manager W. J. Ferris has announced that the company will build a line from La Crosse to Galesville, Wis., and if the necessary franchises can be secured, will extend further from Galesville to Winona and Rushford, Minn.

Lansing-Jackson Electric Railway.—We are officially advised that W. E. Tench & Co. of Detroit, Mich., have been awarded the contract for the construction of this line from Lansing to Jackson, Mich., paralleling the Michigan Central Railway. Work is to start at once at Holt, about five miles south of Lansing. Six carloads of equipment have been shipped to that point and it is expected to have the line completed as far as Mason this year. Theron W. Atwood is president.

Lexington (Ky.) Traction Company.—This company has issued \$300,000 of bonds to obtain funds for the completion of an interurban line from Lexington to Winchester and Nicholasville, Ky.

Marquette, Mich.—It is reported that the Lake Superior Railway Construction Company of Cleveland, O., will begin work within a short time on its line between Marquette and Negaunee, for which a franchise was granted last fall. C. W. Barber, secretary, Cleveland, O.

Mississippi Valley Electric Railway, Nauvoo, Ill.—The contract for the building of the electric railway from Carthage to Nauvoo, Ill., has been let to the Federal Construction Company of New York. The right of way between the two towns has been entirely secured except across one farm, where condemnation proceedings will be necessary. W. A. Calhoun, chief engineer.

Nashville, Tenn.—R. V. Chambers of Cincinnati, O., is promoting a trolley line from Nashville, Tenn., to Louisville, Ky.

Northern Electric Railway, Chico, Cal.—It is announced that the line from Chico to Hamilton will be opened for operation on August 20.

Northern Ohio Traction & Light Company, Akron, O.—Plans are reported to have been made for straightening the line of the Akron Bedford & Cleveland division from a point five miles north of Cuyahoga Falls to Bedford. In some places it is planned to move the track more than a mile east of where it now runs. R. Trumbull, chief engineer, Akron, O.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—General Manager W. A. Smith has announced that preliminary surveys of three different routes have been made for the street railway extension to the school for the deaf.

Otselic (N. Y.) Trolley Railroad.—This company, which is building a railway between Georgetown station and South Otselic, N. Y., 13 miles, has laid three miles of track and has graded about six miles. President, B. F. Gladding.

Peninsula Railway, Barstow, Fla.—It is reported that rapid progress is being made on the line from Barstow to Tampa, Fla., about 50 miles. A shipment of 1,000 tons of 60-pound rails has just been delivered and the right of way has been cleared between Barstow and Plant City, 21½ miles. Grading has been practically completed from Barstow to Mulberry, 8 miles. Grading is to be started at once between Mulberry

and Plant City, 13½ miles. There will be two power houses, one to be built at Mulberry and an electric lighting plant at Plant City, which will be enlarged. The Evers Engineering Company of Cleveland, O., is in charge of the engineering work. E. C. Stuart of Barstow, president.

Philadelphia Rapid Transit Company.—Work is now in progress on the connection between the tracks of the Philadelphia Rapid Transit Company and the Philadelphia Morton & Swarthmore Street Railway at Darby, Pa., which will permit of the latter's cars being run into Philadelphia over the Market street elevated line.

Rocky Ford, Colo.—Eugene S. Alnutt has announced his intention of applying on August 13 for a franchise in Rocky Ford for a line which is to connect that town with La Junta, Colo., a distance of 11 miles. It is proposed to use gasoline motors for the operation of the line. The estimated cost is \$100,000.

San Bernardino Valley Traction Company, San Bernardino, Cal.—Construction material has been purchased for the Riverside-Colton extension and the right of way has been secured through Riverside county. As soon as a small portion of the right of way near Colton has been secured everything will be ready for tracklaying. F. R. Harris, chief engineer.

Scranton (Pa.) Railway.—This company is making preparations to extend its line from Minooka to Rocky Glen, Pa., 2½ miles. Surveys have been completed. Frank Caum, general manager.

Southwestern Traction Company, London, Ont.—S. W. Mower, general manager, has announced that cars will be running on an hourly service from London to Port Stanley about the first of October.

Spokane & Inland Empire Railroad.—Jay P. Graves, president, has given out this statement: "We have in contemplation the building of a line from Colfax to Walla Walla, Wash., and the extension of our system from Moscow to Lewiston, Idaho. We cannot say when these lines will be built, but they are projected and if our plans go through the Inland Empire system may be extended to connect both Lewiston and Walla Walla." The line between Rosalia and Colfax has been completed, adding 30 miles to the system. The work occupied 12 months. Grading is proceeding between Palouse and Moscow, 15 miles.

Terre Haute, Ind.—It is reported that all but about one mile of track has been laid on the interurban line between Terre Haute, Ind., and Paris, Ill.

Titusville (Pa.) Electric Traction Company.—It is reported that on account of the high cost of material and labor the construction of the lines to Cambridge Springs and Oil City will be postponed until spring.

Walnut Grove, Pa.—Residents of Dale, Walnut Grove, Stony Creek and Richland, Pa., have petitioned the Johnstown Passenger Railway to build an electric line between Walnut Grove and Geistown. It is stated that in case the company refuses they will themselves organize a company and build the line.

Washington Water Power Company, Spokane, Wash.—The line from Cheney to the Medical Lake line, connecting the latter with Hayford, Wash., 10 miles, will be opened September 10. Seventy-pound rails are used.

Washington Westminster & Gettysburg Railroad.—It is stated that the right of way has mostly been secured for this company's proposed line from Washington, D. C., to Gettysburg, Pa., via Sandy Springs, Laytonsville and Westminster, Md., about 80 miles. W. H. Benton, chief engineer, Washington.

Winnipeg Street Railway.—This company will issue \$1,500,000 new capital stock for the purpose of making several important extensions.

Zanesville, O.—J. D. Boone of Zanesville is promoting an electric railway to connect Newark, Zanesville, New Lexington and Lancaster with Cleveland, via another line now building between Newark and Mansfield.

Youngstown & Lake Erie Railroad.—J. H. Ruhlman, president, states that practically all of the right of way has been secured for this road between Conneaut and Youngstown, O., and that there will be no difficulty in securing the remainder. The company is considering the feasibility of adopting the Ganz system of motor cars.

Youngstown & Ohio River Railroad, Youngstown, O.—It is probable that the line between Lisbon and Leetonia, O., will be completed before the end of August. Tracklaying and ballasting have been completed and the wires are now being strung. The Youngstown & Southern Railway is pre-

paring to extend its service into Leetonia at the same time as the Youngstown & Ohio. The Youngstown & Southern is now operating between Youngstown and Columbiana.

POWER HOUSES AND SUBSTATIONS.

Allegheny Valley Street Railway, Tarentum, Pa.—It is reported that the capacity of the power plant at Creighton, Pa., is to be doubled, at a cost of about \$350,000. A. W. Hargett, general superintendent.

Indianapolis Newcastle & Toledo Electric Railway, Newcastle, Ind.—The large concrete smokestack for the power house of the Indianapolis Newcastle & Toledo electric line has been completed. The stack is 186 feet tall and 10 feet inside diameter. Work on other parts of the power house is now being rushed.

Lewiston Augusta & Waterville Street Railway.—This company has made arrangements with the Ft. Halifax Power Company for a supply of electricity for 30 years.

Oklahoma City Railway.—General Manager John W. Shartel has announced the contemplated erection of a power house to cost \$175,000 at Oklahoma City. The power house will supply the power for the city line as well as the inter-urban lines, which are to be built.

Rochester (N. Y.) Railway & Light Company.—This company is building a transformer substation 50 by 118 feet of reinforced concrete.

Texas Traction Company, Dallas, Tex.—Work has been started on the construction of the power house at Dallas, Tex., which will supply current for the operation of the line from Dallas to Sherman. The building will be of brick and reinforced concrete and will cost \$41,000. The electrical equipment will consist of two 1,000-kilowatt Curtis steam turbines, two turbine-driven exciters, one 300-kilowatt rotary converter, 2,000-horsepower Babcock & Wilcox boilers and Worthington condensers.

Chicago Lake Shore & South Bend Railway.

J. B. Hanna, president of the Chicago Lake Shore & South Bend Railway, South Bend, Ind., which is building a high-speed electric line from South Bend to Kensington, Ill., to connect with the Illinois Central Railroad for Chicago, writes as follows with regard to the progress of the construction work:

One mile of our track in South Bend has been completed, and the track for 16 miles west, also the pole line, has been completed. We have purchased a gravel pit adjacent to our line and we are now ballasting this portion of our track now laid. From the end of our present track through to Michigan City, a distance of 18 miles, the grading will be finished within the next 30 days, when tracklaying will be begun on this section from both the east and west, also the erection of poles. Our track is now laid two-thirds of the distance through Michigan City, and will be completed within a few days. From the western limits of Michigan City, 12 miles west to Dune Park, the grading has been completed and we will begin the laying of track and erecting of poles as soon as we finish in Michigan City. From Dune Park on to Gary the grading is progressing and all contracts have been let. Two miles of our track is now laid in Gary and the poles erected.

The abutments for overhead crossings west of Gary over the Wabash, Pennsylvania and Elgin Joliet & Eastern railways are nearing completion and the bridges will be erected on them as soon as the construction work on the piers is completed. Our bridge across the Calumet river, 610 feet in length, has been completed, and the grading between Gary and Indiana Harbor will be completed within two weeks, when tracklaying and erection of poles will immediately follow. Private right of way has been purchased across the city of Hammond to the state line; also the grading and filling between Kensington and through to a point at the Little Calumet river have been completed and tracklaying will shortly follow.

All the foundation walls for the power house building at Michigan City and all engine, generator and boiler foundations have been completed. The stack, which is of custodis pattern and to be 210 feet high, has been completed now to the height of 150 feet. All machinery and apparatus to be installed in the power house have been contracted for, and the cement blocks for constructing the walls of the power house are now upon the ground. Within 30 days we will install a force of men at the east end of our road at South Bend and begin the overhead single catenary construction. All bridges for overhead crossings of railroads are in process of construction, as well as all the piers upon which they rest.

Personal Mention

Mr. F. D. Schaffer has been appointed assistant to the president of the Citizens' Traction Company of Oil City, Pa.

Mr. William H. Tobin, Jr., heretofore foreman of the car house of the Pittsfield (Mass.) Electric Street Railway, has been appointed assistant superintendent.

Mr. Sidney E. Foltz, manager of the local lines of the Mansfield Railway Light & Power Company of Mansfield, O., has been elected a director of the company.

Mr. Arthur G. Mitten, whose photograph is presented herewith, was elected auditor of the Chicago City Railway Company on July 29 in place of Mr. J. B. Hogarth. Mr. Mitten is a brother of Mr. T. E. Mitten, president of the company. He was born in 1866 in Brighton, Sussex, England, and came to America in 1875. In September, 1886, he entered the service of the Chicago & Indiana Coal Railway, now a part of the Chicago & Eastern Illinois Railroad, and filled various positions until 1901. From 1901 to 1903 he was chief traveling auditor of the Chicago & Eastern Illinois; during 1904 he was chief clerk to the auditor; from January, 1905, to June, 1906, freight accountant; June, 1906, to June, 1907, agent at Chicago freight station and terminals. In June, 1907, he was appointed general claims agent of the Chicago City Railway, and on July 29 was elected auditor.



A. G. Mitten.

Mr. K. R. Battin has resigned as superintendent of the Henderson (Ky.) City Railway and has been appointed superintendent of the Freeport (Ill.) Railway Light & Power Company.

Mr. W. K. Christie has been appointed master mechanic of the Kalamazoo Lake Shore & Chicago Railway, Kalamazoo, Mich. Mr. Blaine Gavett, formerly trainmaster of the Pere Marquette Railroad, has been appointed superintendent.

Mr. F. W. Brown, formerly with the Pere Marquette and the Michigan Central railways, has been appointed general passenger agent of the Michigan United Railways, with office at Lansing, Mich.

Dr. S. C. Glidden of Danville, Ill., has been appointed chief surgeon of the Illinois Traction Company, and will be in charge of the new hospital department which the new company is organizing.

Mr. J. F. Collins, heretofore superintendent of railways of the Toledo Railways & Light Company, Toledo, O., has been given the title of manager of railways, with entire charge of the transportation department.

Mr. S. B. Storer, who recently resigned as general sales manager of the Niagara Lockport & Ontario Power Company, has opened an office as consulting electrical engineer at 732 University block, Syracuse, N. Y.

Mr. L. H. Conklin, superintendent of the West Penn Electric Company, Pittsburg, Pa., has been appointed general superintendent of the West Penn Railways Company, also with headquarters at Connellsville, Pa.

Mr. F. D. Reilly has resigned as traveling auditor of the Indiana Columbus & Eastern Traction Company and Lima & Toledo Traction Company to accept a position with a mercantile concern in Detroit.

Mr. Lee H. Ray has been appointed superintendent of the Sterling Dixon & Eastern Electric Railway at Sterling, Ill., in place of Mr. A. L. Gillette. Mr. Ray has previously been connected with the Winnebago Traction Company of Oshkosh, Wis.

Mr. G. W. Brine, vice-president and manager of the electrical department, and Mr. Thomas K. Glenn, vice-president and man-

ager of the railway department of the Georgia Railway & Electric Company, Atlanta, Ga., have been elected directors of the company, succeeding A. E. Thornton, deceased, and Mr. W. L. Cosgrove, resigned.

Mr. Clarence P. Hayden has been transferred from the superintendency of the eastern division of the New Hampshire Electric Railway to the western division, with headquarters at Salem, N. H. Mr. Hayden was tendered a banquet by his associates in the eastern division. Mr. Hector W. McKay has been appointed to succeed him as superintendent of the eastern division.

Mr. J. B. Pulliam, heretofore trainmaster of the Grand Rapids Grand Haven & Muskegon Railway at Fruitport, Mich., has been appointed general manager of the Winnebago Traction Company of Oshkosh, Wis., succeeding Mr. E. B. Kirk, who, as recently reported in the Electric Railway Review, has been appointed as general manager of the Sterling Dixon & Eastern Electric Railway at Dixon, Ill.

Mr. J. M. Yount, assistant master mechanic of the Pittsburgh Railways Company, has been appointed assistant to the master mechanic of the Rhode Island Company, Providence, R. I. Mr. Yount has had considerable experience in the mechanical department of street railway work with the Citizens' Street Railway of Indianapolis, the Metropolitan Street Railway of New York, and with the Public Service Corporation of New Jersey.

President Stone of Purdue University announces the appointment of Prof. Charles Henry Benjamin as dean of the school of engineering to succeed Prof. W. F. M. Goss, who recently resigned to accept a similar position at the University of Illinois. Professor Benjamin comes to Purdue from the chair of mechanical engineering at the Case School of Applied Science of Cleveland, O., which he has occupied with distinction for the past nine years. He is a graduate of the University of Maine and has had an unusually successful experience as a teacher and author on engineering subjects.

Mr. R. B. Hamilton, who on July 29 was elected secretary of the Chicago City Railway, in addition to his present duties as purchasing agent, was born 30 years ago at St. Johns, N. B. He entered the street railway business in 1901 with the International Railway of Buffalo, N. Y., while Mr. T. E. Mitten, now president of the Chicago City Railway, was general manager of the International Railway. While in Buffalo he served in various branches of the service, having been employed successively in the claim department, in the auditing department, in the secretary and treasurer's office, private secretary to Mr. Mitten, chief clerk in the passenger and freight department and chief clerk in the transportation department. Two years ago, when Mr. Mitten became president of the Chicago City Railway, Mr. Hamilton came to Chicago as his private secretary. Six months later he was appointed purchasing agent and on July 29 of this year he was elected secretary also, in place of Mr. J. B. Hogarth.



R. B. Hamilton.

Obituary.

O. A. Hale, president of the San Jose-Los Gatos Interurban Railway and the Peninsula Railroad Company of San Jose, Cal., died at his home in that city on July 20.

The United States Express Company on August 3 began operating an express service over the Ft. Wayne & Wabash Valley Traction Company, the Kokomo Marion & Western Traction Company and the Marion Bluffton & Eastern Traction Company's lines. This service will touch a large number of towns and county seats, and the business already offered has exceeded expectations. In a few days regular express messengers will be put on the cars to handle the business.

Financial News

Boston & Worcester Street Railway, Boston, Mass.—It was announced that the Boston & Worcester has sold to E. H. Gay & Co. \$475,000 of 20-year 4½ per cents bonds which are now being offered to investors at 98½. These bonds were issued to secure bonds for double-tracking the main section of the road between Boston and Worcester.

Brooklyn Union Elevated Railroad, Brooklyn, N. Y.—This company has applied to the New York public service commission for permission to issue a mortgage for \$20,000,000.

Central Kentucky Traction Company.—On August 2 articles of consolidation between the Central Kentucky Traction Company and the Franklin & Versailles Traction Company were filed with the county clerk at Lexington, Ky. The name of the new corporation is to be the Central Kentucky Traction Company. The capital stock is to be \$425,000, of which \$350,000 is common stock and \$75,000 preferred.

Central Traction Company, Lexington, Ky.—This company has arranged for an issue of \$300,000 of bonds, which will be used to complete the construction of an interurban line from Lexington to Winchester and Nicholasville, Ky.

Detroit United Railway.—The company has made arrangements for the purchase of the right of way of the Bolland line into Detroit, south and west of the River Rouge, and of a few miles of track between Chelsea and Ann Arbor. It is stated that no immediate steps are to be taken toward building the projected line.

Fresno (Cal.) Traction Company.—The Union Pacific Railroad has acquired a half interest in the property of the Fresno Traction Company. The value placed upon these holdings by the Union Pacific is \$495,000.

Holyoke (Mass.) Street Railway.—The Massachusetts railroad commission has authorized the consolidation of the Amherst & Sunderland Railway with the Holyoke Street Railway. An increase in the capital stock of the Holyoke company not to exceed 1,200 shares of the par value of \$100 each, to be exchanged for shares of the Amherst & Sunderland, is authorized.

Jacksonville Electric Company.—This company, which also operated a lighting plant in competition with the city of Jacksonville, on April 16 last agreed to abandon its lighting business and received a new street railway franchise from the city. Permission has now been secured for the consolidation of this company and the North Jacksonville Street Railway.

Louisville (Ky.) Railway.—This company has sold to the Fidelity Trust Company \$150,000 three-year 6 per cent notes, a part of a series of \$500,000 authorized about two months ago. The price was 104½ and accrued interest.

Nassau Railroad, Brooklyn, N. Y.—This company has applied to the New York public service commission for permission to issue a mortgage for \$5,000,000.

Pawcatuck Valley Street Railway, Westerly, R. I.—As a sequel to the plan of reorganization, published in the Electric Railway Review of June 29, 1907, page 881, this road has been acquired and is now operated by the Westerly Light & Power Company.

Philadelphia Rapid Transit Company.—On August 2 the company made its first payment to the city under the agreement recently made whereby the city is to receive \$500,000 per annum in lieu of car licenses. The July payment amounted to \$31,708.33. For the last half of 1907 the company will be given credit for half of the license fees, amounting to \$119,500, already paid for this year.

Rochester Scottsville & Caledonia Electric Railroad, Rochester, N. Y.—This company, which proposes to build an electric railway connecting the towns named in the title, has increased its capital stock from \$500,000 to \$2,500,000.

Winnipeg (Man.) Electric Railway.—The Winnipeg Electric Railway has decided to increase its capital to \$6,000,000, which is an addition of about \$1,500,000.

York County Traction Company.—On July 30 the stockholders of the company ratified the action of the directors taken on June 2 and dissolved the corporation, which is succeeded by the York Railway Company; the various properties controlled by the company heretofore organized as 24 separate companies will be merged into three companies under Pennsylvania charters. The properties include the railway, the Edison light plant and the York Suburban Land Company.

Manufactures and Supplies

ROLLING STOCK.

Georgia Railway & Light Company, Atlanta, Ga., has purchased 40 cars.

New Orleans Railway & Light Company, New Orleans, La., is in the market for one 25-foot Brill semi-convertible car.

Old Colony Street Railway, Boston, Mass., is having six 40-foot double-truck express cars built by the Danville Car Company.

Boston & Worcester Street Railway, Boston, Mass., has ordered six 40-foot double-truck express cars from the Danville Car Company.

Lake Charles Street Railway, Lake Charles, La., will order three new cars to replace those lost in the recent burning of its car houses.

Little Rock Railway & Light Company, Little Rock, Ark., as reported in the Electric Railway Review of August 3, has placed its order for seven semi-convertible cars.

Portland Railway Light & Power Company, Portland, Ore., has ordered two 40-ton electric locomotives and is also building two, weighing 35 tons, in its local shops.

Illinois Traction System has ordered forty 45-foot double-truck interurban trail cars from the Danville Car Company. These cars are suitable for conversion into motor cars. The company is also having 20 coal and flat cars of 60,000 pounds capacity overhauled at the plant of the Danville Car Company.

Hanover & York Street Railway, as reported in the Electric Railway Review of July 27, has ordered four double-truck interurban cars from the Niles Car Manufacturing Company. Delivery is to be made in November. The specifications call for the following details:

Seating capacity	Length of body....40 ft. 5 in.
.....52 passengers	Over vestibule .....49 ft.
Weight .....28,000 lb.	Over all .....52 ft.
Wheel base .....6 ft. 6 in.	Height, inside .....9 ft. 6 in.
Width, inside .....8 ft. 6 in.	Body .....Metal
Over all .....8 ft. 10 in.	

Special Equipment.

Air brakes....Westinghouse	Paint	Green
Bolsters.Steel platetruss form	Sanders.....	
Curtain material...Pantasote	..Nichols-Intern air sander	
Fenders .....Locomotive	Seats	
Hand brakes ....18 in. wheel	..Cross seats, walkover type	
Heating system....Hot water	Trolley poles and attach-	
Headlights ....Imperial arc	ments....Two poles and	
Interior finish	pantagraph trolley each car	
.....Quarter-sawed oak	Trucks	Baldwin
Journal boxes.....M. C. B.		

SHOPS AND BUILDINGS.

Illinois Traction System, Champaign, Ill.—An interurban station has been promised to Peoria, Ill., by this company and negotiations for the purchase of the necessary property are in progress.

Inland Empire Railway, Spokane, Wash.—The water front and dockage facilities at Coeur d'Alene lake will be improved at a cost of \$20,000.

Lake Charles (La.) Street Railway.—New car houses will be built by this company to replace the ones destroyed by fire on July 19.

TRADE NOTES.

Bayard S. Stewart, who has been sales manager of the Moore Electrical Company, has resigned and will enter the employ of W. S. Barstow & Co. at their New York office.

Memphis Car Manufacturing Company, Memphis, Tenn., has been incorporated for \$100,000 by I. F. Peters, W. W. Simmons, C. W. Thompson, Emil Nathan and W. A. McClure.

Bingham Railroad Construction Company, Jersey City, N. J., has been incorporated with a capital stock of \$100,000 by Percival Wilds, Lawrence L. Brown and Philip A. Carroll.

Henry Gulick, Jr., and J. W. Henderson of Pittsburg, Pa., have taken up the work of general inspection and are making a specialty of the inspection of railway equipment under the firm name of Gulick, Henderson & Co. They are also operating the Engineers' and Founders' laboratories, making a spe-

cialty of expert foundry work. Mr. Gulick was formerly with Robert W. Hunt & Co. and Mr. Henderson was formerly superintendent of the Central Car Wheel Company and later built and operated as manager the Butler Car Wheel Works.

Star Brass Works, Kalamazoo, Mich., manufacturer of the Kalamazoo trolley wheel and harp, reports that it is doing splendid business, showing an increase of 30 per cent in sales during the past year.

John G. Miller has been appointed general agent for the states of Indiana, Illinois, Iowa, Wisconsin, Minnesota and Michigan for the New York Car & Truck Company, Kingston, N. Y. Mr. Miller's offices are in the Marquette building.

Northern Engineering Works, crane builder, Detroit, Mich., has installed power station cranes, one of 20 tons capacity for the Toledo Gas & Electric Company, and two of 20 tons capacity in the Murphy power plant at Detroit, Mich.

James H. Rogers, formerly of the Westinghouse Companies, has resigned to take charge of the engine and boiler department of the T. B. Arnold Supply Company, 1422 Missouri Trust building, St. Louis, Mo.

Tennessee Construction Company, Chattanooga, Tenn., has been incorporated with a capital stock of \$25,000 to build bridges, railroads, gas and electric works, etc. Incorporators: D. J. F. Strother, L. C. Anderson, E. P. Rucker, W. W. Hughes, W. R. Simmons.

Dunn-Locke Vacuum Cleaning Company has removed its offices from 116 West Thirty-ninth street to suite 601, 15 Whitehall street, New York City. The company makes a specialty of devices for the sanitary cleaning of railroad stations, cars, etc.

John W. Hamilton and **Herbert J. Chambers** have resigned as contracting manager and contracting engineer, respectively, of Milliken Brothers, Incorporated, and have formed a partnership to engage in steel construction work. Their offices are at 29 Broadway, New York.

A. Schoonaker, formerly in the purchasing department of the American Bridge Company, has taken a position as western sales manager of the Graham Nut Company of Pittsburg, Pa., and about September 1 will open an office at 1132 Commercial National Bank building, Chicago, Ill.

Morgan Engineering Company has secured the contract for the electric traveling cranes included in the equipment for the new shops of the Grand Trunk at Battle Creek, Mich., and Stratford, Canada. Included in the order are two 120-ton double trolley cranes.

Trenton & Atlantic Construction Company, Trenton, N. J., has been incorporated to construct railroads, steam and electric. The capital stock is \$25,000. Incorporators: J. Ridgway Fell, Trenton; L. Warren Holman, Lakewood; Albert E. Vandebilt, Princeton.

A. C. Woods, assistant to J. P. Ramsey, vice-president and general manager of the Chicago Peoria & St. Louis Railway, has resigned to enter the coil and elliptic springs sales department of the T. B. Arnold Supply Company, 1422 Missouri Trust building, St. Louis, Mo.

D. F. Holman Railway Tracklayer Company, 1104 Ellsworth building, Chicago, has recently installed one of its Standard tracklayers on the Canadian Pacific Railway near Parry Sound, Ont., and has shipped another to Katalla, Alaska, for use on the Copper River & Northwestern Railway.

W. H. Judson Company, Portland, Ore., recently incorporated, has purchased the Estacada Manufacturing Company's plant at Estacada, Ore., and will install a car manufacturing plant with a capacity of five cars a day. This company has increased its capital stock to \$250,000. W. H. Judson is president and G. F. Martin is secretary.

Sherwin-Williams Company's western division representatives and managers to the number of 50 dined at the South Shore Country Club, Chicago, on Friday, August 2. The affair, which is an annual occurrence after the salesmen's summer vacations, was attended by Alexander Sclater, district general manager, and George A. Martin of Cleveland.

Electrical Show.—The management of the electrical show, which is to be held in Madison Square Garden September 30 to October 9 next, announces that it is the desire to share any profit that may result from this exhibition with the exhibitors, and 50 per cent of the box office receipts will be distributed among exhibitors in proportion to the rental which they have paid for space.

W. C. Lawson, until recently sales manager for the Scullin-Gallagher Iron & Steel Company, with headquarters at Chicago, has been appointed sales representative north of the

Ohio river for the Southern Saw Mill Company of Thomasville, Ga., which makes a specialty of long-leaf yellow pine car lumber and bridge timbers. Mr. Lawson has opened offices at 906 Fisher building, Chicago.

Westinghouse Electric & Manufacturing Company, Pittsburgh, in July booked orders in its railway department amounting to about \$2,500,000. Among these are two of unusual size. The Brooklyn Rapid Transit Company contracted for 400 electric railway motors, 200 for elevated service and 200 for use on surface lines. The company will also use the Westinghouse multiple-unit control on the elevated. The other order is from the Schoepf syndicate of Cincinnati. It calls for a complete equipment of electrical apparatus for 24 substations, aggregating 26,000 kilowatts capacity.

Greenlee Brothers & Co., manufacturers of wood-working machinery and tools, are adding new buildings to their extensive plant at Rockford, Ill. These include a new hammer shop, 41 by 317 feet, and an addition, 73 by 240 feet, to a new foundry, which was built but a short time ago. The buildings are to have concrete foundations, brick side walls and steel and tile roofs. The machinery which will be installed in them will be operated by electricity. The rapid growth of the company's business and the additions to the line of machinery and tools manufactured by them has necessitated constant additions to their plant.

ADVERTISING LITERATURE.

General Electric Company, Schenectady, N. Y.—A bulletin treating of floor outlet boxes has been published.

Chase-Shawmut Company, Newburyport, Mass.—A leaflet describes and illustrates extended terminal inclosed fuses.

Electric Service Supplies Company, Philadelphia.—The August number of the *Keystone Traveller* is bright and interesting.

Wheel Truing Brake Shoe Company, Detroit, Mich.—A mailing card of unique design presents the advantages resulting from the use of the Wheel Truing brakeshoe.

Rockwell Engineering Company, New York.—A series of seven illustrated leaflets and catalogues describes their various oil-burning appliances for metal melting and heating.

Garden City Sand Company, Chicago.—A comprehensive catalogue describes "Stonekote," an exterior plastering for buildings, and illustrates some of the many uses. The advantages over stucco are also pointed out.

Wilder Snow Plow & Manufacturing Company, Worcester, Mass.—The value of the Wilder radial snow plow to electric roads is shown in a neat illustrated booklet. This plow is designed with the square or shovel nose, successfully used for years by many steam roads, and is built in two sizes, single or double track, right or left hand running, for third-rail or overhead trolley. Stress is laid upon the radial feature, by which sharp curves and sudden changes of grade are taken successfully without special adjustment. The air equipment for wings, diggers, flangers, sanders, brakes, etc., is under the complete control of the motorman. The booklet also contains information regarding service tests, together with a number of strong testimonial letters.

STEEL-WOOL JOURNAL PACKING.

The troubles experienced when using cotton or wool waste for packing journal boxes are well known and usually accepted as a matter of course. The ordinary waste must be packed tightly against the journal or it will sag away and its tendency to cake and roll often makes it unsatisfactory.

A steel-wool packing, made by W. Robertson & Co., 77 Jackson boulevard, Chicago, is a mixture of 50 per cent long-fiber cotton and 50 per cent of steel-wool. The steel-wool is made from a special steel low in carbon, yet with ample resiliency to secure for the mixture sufficient spring to carry the weight of the oil and stand up well against the journal.

As the steel in the steel-wool is a non-absorbent, this packing takes up only one-half the amount of oil that would be taken up by an equal volume of cotton waste. This wool packing does not take the metallic incrustation usually found on cotton waste in contact with the journal; it does not cake or sag away from the journal and being porous allows the dirt and dust to sift through it to the bottom of the cellar of the journal box.

In this way the wool waste remains in good condition for a long period of time. It is claimed that this waste has a life of seven times that of cotton waste, uses less oil, requires less frequent inspection and consequently less labor, and that it will keep a journal well lubricated and cool when other packings will cause hot boxes.

NEW CARS FOR CHICAGO & MILWAUKEE ELECTRIC RAILROAD.

The Jewett Car Company has recently delivered 10 new cars to the Chicago & Milwaukee Electric Railroad. These cars are of the standard design of the railroad company. The length over the body is 40 feet 6 inches; length over vestibules, 52 feet 3 inches; width over all, 8 feet 9½ inches. The center and intermediate sills are 6-inch I-beams with yellow pine fillers. The side sills are made up of two yellow pine sills with a 6 by ¾ inch steel plate sandwiched in between, making the framing very stiff and heavy. The body framing is of standard steam coach construction.

The interior of the car is divided into a main and a smoking compartment with a toilet room in the main compartment next to the smoking compartment partition. On the opposite side of this partition is located the hot water heater, which is removed during the summer and a seat put in its place.

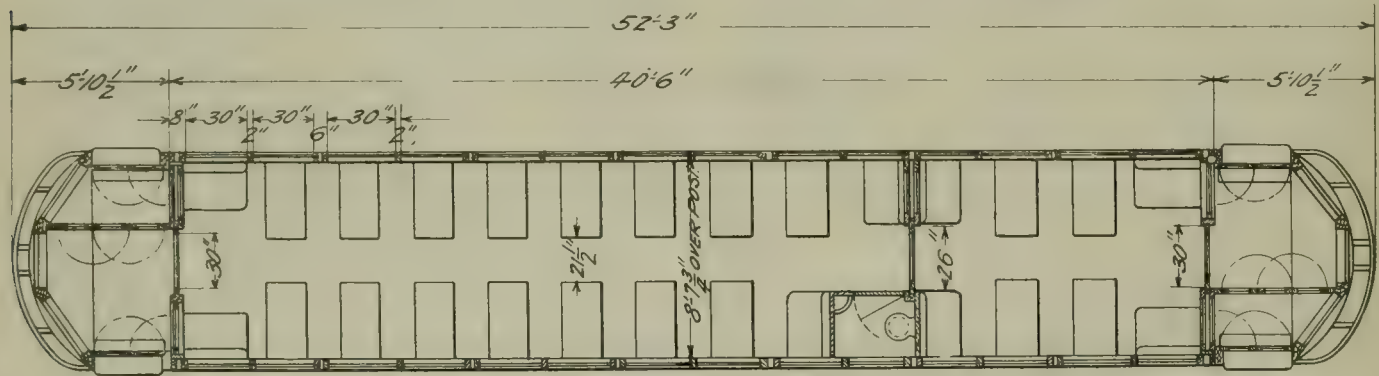
The finish is mahogany inlaid with marquetry; the ceiling is of the semi-empire type; the gothics and deck lights are of green opalescent glass. The windows are spring balanced, have double catches and contain 3-16-inch polished plate glass. Silk pantasote curtains are used. A large plate mirror is provided on the end of the toilet room. The seats are 37-inch return walkover with 25-inch roll backs.

The accompanying halftone engraving of the car interior shows the frosted lamps, which give an abundance of well distributed light. A continuous parcel rack, put in since the photograph was taken, adds to the appearance of the car interior. In one corner of the smoking compartment is placed

and conforms with a Wisconsin law which requires that all interurban cars operating over 25 miles in the state shall be provided with a toilet room. In a recess of the toilet room



Chicago & Milwaukee Electric Railroad—Interior of New Cars.



Chicago & Milwaukee Electric Railroad—Floor Plan of New Cars.



Chicago & Milwaukee Electric Railroad—Exterior of New Cars.

a fire extinguisher and over the end door, inclosed in a built-in cabinet, is a set of emergency tools. The aisles are covered with perforated rubber matting.

The wall and ceiling of the toilet room are finished in a white rubber composition, imitating tile. The hopper is of the gravity-flush type, having a water tank directly above the toilet room. The tank is filled by a hose connection under the car body, while the water level is shown by a gauge glass over the aisle. This toilet room, which is similar to those found in Pullman cars, is a great convenience to the public

partition is the ice water tank of polished white metal with a separate compartment for ice.

Steel wheels 34 inches in diameter, and this company's standard trucks, carry inside-hung motor and brakes. A portable arc headlight is used on either end of the car. Six-inch trolley wheels, ball-bearing trolley bases and trolley retrievers are shown in the halftone engraving.

The bottom of the car is completely covered with ¼-inch transite, which adequately protects the body from fire in case of trouble with the electrical equipment. Each car is equipped

with four GE-73 motors of 75 horsepower each, controlled by the Sprague-General Electric multiple-unit system type C6K. An interesting feature of this control system is the current-limiting relay. In case of too rapid feeding or other trouble this relay opens the control circuit. It is then necessary to move the controller back to the off position before power can again be applied.

Cables and cable boxes are provided for train operation. Air sanders and automatic air brakes interchangeable with steam road equipment are used.

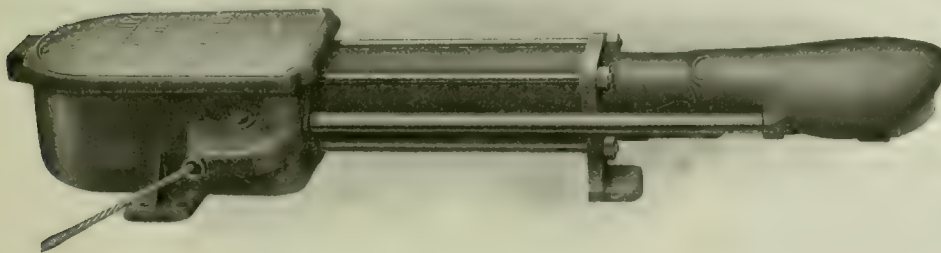
The arrangement of the motorman's cab allows him to be isolated from the remainder of the vestibule and still have ample room. This special cab was described and illustrated in the Electric Railway Review of March 9, 1907, page 328. The air brake gauge is illuminated by a small electric lamp inside its casing.

These cars have a seating capacity of 54 persons and weigh with equipment about 72,000 pounds.

THE MILLOY TROLLEY RETRIEVER.

With the use of high-speed cars the troubles likely to result from the trolley leaving the wire make it necessary that control of the trolley shall be at once obtained or serious damage to the overhead construction and even to the trolley itself will probably result. To meet this condition the Milloy Electric Company, Bucyrus, O., has designed the trolley retriever shown in the accompanying illustration.

This retriever includes a drum operated by a rotary



Milloy Trolley Retriever.

spring, which keeps a flexible bronze cable tight at all times. One end of this cable is attached to the drum and passed over a sheave mounted on the end of a horizontal piston. After the cable passes around this sheave it returns to within six inches of the drum, passing out at the head of the machine and under a sheave mounted in a clevis, to a strap. This strap is fastened to the running board directly under the pole.

On the bottom of the machine are two centrifugal dogs supported by two contortion springs, the tension of which can be adjusted, so that the dogs can be made to act fast or slow as may be desired. These dogs set inside of a rotary sprocket, which engages with the dogs. By turning the sprocket wheel three-fourths of an inch to the right, a small connecting rod engages the sprocket wheel at one end and a short lever connected with a three-way air valve at the other end, thus opening the port, applying air to the piston, which moves forward 12 inches and takes up 24 inches of the bronze cable. As the cable engages the pole six feet from the wheel, and the pole in most cases being at a 45-degree angle, the trolley wheel travels downward five feet for each foot of piston travel, with a speed regulated by a stop or waste cock in the air pipe.

The rotary cam referred to is mounted on the same vertical base that carries the drum, supported underneath by a contortion spring that has sufficient strength to bring it back to its normal position when the tension is taken off the cable. This is done in the usual way; the conductor takes hold of the rope which hangs free at the back of the vestibule, pulls it down a fraction of an inch, and sets it back on the wire, the machine automatically adjusting itself.

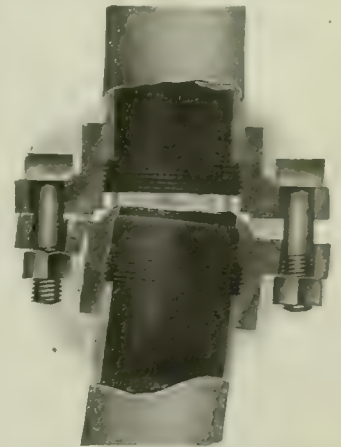
The retriever is installed on the left side of the running board, far enough away to allow sufficient clearance so that the trolley pole or any portion of the line coming down on the running board cannot strike it. It is also set down on the roof of the car so as to be lower than the trolley base. It is claimed that the machine will work in all kinds of weather—sleet, rain, snow, dust or grit having no effect on it.

The Ft. Wayne & Wabash Valley Traction Company is making plans for installing storage batteries on its cars for lighting.

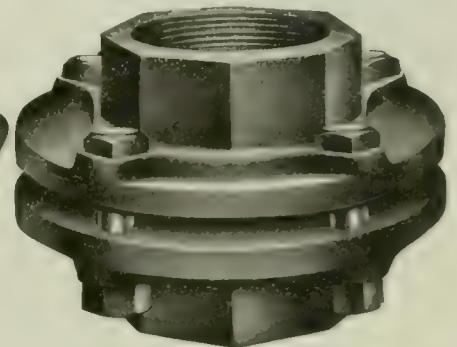
KEWANEE FLANGE UNIONS.

Cast-iron flanges, if made light, are a constant source of trouble. If they do not leak at the gasket they are easily broken by any slight added strain placed upon them.

The Kewanee flange union, shown in the accompanying illustration, has been designed with a view to overcoming the frequent troubles experienced with light gaskets. It is a metal seat flanged union, made of malleable iron and brass. The malleable iron flanges afford a very strong yet light-weight construction. The concave brass ring, as shown, is screwed tightly into place and against this bears the convex malleable iron surface; giving a combination of hard metal against a soft one. The bearing surfaces are such that the two lengths of pipe connected can be badly out of alignment and still make a tight joint. This



Kewanee Union—Bad Alignment but Tight Joint.



Kewanee Union.

new flange union is manufactured by the Western Tube Company, Kewanee, Ill.

A NEW METHOD OF CATENARY CONSTRUCTION.

As an example of modern practice in catenary work the following description of a section of line equipped for the Mansfield (O.) Street Railway Company by the Ohio Brass



Example of Catenary Curve Construction.

Company will be of interest. On one part of the line bracket construction was used, while another part embodies span construction. This stretch also includes rather a short curve which affords an excellent opportunity to show what can be done with catenary material in rounding severe curves. Three-

eighths-inch steel strand messenger wire is used throughout, and No. 00 grooved trolley wire, the trolley wire being suspended 16 inches below the messenger wire at the bracket and span suspension points. The messenger wire is given a sag of 11 inches in 120-foot spans, and the proper sag is used on the other lengths to give the same tension in the messenger wire throughout.

The brackets are of T-bar construction, $2\frac{1}{4}$ by $2\frac{1}{4}$ by 5-16 inches, weighing 4.2 pounds per foot, with $\frac{5}{8}$ -inch support.

The span construction, not shown in the illustrations, consists of two strain yokes connected by a $\frac{5}{8}$ -inch rod. The messenger wire rides on top of the upper yoke and the trolley



Steady Bracket to Prevent Lateral Swinging.

wire is held underneath the lower yoke by means of a Detroit Form 4 malleable iron clamp. Span wires run from both the upper and lower yokes to poles on opposite sides of the track, and 1-inch wood break strain insulators are inserted at the poles, the span wires being alive to the wood breaks at the poles.

For the curve pull-offs a bridle is made from $\frac{1}{4}$ -inch strand. The upper strand of the bridle is served around the messenger wire at the trolley suspension point and the lower strand around a strain collar just above the trolley clamp. A 1-inch wood break strain insulator is inserted at the end of the bridle, from which pull-off wires run to suitable trees or poles.

The spacing between brackets and span suspensions varies somewhat owing to the fact that poles were used as they had previously been spaced. The longest span is about 123 feet, the variation being from this distance down to 30 or 40 feet. The trolley suspensions are installed about every 10 or 11 feet, depending upon the length of the span, and consist of $\frac{1}{2}$ -inch standard messenger clip, malleable galvanized; $\frac{1}{2}$ -inch steel hanger rod, malleable galvanized, and $\frac{1}{2}$ -inch Detroit Form 1 clamp with $\frac{1}{2}$ -inch boss, malleable galvanized. The rods are cut to the proper length to give a straight trolley. The trolley suspension at the curve consists of $\frac{5}{8}$ -inch messenger clip, malleable galvanized; $\frac{5}{8}$ -inch steel hanger rod, malleable galvanized; and a $\frac{5}{8}$ -inch strain collar threaded on the rod just above the Detroit Form 4 clamp which is used on the curve.

On one of the brackets the steady device is installed. This device is designed to steady the trolley from lateral swinging and consists of a porcelain strain insulator mounted on an insulator pin which extends downward from the bracket arm. Around this strain insulator is placed a forged iron clamp which holds the $\frac{3}{4}$ -inch pipe which acts as a steady arm. A $\frac{5}{8}$ -inch trolley suspension device is installed a little to one side of the bracket and around this hanger rod at the bottom a strain clamp is installed which engages the other end of the steady arm.

Not Enough Copper.

A well-known copper producer figures that the consumption of copper since the first of the year has been several million pounds in excess of production, the output of the Butte district having fallen off more than 20,000,000 as compared with the corresponding period of last year.

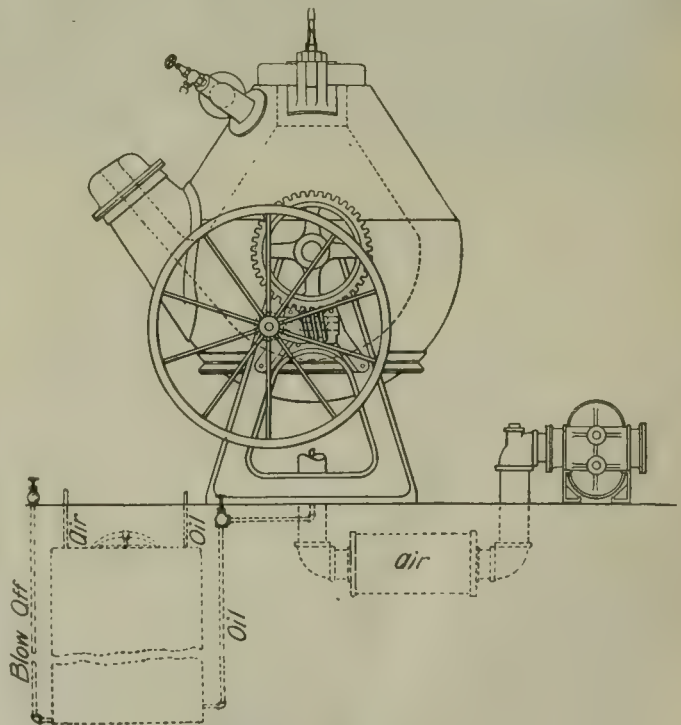
Copper is going into hundreds of new uses every day, and consumption is increasing proportionately; has, in fact, been running in excess of production for several years. The business of the great electric companies, for example, has been increasing at the rate of 25 to 50 per cent a year, while the increase in the copper production of this country averages between 6 and 7 per cent a year.—Southwestern Electrician.

SCHWARTZ METAL MELTING AND REFINING FURNACE.

Considerable difficulty is experienced in electric railway repair shops in obtaining sound bronze castings. Rush work is often delayed because castings which are received at the last moment, perfectly sound, judged by their external appearance, prove to be spongy and filled with blow holes when the outer skin has been removed. As the soundness of bronze castings depends largely upon the pouring temperature, and the preventing of overheating the metal, master mechanics and shop foremen will appreciate the value of the Schwartz melting furnace, which permits obtaining and maintaining desired constant temperature. This furnace, manufactured by the Hawley Down Draft Furnace Company of New York and Chicago, is built in sizes ranging from 300 to 8,000 pounds per heat and is especially suitable for railway shops. Such furnaces are capable of melting not only alloys of copper and tin, but cast iron and steel as well. This will be greatly appreciated, since by means of these furnaces the master mechanic has at his disposal means for supplying a heat of cast steel, iron or bronze in an hour's time, thus greatly facilitating repairs which must be rushed. Owing to the method of heating, the quality of the metal produced by these furnaces is far superior to the ordinary crucible product. The metal contains fewer impurities, and, as it is possible to easily control the temperature to exactly that desired, castings free from blow holes or spongy spots are easily obtained.

The furnace consists essentially of a steel shell, lined with quartz fire tile, and an oil burner, by means of which the highest temperatures needed for melting iron and steel are easily obtained in a short time. The barrel is mounted on trunnions and is tipped by a hand wheel, with worm and gear. All sizes are readily manageable by one man.

It is stated that a large number of foundry companies and railway shops using these furnaces have found that with



Schwartz Melting Furnace.

reasonable care the lining of the furnace will last for 1,500 heats. It is also said that the amount of fuel required averages 30 gallons of crude oil per ton of metal melted, which is certainly a most favorable showing. For locations where only a small amount of oil can be stored at a time, special tanks are provided which hold sufficient oil for a couple of heats. The blast for operating these furnaces can be supplied from any form of blower which will furnish air at 16 to 20 ounces, or the burners may readily be fed from the ordinary compressed air line in a railway shop by throttling the high-pressure air through a constant-pressure reducing valve.

Messrs. Donkin and Kennedy, in 17 independent boiler tests, are reported to have found the heat lost up the stack when no economizer is used, to range between 9.4 per cent and 31.8 per cent of the total heat of combustion. As it is not practicable to cool the gases to atmospheric temperature, it is evidently impossible to utilize all the heat, but the ordinary economizer should, with mechanical draft, show a saving of between 10 and 20 per cent.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 7

CHICAGO, AUGUST 17, 1907

WHOLE No. 225

TABLE OF CONTENTS.

Editorial:

—Fire and Water	181
—The Choice of Prime Movers.....	181
—Reducing Percentage of Damage Costs.....	181
—Please Face Forward	181
—Brakes Inside or Outside	182
—Finding Lost Articles.....	182
—For Immediate Depreciation Accounts.....	182
—Protecting Car Cables.....	183
—San Francisco Strike Results	183
Annual Reports:	
—Kansas City Railway & Light Company.....	184
London (Crane Car (Illustrated))	184
Communications:	
—A Criticism of Mr. Morris' Suggestions for Fire Protection. By W. G. Asmus (Illustrated).....	185
—The Reply of Mr. Morris	187
Electrification of the New York New Haven & Hartford Rail- road. By E. H. McHenry (Illustrated).....	188
The Selby Avenue Tunnel of the Twin City Rapid Transit Company	192
Valuation of Milwaukee Properties.....	193
A Suggestion for a High-Tension Wire Entrance. By H. C. Reagan (Illustrated)	193
Long Island Electrification	194
Determining the Size of Feeders. By Henry Docker Jackson (Illustrated)	194

Power for the Philadelphia & Easton.....	195
Investigation of New York Transportation Facilities.....	196
Lease of Chicago Union Traction Properties.....	197
Transferring Automobiles on Trail Cars (Illustrated).....	197
The Cologne-Bonn High-Voltage Electric Railway (Illustrated).....	198
Piping and Power Station Systems—XLIX. By W. L. Morris, M. E. (Illustrated).....	199
Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	201
News of the Week:	
—Belmont Tunnel Bore Inspected.....	202
—Connecticut Electric Railways	202
—Cleveland Traction Situation	202
Construction News:	
—Franchises	203
—Recent Incorporations	204
—Track and Roadway	204
—Power Houses and Substations	205
Personal Mention	206
Financial News	206
Manufactures and Supplies:	
—Rolling Stock	207
—Shops and Buildings	207
—Trade Notes	208
—Advertising Literature	208
Electric Heater with Removable Back (Illustrated).....	208
Progress of the Danville Car Company (Illustrated).....	209

Premiums on fire insurance paid by the Metropolitan Street Railway Company of Kansas City in the fiscal year ended May 31, 1907, amounted to \$26,684, as compared with \$37,133 in the previous year, a reduction of \$10,449, or 28 per cent. This saving was effected by the installation of sprinkler systems in the most important car houses. In the annual report of the controlling company, the Kansas City Railway & Light Company, Bernard Corrigan, the president, states that contracts have been awarded for the equipment of two additional car houses with sprinkler systems and the installation is now in progress. These systems will effect a further material reduction in premiums. Besides this direct saving the new improvements have reduced the fire risk to the rolling stock. The importance of the reduction in insurance premiums as a result of the installation can be appreciated when it is stated that \$10,449 amounts to 5 per cent on \$208,980. The company has the additional advantage of guarding against serious disablement of service as a result of fire.

The final decision cannot justly be given in the selection of any motive power until the fixed charges are added to the operating expenses, but obvious as this is to the expert consultant it is often overlooked in practice. The detailed estimate of the probable maintenance expenses of equipment of new design involves more or less uncertainty which is unavoidable; the probable life of the apparatus is difficult to foretell with accuracy, and in a new station the load factor cannot as a rule be predicted as closely as is desirable. Yet in spite of these variable factors it remains possible to figure the total power cost of each installation on the basis of assumed limiting conditions. When the large gas engine built particularly for railway service is more fully on the market we shall see interesting times in the power plant designing field. At present no single prime mover seems to be pre-eminently favored for railway service. Development costs must come down, and the prices of the newer units brought nearer the line of standard production charges, before the future of any one prime mover can be

definitely predicted. On the score of operating expense, the small gas engine guaranties look favorable, but that is not the whole story, because larger units are being adopted.

By adoption of the policy of contesting to the courts of last resort all personal injury and damage cases in which the road, in the opinion of its counsel, was not liable, the Metropolitan Street Railway Company, Kansas City, has decreased the percentage of its gross revenue paid for injuries and damages. The result of the policy is discussed by Bernard Corrigan, president of the parent company, the Kansas City Railway & Light Company, in the annual report just issued. The new policy was adopted in the fiscal year ended May 31, 1903. While the total number of passengers, revenue and transfer, increased from 90,823,557 in that year to 136,071,798 in the year ended May 31, 1907, or over 50 per cent, the total expense for personal injuries and damages increased in the same period from \$253,946.51 in the earlier year to \$276,892.19 in the last year, or only 9 per cent. In the fiscal year 1902-1903 the total expense for this account was 7.97 per cent of the gross revenue, while in the year just ended it was but 5.74 per cent, notwithstanding the great increase in traffic. It is not only right, but it is thus shown to be profitable, for a street railway to protect itself from demands in cases where it is not liable.

Many and various methods have been tried by the street railway companies to educate the public in such a way as to prevent the large number of accidents caused by carelessness of passengers in boarding and alighting from cars. Directions to "please face forward when alighting" have been stenciled on the backs of the seats, illustrations of the proper and improper methods of alighting have been posted among the advertisements in the car, and some companies have even gone so far as to remove the rear handhold on the platform. The Omaha & Council Bluffs Street Railway is now experimenting with the plan of inserting advertisements in large type, with and with-

out illustrations in the daily newspapers, asking the public to co-operate with the company in its effort to reduce accidents. These are changed from time to time, but each one contains a suggestion or a caution for the safety of the passengers. While this plan may not be more productive of results than others that have been tried before it presents the matter to the public in a new form and is at least a step in the right direction. Moreover, the expense involved is insignificant as compared with the possible saving in damage settlements if the plan proves only partially successful.

In a recent work on "Electric Railway Engineering," by Messrs. Parshall and Hobart, which has lately been reviewed in these columns, the question of the superiority of

Brakes

Inside or
Outside.

inside or outside hung brakes is considered. Citing the fact that it is quite general practice for steam railways to hang the brakeshoes on the outside of the truck,

the authors say that where this arrangement is not prevented by other conditions it should always be adopted. It is stated that the reduction in maintenance cost due to easy access to the brake-work is sufficient to outweigh all other considerations. The outside-hung brake, however, has the disadvantage that when applied it tends to pull down one end of the truck frame and push up the other. This subjects the truck frame to stresses which it otherwise need not carry. These stresses in turn increase the load on the journals. It is stated that this action is particularly noticeable on equalized trucks and that when the brakes are applied the downward pull is liable to bring the pedestal down hard on to the equalizers on the top of the box, thus producing the unpleasant jarring sometimes felt when brakes are applied heavily on cars with trucks of the equalized type. An attempt to overcome this has been made in the design of the "non-tilting" type of truck. On trucks other than those of the equalized type the mentioned disadvantage of the outside-hung brake disappears. It would be interesting to see comparative costs for maintenance which would illustrate these arguments. We have always felt that where the wheel base was not too limited both inside-hung motors and brakes were the nearer correct mechanically, since then the truck parts assume the conditions of continuous beams with their heaviest loading between supports and not as cantilevers loaded at the ends.

One of the many simple ways for an electric railway to gain popular favor, although it may affect but comparatively few

Finding

Lost

Articles.

passengers, is to show especial care in the collection and returning of lost articles.

The Pacific Electric and the Los Angeles

Interurban railways make a special effort to have all articles found on their cars

delivered to a "lost and found" room and there classified in such a way that little difficulty will arise when such articles are delivered to their owners. It is the practice to hold for 60 days all lost articles. At the end of this time, if they have not been called for, the finder is notified that he may claim the "lost" article as his property. Should the finder not respond to the notice sent him the lost article is considered as property of the railway company to be held for sale. In order that the work of keeping account of the number of days that particular articles have been held may be facilitated, the lost-and-found room has been fitted with two cases of 30 compartments each. One of these cases is on one side of the room and the sections in it are numbered to represent the days of one month. The other case, similarly arranged and numbered, is on the opposite side of the room. It is thus seen that there is an individual compartment for all the articles found on each day for two months. With these cases occupied the attendant can each day, when new articles are received, place them in the compartment numbered for

the day of the month on which they are received and at the same time remove the old articles from the same section; thus knowing definitely that the old articles as removed have been stored for the full 60 days. The simplicity of this arrangement, including 60 cases, one for each day of the two months, renders the accounting work of the lost-and-found department a small task and assures that any article in the department can be turned over to a claimant with little delay.

FOR IMMEDIATE DEPRECIATION ACCOUNTS.

There is no more imperative need that now confronts the executive officials of electric railways than the immediate application of adequate depreciation accounts. To consider depreciation as purely a luxury for application in the indefinite future, or as a fanciful thing, a toy to be played with, will not suffice at this time. Conditions which are gathering rapidly will force either the substantial recognition of depreciation as a vital element in electric railway accounting or else situations which will mean but the one inevitable end of bankruptcy for some companies.

It is folly to allow the claims of the low-fare advocates to pass without that complete refutation of argument which proper accounting methods would make possible. To administer a late correction through receivership of a street railway property for evils in its past financing and to wipe out the sins of promoters and early managers by foreclosures and the ruin of security holders may yet be avoided by many companies which have procrastinated in the installation of fair depreciation accounts.

No one who has still the power to choose should hesitate for a moment between maintaining adequate depreciation of equipment and way and structure accounts and creating a fund for amortization of the investment when limited franchises are involved, or permitting the alternative, certain shoals of trouble. Depreciation is a fair and definite expense of operation and should be so recognized. To strip a street railway of all its surplus earnings above bare operating expenses, and fixed charges and to hold its maintenance expenditures to the slimmest point is worse than the failure of individuals to prepare for old age in their earning days. Both courses can scarcely fail to end in poverty. The executive official who leads his property through this tortuous path of difficulties brings distress to the innocent security holders.

It is natural in these days to view with alarm the increasing tendency to regulation of corporations by national, state and municipal authorities. That the keenest observers are fearful of the results of the present extraordinary political and social conditions is sufficient reason for the wise to set their houses in order while they may. Increasing power to regulate corporations is demanded by public authorities on every hand. Under the guidance and encouragement of the chief executive of the nation the movement for regulation has attained a powerful momentum, which has carried it far—too far, we believe; but nevertheless it is a condition which must be confronted.

No better way exists of meeting the present situation and the outgrowths of the future than to introduce promptly such accounting methods as will take immediate cognizance of the real depreciation of the property which exists. Where there is discrepancy between capitalization and the fair value of tangible and intangible property, which provision for depreciation in the past would have prevented, it may not be too late to save the day by recognizing the facts, which will not fail to demand such recognition sooner or later. Today may be the opportune time; a year from now may be too late.

The temptation to operate a new property at low expense and to make no provision for the depreciation which will develop rapidly in future years is so strong that courage is required to resist it. But it is a question that future managements or the accounts of ensuing years must meet. Experience has revealed to many the suicidal nature of a policy

which depends on constantly increasing additions to capital account and on the growth of traffic to justify excessive dividends in the early history of street railway properties. The original theories of depreciation have become concrete facts which cannot safely be ignored.

Certain tendencies of the day, now marked in some cities, will develop in other places when conditions are ripe. The road to political preferment by attacks on street railway companies and demands for lower fares is so easy that demagogues will continue to elect to travel it. When companies can prove the need of all the revenue they can secure to yield returns on the actual cash capital invested, to safeguard the security of the principal placed in the property and to maintain plant and equipment, they will be fortified by arguments against which no assaults could prevail. In the courts of last resort to which all attacks could be carried, the disclosures made as a result of proper accounting methods would constitute a guarantee against confiscatory fares. Especially is it needful that companies with expiring franchise rights in large cities should protect their position and approach the ideal in accounting as closely as possible; but no roads, strong or weak, large or small, can afford to assume the risks which failure to adopt depreciation as a fundamental necessity of accounting will entail.

PROTECTING CAR CABLES.

Nearly all the later types of cars have their motor and controller leads partially or wholly inclosed in conduit and the necessary flexible parts of the leads are covered with loom or flexible metal conduit to protect them while rubbing over the motors and axles as the trucks swing on curves. On most of the older types of cars no conduit is used, and in some cases the wires are not even made up into cables, being run in a helter-skelter fashion from the trolley base to the controller and from the controller to motors and resistances.

Continual vibration rapidly wears off the insulation on car wires, eventually producing short circuits, with the probable crippling of a car on the street. If it is impossible to put the wires in conduit or cable, some effort should be made to cleat them up in such a way that there will be no movement of the wires against each other or against parts of the car. The leads should be well taped in places where they come against the metal work of the car, affording some additional protection against short circuits. Many failures of motor leads can be traced directly to allowing them to rub against the motors. It is nearly always possible to cleat the leads to the car body in such a way that they will seldom rub except on the sharpest curves. It is not unusual to find the leads rubbing against the axles and keeping the axles bright for a length of two or three inches. Unless this detail is taken care of the insulation will be worn from the lead, resulting in a short circuit and necessitating cutting out at least one of the motors.

If it is impossible to prevent the leads from rubbing on the motors it will be found a considerable advantage to cover them with loom, which will stand abrasion much better than the ordinary insulation. On cars with open front platforms trouble is frequently caused in the wet weather by the water soaking through the platform into a badly insulated joint in the controller leads. This may result in making alive the grab handles and thus giving shocks to the passengers or motormen. A piece of rubber or canvas can often be used to good advantage to protect leads exposed in this way. Wooden or tin guards might be attached to the car body to prevent the wheels from throwing water and mud into the resistance and among the motor leads.

A rainy or slushy day will bring to light many such weaknesses in car wiring, and it is always on these days that motor failures are particularly frequent. The repairing of ordinary breakdowns generally keeps the car house force busy without the addition of the rather unnecessary trouble caused by neg-

lected car wiring. A little time spent when the weather is good and the cars are working satisfactorily, in overhauling the car wiring, cleaning up the wires, protecting them from water, and going over the insulation, will be repaid to good advantage the first rainy day by a marked decrease in car failures.

SAN FRANCISCO STRIKE RESULTS.

Since the United Railroads assumed control of the San Francisco street railway systems in March, 1902, strike has followed strike, regardless of signed working agreements.

In March, 1902, carmen on the Market street line were being paid 22 cents an hour and on many of the other lines the rate was 21 cents. Shortly after the organization of the new company the carmen struck for a flat rate of 25 cents an hour, which was granted. In 1903 a demand for an increase was placed before a board of arbitrators, on whose recommendation a scale of 25 cents per hour for the first year, 26¼ cents for the second year, and 27½ cents for the third year was adopted, and a two-year working agreement was signed on this basis.

Fifteen months later the carmen violated their contract by striking again. Patrick Calhoun, president of the United Railroads, again consented to have the matter arbitrated. The rate of wages was fixed at 31, 32 and 33 cents an hour for the first, second and third years, respectively, an advance of 22½ per cent over the rate fixed in the violated contract and an increase of over 50 per cent since the United Railroads assumed control, in March, 1902. This contract terminated on May 1, 1907, on which date the carmen struck for a flat rate of \$3.00 for an eight-hour day. Mr. Calhoun's offer of arbitration was refused.

This last strike, which has been in force since May 1, has been marked by much rioting and disorder, but at the present time practically all the lines are in full operation and carrying nearly the usual volume of traffic.

In commenting on the carmen's strike, The Journal of Electricity, Power and Gas of San Francisco, says:

"The people of San Francisco could see neither sufficient right nor reason in the carmen's complaint for the industry and reconstruction of this city again to be impaired so seriously by the cessation of car service. In this union-ridden town, in which the boycott has been used so successfully as a bogey man to timid merchants, and in which the interference of pickets has been so vexatious, there was a healthy and bold determination on the part of the majority of the third party to all strikes—the passengers and consumers—to exercise their rights of individual liberty to patronize the cars as suited their convenience. * * * In each of these three strikes the disgruntled employes were foredoomed to failure. Incalculable damage has been done by the strikers, and they have gained nothing. By the victory of Mr. Calhoun a great fundamental principle of American citizenship has been established for the first time in many years in San Francisco, and The Journal sincerely hopes that the principle of the liberty of the individual to buy or sell labor as it seems best to the individuals concerned, may forever be maintained faithfully in this city."

Lake Shore Electric Railway.

According to President E. W. Moore the Lake Shore Electric Railway will build the proposed line from Fremont to Tiffin as an extension of its Sandusky Fremont & Southern, just as soon as the money market improves so as to make the financing of the road possible. The proposed extension is 16 miles long and will cost in the neighborhood of \$25,000 a mile to build. A survey has already been made and President Moore is confident that the road will be started next spring. The authorized mortgage on the Sandusky Fremont & Southern is for \$1,500,000, of which \$500,000 was used to build the line from Sandusky to Fremont. It will take about \$500,000 to build the extension to Tiffin and a like amount to build a line from Fremont to Fostoria, which is also contemplated by the Lake Shore Electric.

ANNUAL REPORTS.

Kansas City Railway & Light Company.

Gross earnings of the Kansas City Railway & Light Company in the fiscal year ended May 31, 1907, were \$5,715,339, an increase of 10.91 per cent over the previous year. Operating expenses, which required 50.9 per cent of gross earnings, amounted to \$2,909,136, or 12.04 per cent more than in the previous year, due principally to increased wages and to the increased cost of paving and of maintenance of track. Net earnings, therefore, aggregated \$2,806,203, a gain of 9.76 per cent. Of the total gross earnings of \$5,715,339 the Metropolitan Street Railway Company contributed \$4,821,903 and the Kansas City Electric Light Company \$893,436. The financial results of the operations for the year were as follows:

Year ended May 31—	1907.	1906.	1905.
Gross earnings	\$5,715,339	\$5,153,168	\$4,444,674
Operating expenses	2,909,136	2,596,539	2,235,260
Net earnings	\$2,806,203	\$2,556,629	\$2,209,414
Operating expenses—per cent of gross earnings.....	50.9	50.39	50.29

To the net earnings of \$2,806,203, there was added \$9,440 other income, making a total of \$2,815,643. There was deducted from this amount \$1,765,870, leaving net income of \$1,049,773. From the net income there was paid the 5 per cent dividend on the preferred stock, amounting to \$476,105, and \$55,000 for the retirement of Corrigan Consolidated Street Railway bonds. From the balance then remaining \$329,814 was transferred to "surplus in reserve," and the balance of \$188,854 was carried to the surplus, making a total surplus at the end of the year of \$846,205. The \$678,760 interest received from the subsidiary companies offsets the expenditures during the year for interest on funded and floating debt.

In his introductory report, Bernard Corrigan, the president, refers to a number of details regarding the operation of the property. He mentions the reduction in the cost of damage and injury claims, and the lessened expense of fire insurance resulting from installation of sprinkler systems in the most important car barns.

An additional 5,000-kilowatt steam turbine has been installed in the main power house, which furnishes current to the street railway and the electric light companies, subsidiary companies, making a total capacity for this station of 20,000 kilowatts. Additional rotary converters for both companies have been installed in the various substations. Mr. Corrigan states that with the completion of a 1,500-kilowatt railway rotary converter substation at Fifteenth and Walnut streets, which will be in operation before the end of the calendar year, both of these companies will be prepared to handle the business which may reasonably be expected in the ensuing 18 months. He also refers to the erection of a new substation near Forty-seventh street and Lydia avenue, which is equipped with two 500-kilowatt rotary converters and will furnish the light and power for Electric park. When the park is not used, these rotaries will be employed in the railway service.

The purchase of the stock and the reconstruction of the Kansas City & Westport Belt Railway are mentioned. This road comprises 16.76 miles of single track, making a total operated by the system at the close of the fiscal year of 239.04 miles of single track. The Kansas City & Westport Belt road has the only entrance into the southern part of Kansas City, Mo., for the delivery of freight, and, as the growth of the city is principally toward the south, it is believed that these facilities will be of great value. Since the purchase of this property, stone ballast has been laid, and the entire track has been relined and resurfaced. Operation with steam locomotives has been abandoned and electricity substituted as a motive power, an overhead line having been erected. To furnish the current for handling the freight and passenger business on this line a fireproof substation has been erected and equipped with a 750-kilowatt rotary converter. The 50-ton electric locomotive, which has been purchased by the com-

pany, is capable of hauling 12 loaded freight cars. It is expected during the coming year, Mr. Corrigan adds, that the operating expenses will be materially reduced, and that this company will contribute a substantial amount toward the general income.

Statistics of operation from the fiscal year ended May 31, 1901, are given. From that year to the 12 months' period just concluded gross earnings per car-mile rose from 17.74 cents to 21.36 cents, operating expenses from 10.45 to 11.24 cents, and net earnings from 7.29 to 10.12 cents. The traffic figures for the last three years compare as follows:

Year ended May 31—	1907.	1906.	1905.
Revenue passengers	94,996,998	88,296,480	77,223,357
Transfer passengers	41,074,800	37,810,545	32,494,086
Per car-mile—gross earnings.	21.36 cts.	21.61 cts.	20.86 cts.
Per car-mile—oper. expenses.	11.24 cts.	11.25 cts.	10.79 cts.
Per car-mile—net earnings..	10.12 cts.	10.36 cts.	10.07 cts.
Per car-hour—gross earnings.	\$1.92	\$1.954	\$1.8452
Per car-hour—oper. expenses.	\$1.01	\$1.017	\$0.9542
Per car-hour—net earnings...	\$0.91	\$0.937	\$0.891
Track mileage bet. termini...	124.99	113.83	110.35
Single-track mileage.....	239.03	222.71	217.79

While the Kansas City Heating Company, owing to unfavorable operating conditions, has been unable to make much of a showing in the production of revenue, the ability of the companies to furnish steam heat, Mr. Corrigan says, has enabled the light company in many instances to secure contracts for furnishing light and power.

LONDON CRANE CAR.

The accompanying illustration will serve to show the general appearance of a substantially built crane car in use on the District Railway of London. It will be noted that the car has two sheet steel cabs and two jib cranes, the lifting ropes of which are operated by winches. These winches, as



Crane Car with Two Cranes.

may be seen, are strongly built with sheet steel side frames bolted to the floor of the car. The crane posts are housed inside the cabs so that the largest possible amount of floor space is left for carrying materials on the car floor between the two cabs.

To Use Steel Ties.

The San Antonio (Tex.) Traction Company is to make experiments with steel ties on its lines in San Antonio, and with this purpose in view a consignment of steel ties has been ordered for use in a portion of the business district. It is expected the results from these will be more satisfactory, and especially so in holding the rail more rigidly than wooden ties. The rails are to be securely bolted to the ties and both rails and ties will be embedded in concrete.

COMMUNICATIONS.

A Criticism of Mr. Morris' Suggestions for Fire Protection.
To the Editors:

In the August 3, 1907, issue of the Electric Railway Review, on page 136, appears an article on "Piping and Power Station Systems," by W. L. Morris, M. E. This article deals with fire protection for power houses and shops.

Having been in the fire protection and insurance field for a considerable period and having laid out fire protection systems for a large number of factories, power houses, traction properties, etc., I beg to criticize Mr. Morris' system of protection and also several statements made regarding the ability of fire insurance engineers to find the hazardous points in risks and to apply the proper protection therefor.

Mr. Morris states that the roof of a power station is just as liable to be set afire from the top as from the under side, and then proceeds to recommend perforated pipes for the outside protection of the roof. What about the fire protection for the underside of the roof? Is not this underside protection really more important than the protection for the outside of the roof? It has been found through practical experience that perforated pipes, particularly when located outside and subject to all sorts of weather, soon become thoroughly clogged by the accumulation of rust and dirt, both on the inside and outside of the pipes, which renders most of the perforated pipe systems useless.

Perforated pipes for fire protection were patented and used to some extent a number of years ago, but these systems have been entirely discarded as being absolutely unreliable and unsatisfactory, particularly where the perforated piping was used for outside fire protection.

Instead of the perforated pipe system I would state that much more efficient fire protection can be obtained by placing one line of piping along the ridge of a hip roof and spacing at regular intervals on this piping what are commonly termed open or roof sprinklers, which are especially designed for this class of fire protection and which have been found to be far better than any perforated pipe system. These open, or roof, sprinklers are made of non-corrosive metal and the sprinklers are so designed as to distribute water down and on both sides of the roof in an even spray and not up into the air, where it will do not good. Furthermore, these sprinklers have relatively larger openings than the perforated pipes, but they are spaced so that the spray from one sprinkler will slightly overlap that of another, thus insuring an even and adequate discharge of water over the entire roof surface. These sprinklers will not corrode and obstruct the proper flow of water, and it will only be necessary to have one line of piping on the roof instead of two lines of perforated pipes, as shown in Figure 297.

The runway shown on the roof in the cut is in my estimation absolutely unnecessary when you take into consideration the slight pitch of the roof. This runway only adds more combustible material to the roof and would eventually become a serious hazard, as it would be a very acceptable place for birds to build their nests underneath, and should even a very slight spark lodge in one of these nests there would be ample fuel in the immediate vicinity to start a blaze.

In considering fire protection it is just as necessary to provide proper protection for buildings adjoining or in the immediate vicinity of a valuable power house as it is for the power house itself, particularly if they are so situated as to form a serious hazard to the power house, which condition would have considerable bearing on the insurance rate on the power house.

Mr. Morris assumes that it would be necessary to install an Underwriters' fire pump if there are other buildings to protect besides the power house. This assumption does not hold good in the majority of risks equipped with fire protection apparatus. In the first place, all properties equipped with automatic sprinklers, hydrants, etc., must have two separate sources of water supply. These supplies consist principally

of adequate city water connections wherever available, and in addition a gravity tank of such size and height as to provide a reliable secondary source of water supply.

Underwriters' fire pumps are used only where there is no adequate or available city water supply, or where the risk is of large dimensions, or where there is an unusual degree of hazard.

Mr. Morris evidently is not familiar with the most efficient means now in general use for the extinguishing of incipient fires, namely, approved automatic fire extinguishers.

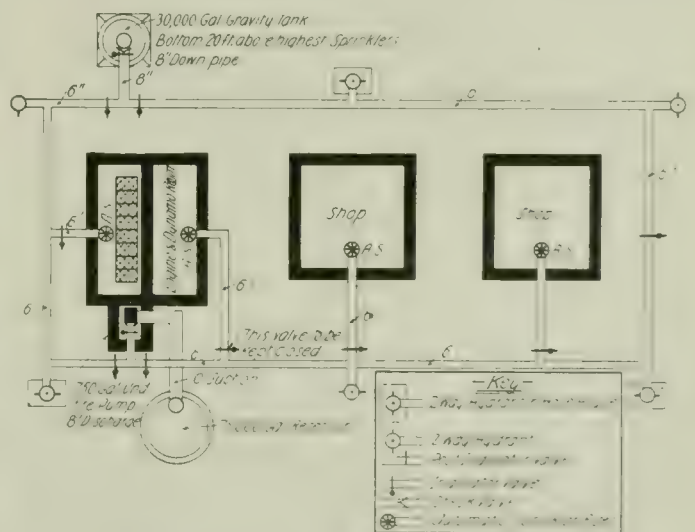
I presume Mr. Morris, in his article, is dealing principally with the protection for electric light and power stations and such other buildings as may be found in conjunction therewith.

I would therefore state that the primary fire protection to be considered should be a complete system of approved automatic sprinklers, with two independent and sufficient sources of water supply.

Considering the power stations separately, it has been found good practice to install automatic sprinklers throughout both the boiler and engine rooms, provided, of course, that the roofs and floors or roofs only are of a combustible nature. If automatic sprinklers are installed in the engine and dynamo room the usual practice is to provide an outside post indicator shut-off valve located at a safe distance from the power house to control the sprinklers in the engine and dynamo rooms. This valve is then kept tightly closed so that there will be no water in the sprinkler piping over the dynamos. In the event of a fire this valve may then be readily opened from the outside, thus allowing the water to enter the sprinkler piping in the engine and dynamo rooms.

Under this arrangement there is no danger of water damage to machinery through the accidental breakage or leakage of the sprinkler piping.

Naturally in boiler rooms this accidental water leakage from the sprinkler piping is not of such great importance, therefore the outside controlling valve for the automatic



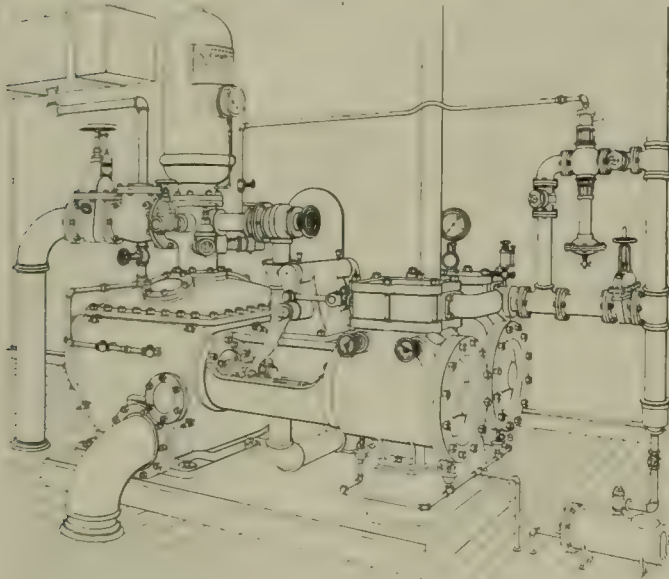
Suggested Plan for a Fire Protection System.

sprinklers in the boiler room is kept open at all times, which allows the water pressure to rest directly on the automatic sprinklers.

This is the condition in all cases except for engine and dynamo rooms, as above cited, and also where sprinklered buildings are not heated sufficiently to prevent freezing of the water in the sprinkler piping. In this case what are termed automatic dry pipe valves are installed in the main vertical inside feed pipe to the automatic sprinklers. The sprinkler piping is pumped full of air at an average pressure of from 30 to 35 pounds, and this air pressure acting on an automatic dry pipe valve tends, owing to the peculiar construction of this valve, to prevent the water from entering the

sprinkler piping until the automatic sprinklers are opened through heat from fire, when the air first rushes out of these sprinklers to be immediately followed by the quick tripping of the dry pipe valve and consequent flow of water into the main sprinkler piping.

Granting that an Underwriters' fire pump is used as one source of water supply to the automatic sprinklers, this fire pump should be located in a brick or concrete pump house. This building should be built outside the power house, either adjoining the boiler house on the least exposed side or adjacent to same, but never at an inaccessible point or at any great distance from the steam supply. The steam



Underwriters' Pump Properly Equipped and Connected.

supply line to the fire pump may be run either overhead or underground and connected to the main steam header over the boilers at a point where a constant supply of steam may be had, whether one or all the boilers are in operation. At the point of connection to the steam header an outside screw and yoke valve should be placed and this valve should then be kept open at all times, so that in case of fire over the boilers it will not be necessary for an attendant to climb up and open this valve, as the fire might be in close proximity to the valve, which would make it inaccessible.

Coming to the steam connections at the fire pump; as stated previously, where automatic sprinklers are installed two independent sources of water supply should be provided, one source being in service at all times, whether city water or gravity tank. The fire pump is then held as a reserve, or secondary, source of water supply, in which case, as has been found through years of practical experience, it is not advisable or necessary to continuously operate the fire pump by means of an automatic regulator in the steam connection at the fire pump, as the primary water supply should be ample to provide sufficient protection against a fire in its incipency. This supply, if not entirely extinguishing the fire, would at least be the means of holding the fire in check long enough to enable the engineer to reach the fire pump and operate same through a single throttle valve, located in the steam line at the fire pump.

If an automatic steam regulator is provided at the pump it should be one approved by the insurance companies and installed on a by-pass, with controlling valves on each side of the regulator, so that the regulator may be cut out for repairs, but still leaving the fire pump operative by means of a third valve in the direct steam line, where it may be operated at will by the engineer.

The system of automatic governor control as indicated by Mr. Morris is not approved by the insurance companies and is furthermore entirely too complicated to be of any practical use, as it is too liable to fail at the critical moment. A much more reliable and efficient steam control may be obtained as indicated in the Underwriters' pump pamphlets.

Mr. Morris further states in his article that the fire service and low-pressure service may both be supplied from the fire pump. This is not in accordance with present-day practice, nor is it good engineering.

The entire fire protective system, including sprinklers, pumps, hydrants and underground supply mains, should be maintained distinctly separate from any other domestic service, so that it may be in proper working condition at all times, and furthermore, so that the fire protection will not be crippled by accidents to domestic service piping in any building where there may be a fire, thus robbing the fire mains of their water supply unnecessarily.

Too much dependence should not be placed upon station attendants, who, as stated by Mr. Morris, might become excited in case of fire, making it easy to forget to close or open the proper valves, thereby defeating the prime object of the entire fire protection.

All fire protection systems should be installed with as few appliances as possible commensurate with good protection, so that it will not be easy for excited attendants to forget to close or open the proper valves at a critical moment. Many sad experiences can be related by insurance companies where absolutely needless and excessive fire damage has resulted through the breaking of the domestic service piping on account of its being connected with the fire mains, also by the inaccessibility of valves which had to be operated in case of fire and which could not be operated, owing to the close proximity of the fire to these valves, many therefore remaining closed where they should have been open, and vice versa.

Underwriters' fire pumps should be connected up with the water supplies separate, such as an underground reservoir or tank set on the ground. This pump suction supply should be large enough so that the fire pump may be operated to its full rated speed and capacity for at least 100 minutes.

Referring to page 137 (Electric Railway Review, August 3), second paragraph. Mr. Morris calls attention to the loop system or belt line of piping and states that in a system designed in this manner and supplied with a 6-inch discharge from the pump would require 4-inch piping, or possibly 5-inch at the most.

In the first place an Underwriters' fire pump with only a 6-inch discharge is the very smallest Underwriters' pump manufactured and is rated at only 500 gallons per minute. A fire pump of this size is used only for very small risks and where there is a minimum of area or hazard. Therefore a loop system of piping would be entirely unnecessary and too costly. Four-inch underground piping is entirely too small for a system of the size shown in the cut, Figure 298, and is not allowed for fire protection by the insurance companies. In any event the two 4-inch sides of the loop are not equal in area to the 6-inch pump discharge opening into this loop, consequently, taking into consideration that the area of the loop system is smaller than the supply pipe from the pump, this to begin with cuts down the efficiency of the service without taking into consideration the loss of head through friction in such long runs of small 4-inch piping as proposed by Mr. Morris.

Mr. Morris further states that 5-inch pipe would be ample. Evidently Mr. Morris is not aware that 5-inch cast-iron pipe is not manufactured for fire purposes, and if he intends using 5-inch wrought-iron pipe he is again in the wrong, as it has been found extremely bad practice to install wrought-iron pipe underground for fire protection mains, particularly where there are ashes or cinders in the ground, which so rust wrought-iron pipe in such a short space of time that it soon becomes useless.

No fire protection piping should be installed underground

other than cast-iron pipe of sufficient weight to withstand the high pressure which can be obtained from an Underwriters' fire pump. The illustration herewith shows a system of fire protection for the same arrangement of buildings as shown on page 137, Figure 298.

This, in my estimation, would constitute a most reliable and efficient fire service, assuming that no adequate city water mains are available. If adequate city water mains are available a suitably sized connection to same would then take the place of the gravity tank shown on the inclosed diagram; or if city water is available, also the city fire department, then the Underwriters' fire pump might be dispensed with, using the city water and gravity tank as the two supplies for the fire protection systems. You will note on my diagram that no domestic water supply connections are made to any of the fire service mains, pump or tank, thereby simplifying the fire protection and eliminating a very undesirable feature, namely, the mixing of the domestic supply piping with the fire protection piping, and also the multiplicity of valves which must be operated in the event of a fire and by attendants who might easily become excited and not do the right thing at the right time.

It appears to me that Mr. Morris is not conversant with the manner in which fire protection is handled by insurance companies at the present time. He states on page 136, third paragraph: "The insurance companies demand a specific construction, but, their rules being general, no expert judgment is used for each individual risk. They oftentimes demand things wholly useless and neglect to make demands that are absolutely essential for protection against fire. This is a feature of their business that cannot well be otherwise."

It is almost useless to comment on such manifestly absurd statements. One might as well say that doctors promulgate one general set of iron-clad rules, using no expert judgment for each individual case.

It is very evident after reading Mr. Morris' article that he undertakes to apply a remedy for seeming ills without first diagnosing the case. This condition cannot well be otherwise where no practical and intelligent fire insurance engineers are consulted or employed. Fire insurance engineering of today is not the old hit or miss style which existed many years ago.

Fire insurance engineering is a distinct and important field in a class by itself and which class does not depend upon mechanical engineers for information as to how to lay out a good system of fire protection or to find the unprotected portions of a plant.

Furthermore, no plant needs to be equipped so that it can collect its insurance as stated by Mr. Morris. Insurance can be collected, whether a plant be equipped with fire protection or not. Naturally a plant not equipped with good fire protection must pay a higher rate of insurance than one that is so equipped, but both may recover their losses in the event of a fire. Every insurer makes his own rate, and this rate may then be materially reduced by installing approved fire-fighting appliances and efficient outside fire mains and water supplies laid out by an intelligent and experienced insurance engineer.

W. G. ASMUS,

Engineer American Railway Insurance Company.
Cleveland, O., August 9, 1907.

[The preceding communication from Mr. Asmus has been read by Mr. Morris, whose reply follows.—Eds.]

The Reply of Mr. Morris.

The discussion by Mr. Asmus of that part of my serial article on "Piping and Power Station Systems" which deals particularly with fire protection brings to light a considerable amount of valuable information as considered from the standpoint of the underwriters' engineer. Mr. Asmus discusses in detail the sizes of pipes, fittings, etc., for fire-supply water lines and sprinklers.

The restrictions of space so limit my series of articles,

which includes a broad scope, that no attempt has been made on my part to consider these matters in minute detail. For this reason the criticisms in this communication which treat of details only are valuable.

The various methods and details proposed in the different instalments of the serial article have been presented with a view to securing better and more reliable fire protection than has generally obtained in the past for power station work. A point to lay special stress upon is to what extent do power plant operators wish to make the fire protection devices automatic. It should be remembered that in a power station the operator has at hand at all times a force of practical men who are accustomed to watch and to act quickly. In power plant installations a fire pump can generally be installed so that it will have regular work to do and thus no loss of investment be apparent.

The suggestions made by Mr. Asmus with regard to the fixed rules of the underwriters are based on facts and are admitted by the underwriters' inspectors. If the company with which he is associated is making a special study of each risk, undoubtedly the engineers are authorized, when occasion demands, to depart from the rigid rules of the board of fire underwriters.

WILLIAM L. MORRIS, M. E.

Chicago, August 15, 1907.

DIRECTORY OF ELECTRIC RAILWAY ASSOCIATIONS.

American Street and Interurban Railway Association. Secretary, Bernard V. Swenson, 20 West Thirty-ninth street, New York. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Accountants' Association. Secretary, Elmer M. White, assistant treasurer Birmingham Railway Light & Power Company, Birmingham, Ala. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Engineering Association. Secretary, S. Walter Mower, general manager Southwestern Traction Company, London, Ont. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Claim Agents' Association. Secretary, B. B. Davis, claim agent Columbus Railway & Light Company, Columbus, O. Annual meeting, Atlantic City, N. J., October 14-18.

American Street and Interurban Railway Manufacturers' Association. Secretary, George Keegan, 2321 Park Row building, New York, N. Y. Annual meeting, Atlantic City, N. J., October 14-18.

Canadian Street Railway Association. Secretary, Acton Burrows, 33 Melinda street, Toronto, Ont. Next meeting, Montreal, September.

Central Electric Railway Association. Secretary, W. F. Milholland, secretary and treasurer Indianapolis Traction & Terminal Company, Indianapolis, Ind. Next meeting, Columbus, O., September 27.

Colorado Electric Light Power and Railway Association. Secretary, John F. Dostal, Denver Gas & Electric Company, Denver, Colo. Next meeting, Denver, Colo., September 18, 19 and 20.

Iowa Street and Interurban Railway Association. Secretary, L. D. Mathes, general manager Union Electric Company, Dubuque, Ia.

Massachusetts Street Railway Association. Secretary, Charles S. Clark, 70 Kilby street, Boston, Mass. Meetings held in Boston on second Wednesday of each month, except July and August.

Michigan Electrical Association. Secretary, A. C. Marshall, Port Huron, Mich. Annual meeting, Post Tavern, Battle Creek, Mich., August 21, 22 and 23.

Northwestern Electrical Association. Secretary, R. N. Kimball, Kenosha, Wis. Annual meeting, Milwaukee, Wis., January, 1908.

New England Street Railway Club. Secretary, John J. Lane, 12 Pearl street, Boston, Mass. Meetings held on fourth Thursday of every month.

Oklahoma Electric Light, Railway and Gas Association. Secretary, Galen C. Crow, general manager Guthrie Electric Light & Power Company, Guthrie, Okla.

Southwestern Electrical and Gas Association. Secretary, R. B. Stichter, Dallas, Tex.

Street Railway Association of the State of New York. Secretary, J. H. Pardee, J. G. White & Co., New York, N. Y. Next meeting, Kingston, N. Y., September 21.

Wisconsin Electric and Interurban Railway Association. Secretary, Clement C. Smith, president Columbia Construction Company, Milwaukee, Wis.

ELECTRIFICATION OF NEW YORK NEW HAVEN & HARTFORD RAILROAD.

BY E. H. M'HENRY, VICE-PRESIDENT.

The terminal tracks of the New York & Harlem Railroad, between the Grand Central station, New York City, and the junction point at Woodlawn, 12 miles, are jointly leased and operated by both the New York Central and the New Haven companies. The zone of electric operation on the lines of the latter extends 21 miles farther, to Stamford.

The New Haven company was one of the earliest pioneers in the field of heavy electric traction, and has operated six of its shorter branch lines by electricity in commercial service for a number of years past, beginning as early as 1895.

The calculations and experience of the railroad company's engineers indicate that the total cost of a single-phase installation will be much less than that of the continuous-current system, and that the higher electrical efficiency, lower fixed charges, maintenance and operating expenses of the single-phase system all tend to reduce the relative cost of current

analyzing operating conditions and requirements was assigned to Calvert Townley, consulting engineer, and William S. Murray, electrical engineer, of the New Haven company, to whom, together with their able assistants, credit is due for the design, supervision and successful execution of the many and difficult details of this novel installation.

Under general conditions it is altogether improbable that the direct saving resulting from the simple substitution of electric for steam power will be sufficient to justify the additional investment and financial risk.

It may be claimed for electric traction that it will extend the limits of profitable operation of high-speed heavy trains, and also of light trains of low capacity. Other but relatively minor advantages are possible in the effect upon earnings. The availability and value of real estate and structures at large terminals will be greatly augmented by the possibilities of using two or more superimposed track levels, as strikingly exemplified in the plans for new terminals in New York City for the New York Central and the Pennsylvania companies.

Overhead Catenary Construction.

The overhead system consists of two steel cables of espe-



New York New Haven & Hartford Electrification—Anchor Bridge and Catenary Construction.

delivered to the engine shoes in about the same proportion.

The choice of frequency was practically fixed by the manufacturing companies within limits of 15 and 25 cycles, and the comparative merits of these two rates only were considered. Under existing conditions it was decided that the practical commercial value of the higher frequency outweighed the more theoretical merits of the lower one.

The general features and details of the New Haven company's alternating-current-direct-current locomotives and single-phase installation are contained in the subjoined descriptions with illustrations prepared by the Westinghouse Electric & Manufacturing Company, the contractors for the electric locomotives, catenary track equipment and turbo-generator units, and by Westinghouse, Church, Kerr & Co., the contractors for the Cos Cob power house and equipment.

The difficult and responsible task of determining and

cially high strength, supported at intervals by steel bridge structures. A copper conductor or trolley wire (No. 0000 B. & S. gauge grooved) is suspended below the two supporting cables by means of hangers placed at frequent intervals.

The main conductors over the running tracks are paralleled throughout their entire length from Stamford to Woodlawn by two feeder wires. These feeders constitute auxiliaries to the main track conductors and are connected with the latter at each anchor bridge through circuit-breakers. The office of the auxiliary feeders is to provide means for feeding around any one section in case it is cut out of service on account of some accident in that particular section.

All bridges are placed at a fixed distance of 300 feet apart. On curves guide poles are provided from which pull-over wires are attached and secured to the catenary spans.

The general appearance of the standard 4-track inter-

mediate bridge is shown in the illustrations. It consists of two supporting side posts and a horizontal truss. Each supporting post is approximately 38 feet long by 1 foot 10 inches square. The cross truss is attached by means of bolts to the vertical posts, allowing a distance of 23 feet 4 inches from the lower side of the truss to the top of the rails. The truss is 4 feet 6 inches deep from back to back of the upper and lower chord angles, which latter are placed 1 foot 10 inches from back to back.

The extensions of the side posts above the trusses are utilized for supporting the feeder wires.

In the calculation of these bridges very heavy weather conditions were assumed and provision was made for clamp-

cause the clamp to swing downwards, thereby lowering the point of application of the pull of the cable, so that the porcelain is put in compression and there is no tendency to shear off the top of the porcelain, as is usually the case with porcelain line insulators. Each porcelain stands a shop test of 55,000 volts assembled.

Strain Insulators.

The insulators which are used for dead-ending the catenary cables at the anchor bridges are designed to stand a shop test of 50,000 volts and a working load of 20,000 pounds. One of these insulators is provided in each catenary cable at each anchor bridge, thereby dividing the road into separate sections between the anchor bridges.

The guy-pole strain insulator is somewhat similar in appearance to the well-known "giant strain," except that it is much larger and is designed to stand a test of 50,000 volts and a mechanical pull of 15,000 pounds.

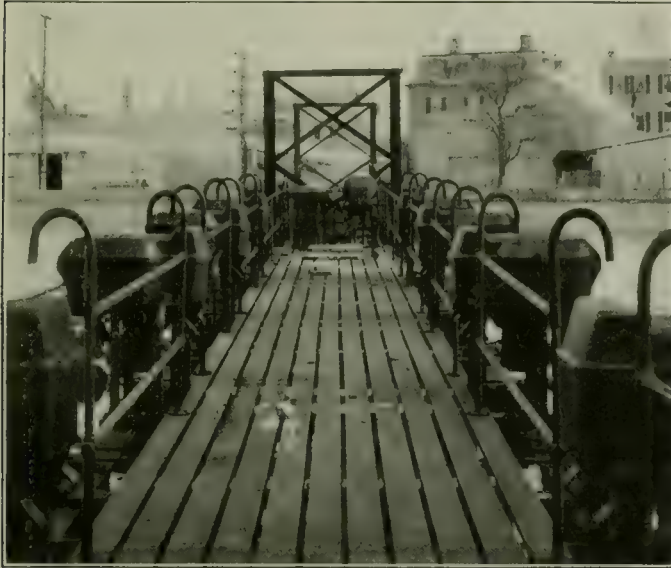
Insulating Separators.

In order to enable any one track to be electrically disconnected from any other parallel track when the circuit-breakers on the anchor bridges are open, insulating separators are provided in the pull-over wires between the tracks. They consist of long rods of selected hickory, thoroughly impregnated and fitted at the ends with malleable iron heads secured to the conically shaped heads of the rods by means of bolts. These insulators have an ultimate tensile strength of about 16,000 pounds.

At no point in the entire construction is wood relied upon for insulation to ground, and it will be noted that these wooden separators normally have no difference of potential upon them. They are merely provided in case of accident, when it is necessary to isolate one section of track from another.

Trolley Hangers.

The trolley wire is supported every 10 feet from the catenary cables by means of triangular trolley hangers of



New York New Haven & Hartford Electrification—Top of Anchor Bridge.

ing the catenary cables on the intermediate bridges so that they are obliged to partially withstand the longitudinal pull of the latter.

Anchor Bridges.

Anchor bridges of especially heavy construction are placed every two miles, and against these bridges the catenary cables are anchored. An illustration represents a transverse view of a standard 4-track anchor bridge with the auxiliary apparatus mounted upon it. Signals are also mounted upon the bridge. The 4-track anchor bridge consists of two A-shaped posts having a spread at the base of 15 feet and a width at right angles to the track of about 2 feet.

Catenary Cables.

Each of the two catenary cables which support the copper trolley conductor comprises an extra high strength steel cable, 9/16 inch in diameter, consisting of heavy strands. The cable has an ultimate strength of 33,800 pounds. These cables are strung between the bridges, with a sag at mean temperature of 6 feet in a standard span of 300 feet.

Main-Line Insulators.

The insulating supports for the catenary cables on the intermediate bridges consist of heavy porcelain insulators of the skirt type, which are 15 inches in diameter and about 7 inches high. The catenary cable rests in a groove in the top of the porcelain and is held by means of a malleable iron clamp fitted with U-bolts and placed one on each side of the insulator. The head of the insulator is conical in shape and is surrounded by means of a split malleable iron clamp and a lead packing.

The construction of the clamp and the collar is such that in case of the breakage of the messenger cable on one side of the insulator, the pull of the cable on the other side will



New York New Haven & Hartford Electrification—Type of Electric Locomotive Used.

varying lengths. These hangers are so adjusted in length that the trolley wire is maintained in a horizontal position, it being 6 inches below the catenary cables at the middle point of the span.

Trolley Section-Break Insulators.

At each anchor bridge it is necessary to provide an insulator and a trolley wire. This is accomplished by means of two bronze end castings, to which the ends of the trolley wire are bolted. Two parallel sections of impregnated hard-

wood are fastened to these castings, and to these wooden strips are fastened renewable pieces of trolley wire in such a manner that the ends of these renewable pieces overlap one another. By this means it is possible for the sliding contact on the locomotive to pass from one section to the next without opening the circuit, thus avoiding all flashing.

A diverging trolley wire is connected to the main wire by means of a frog of standard design, and in order to prevent the contact shoes on the locomotive from catching, deflector wires are placed in the angles between the two trolley wires.

Automatic Circuit-Breakers.

The type of circuit-breaker which has been developed for this installation consists of a cast-iron framework adapted to be bolted to channel irons resting upon the upper chords of the anchor bridges. This framework carries an iron box provided with a hinged cover. Arrangements are provided so that if the cover is opened the circuit-breaker will be automatically tripped so as to prevent any possibility of the attendant taking hold of live parts.

The circuit-breaker is of the well-known Westinghouse design and is capable of handling 11,000 volts on heavy short-circuit. The switch is also arranged to open automatically on overload.

The control wires for the closing magnets and the tripping

boiler room are of structural steel, but all other columns required in the building are of concrete blocks.

The basement floor is of concrete, laid upon the foundation rock. All other floors in the building are of reinforced concrete; and the roof, which has a pitch of $4\frac{1}{2}$ inches per foot, is of reinforced cinder concrete, finished on the exterior with Ludowici tile. A self-supporting steel stack, 13 feet 6 inches in diameter, extending to a height of 100 feet from the engine room floor, is carried by the steel columns which support the fan room floor.

The turbine room is 60 feet wide by 112 feet long, and the switchboard occupies a space next to the turbine room, which is 25 feet wide by 110 feet long. The boiler room is 160 feet long and 110 feet wide. The distance from the floor to the top of the crane runway rail is 27 feet 2 inches, and the height from the turbine room floor to the bottom of the roof trusses is 39 feet 2 inches.

Turbo-Generators.

The initial generating equipment of the power house consists of three multiple-expansion parallel flow Parsons steam turbines direct connected to single-phase Westinghouse generators. Provision has been made for the installation of a fourth unit of corresponding size. The turbines are rated at 4,500 brake horsepower each and the generators at 3,000 kilowatts each, at 80 per cent power factor. The generators



New York New Haven & Hartford Electrification—General View of Cos Cob Power Station, Showing Coal Trestle and Dock.

coils are carried in iron conduit and lead-covered cable to the adjoining signal tower, where a switchboard panel is provided.

Track.

Both rails of all tracks are bonded by means of No. 0000 compressed terminal flexible bonds placed around the fish plates.

Cos Cob Power Station.

The power house at Cos Cob, Conn., which has just been completed, is of interest as being a feature of the first installation of single-phase electric equipment for the operation of trains over a trunk line railway system. It furnishes single-phase current for the operation of electric trains over the New Haven road and is also designed to deliver three-phase current to the Port Morris power house of the New York Central to compensate for the energy required to operate the New Haven trains over the lines of the New York Central system.

Power House Building.

The power house is located adjacent to the main line of the railroad and on the bank of the Mianus river, about one mile from Long Island sound. Coal can be delivered either by water or rail, and an unlimited amount of salt water is available for condensing purposes.

The building walls, below the water table, and the machinery foundations are monolithic concrete. The water table and the walls above it, including the window arches and coping, are of concrete blocks. The interior columns in the

are wound for three-phase current, but arranged for the delivery of both three-phase and single-phase current.

The excitation of the generator fields is provided for by two 125-kilowatt direct-current generators, direct connected to Westinghouse engines; and one motor-driven exciter.

A separate condensing outfit is provided for each turbine, consisting of an Alberger three-phase counter-current surface condenser, a two-stage dry air pump, a centrifugal circulating pump direct connected to a Westinghouse engine, and a Monitor hot-well pump, the speed of which is automatically controlled by a float.

To prevent the rapid deterioration of the brass condenser tubes by the galvanic action which usually occurs where salt water is employed for condensing purposes, a motor generator set has been installed and provided with suitable controlling apparatus for maintaining in each condenser a counter electromotive force slightly in excess of the electromotive force due to the galvanic action and the stray currents.

Boilers.

The initial installation consists of twelve 525-horsepower Babcock & Wilcox water-tube boilers, set in batteries of two boilers each. Provision is made for four additional boilers to take care of the fourth turbo-generator unit when it is installed. These boilers are equipped with Roney mechanical stokers and Babcock & Wilcox superheaters and deliver steam at 200 pounds gauge pressure and 125 degrees superheat.

A novel feature of the boiler settings is the installation

of an external steel casing entirely inclosing the brick work, thus rendering the settings impervious to air leaks.

Three Green fuel economizers are provided, each inclosed by means of metal sectional covering insulated with prepared asbestos blocks.

Under ordinary conditions the boiler feedwater is delivered from the pump house at Mianus through a 10-inch main to a concrete reservoir of 600,000 gallons capacity situated just outside the power house. From this reservoir the make-up water flows by gravity to two 13,000-gallon feedwater tanks located in the boiler room basement. These tanks also receive the discharge from the hot well pumps.

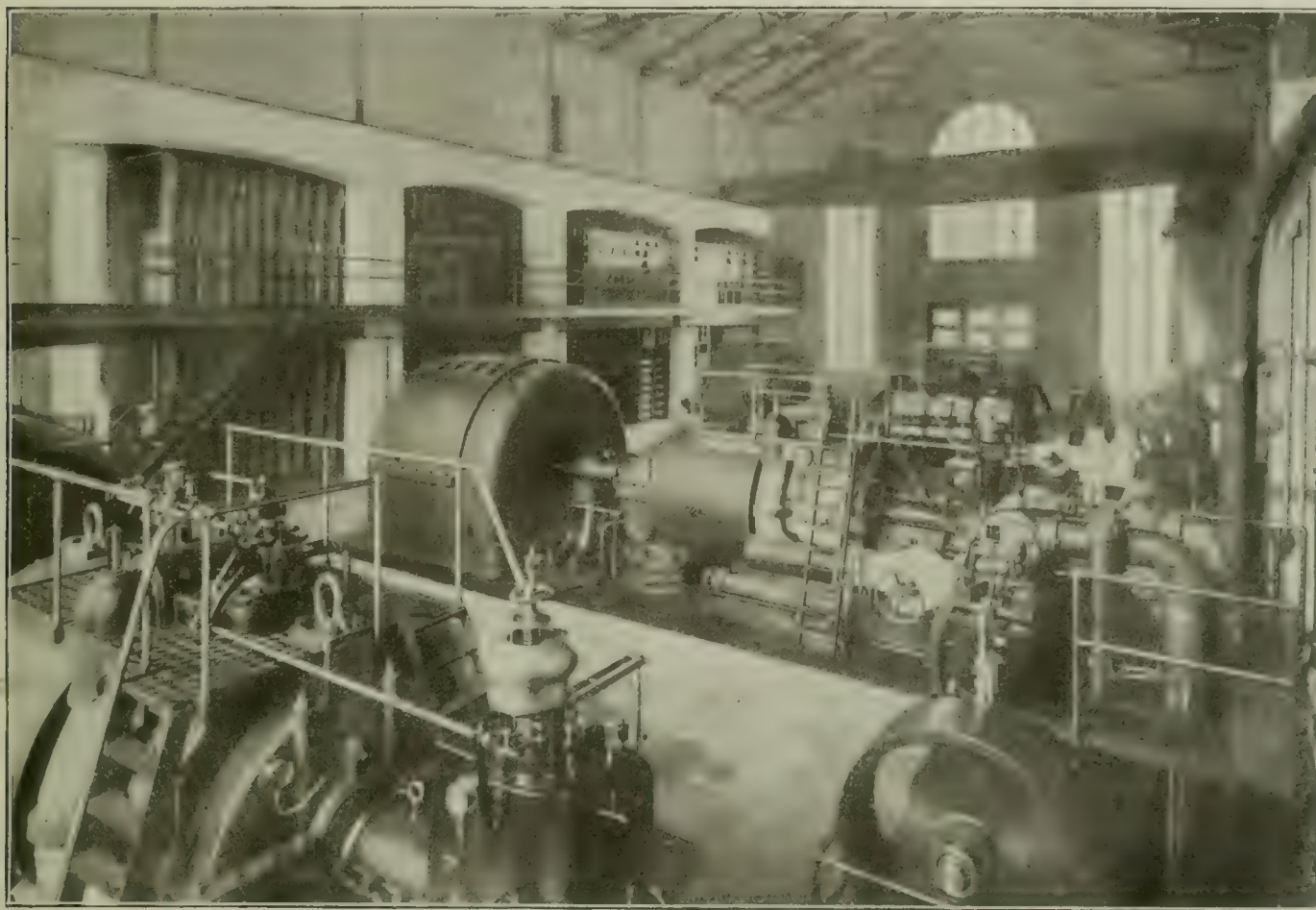
An auxiliary source of feedwater supply is provided for by a connection to the mains of the Greenwich Water Company. The three feed pumps are of the compound direct-connected duplex outside-packed plunger type. An emergency

The ashes are disposed of by gravity into chutes leading to narrow-gauge cars in the basement.

Piping.

A steam main is carried over the boilers on each side of the boiler house, each of the two mains crossing over to the opposite side at the center of the boiler room and extending through the partition wall into the turbine room, thence downward into the basement connecting to a header under the floor. From this header connections are made to each turbine. A separate steam main is provided for the steam-driven auxiliaries, which are all designed to use superheated steam.

A closed feedwater heater containing 2,000 square feet of surface and utilizing the exhaust from the steam-driven auxiliaries is provided. A continuous circulation oiling system for the turbine and generator bearings is installed.



New York New Haven & Hartford Electrification—General View of Engine Room, Showing Switchboard in Background.

feedwater supply system consists of two Hancock inspirators, taking water from either source of supply and delivering it through an independent line to the boilers.

Four 14-foot fans, direct connected to horizontal high-speed engines, deliver the flue gases to the stack. The speed of the fans is adjusted to the demand on the boiler by automatic regulating valves controlling the fan engines.

Coal-Handling Installation.

All coal received by water is unloaded from the barges by a steel derrick operating a clam shell bucket and delivered mechanically into two flight conveyors, extending the length of the boiler room, which discharge the coal into spouts leading to the stoker hoppers of the boilers.

Coal received by rail is dumped from the car directly into a chute leading to a storage bin.

The drips from the high-pressure steam line are returned to the boilers by a Holly gravity return system.

Electrical Distribution.

The main cables from each generator are run in the air chamber under the turbine room floor, up to the switchboard gallery and thence through selector oil circuit-breakers down to the high-tension buses under the switchboard gallery. These circuit-breakers are electrically interlocked so that the buses cannot be paralleled.

The two high-tension buses, with their accompanying switching equipment, are interchangeable and are arranged so that each can be used separately: one supplying three-phase current to the Port Morris feeders, and the other supplying principally single-phase current for propulsion. Each bus is further divided by knife switches into three sections.

Each leg of the high-tension bus, consisting of two 3 by $\frac{1}{4}$

inch copper bars, is inclosed in a separate masonry compartment. Removable glass doors are provided in the bus compartments. Each oil circuit-breaker can be disconnected from the bus and circuit by hook type knife switches located on the rear of the structure.

Each feeder is protected by a lightning arrester of the Westinghouse Electric & Manufacturing Company's low-equivalent type, with fuses.

The voltage of each high-tension bus is maintained constant by a Tirrill regulator controlling the exciter field circuits.

The main switchboard is made up of marble slabs carrying Westinghouse instruments and switching apparatus.

The station storage battery is located in the basement below the switchboard gallery and consists of 55 cells of the Westinghouse Machine Company's 5-S-5 type of 10 amperes capacity for eight hours, and is used for operating the control circuits of the circuit-breakers and the switchboard signal lights. The battery is charged through a Cooper-Hewitt mercury converter, taking current from the alternating-current lighting circuit.

Cooper-Hewitt mercury arc lamps are used for general illumination and incandescent lamps for restricted locations.

SELBY AVENUE TUNNEL OF THE TWIN CITY RAPID TRANSIT COMPANY.

The Twin City Rapid Transit Company of Minneapolis, Minn., on August 10 began operating cars through the new Selby avenue tunnel in St. Paul, which reduces the grade at that point from 16½ to 7 per cent and eliminates the necessity of a counterweight to handle the cars up and down St. Anthony hill.

In 1887, when the first cable street railway was built in St. Paul, it extended from St. Paul's business district to St. Anthony hill, the most popular residence section, and as the cable system allowed almost any grade to be overcome, the most direct route was chosen via Fourth street and Selby avenue. To pass from the business district to the level of the hill district required a grade of 16½ per cent between Pleasant avenue and Summit avenue. When the cable lines were electrified in 1898, the Selby hill grade being too steep for direct traction, a counterweight was installed.

In March, 1905, the company decided to construct a tunnel that would do away with the counterweight device and permit of more frequent car service. Plans for a tunnel with open approaches were prepared in 1906 and the contract for the construction of the subway and approaches was let to George J. Grant of St. Paul, the lowest bidder, in competition with a number of large firms having had extensive experience in the subway construction of Boston and New York.

The preliminary work of remodeling the various pipe systems on the street was begun in September, 1906. New sewers, water pipes, gas mains and electric conduits had to be provided for each side of the street, before the construction of the subway proper was commenced. The cars were removed from the street on November 10 and run around on temporary tracks via Farrington avenue, Rondo street and Smith avenue.

From that date work was pushed vigorously day and night, except Sundays, until the arch and roadway construction was finished. It was considered best to allow 14 days for the concrete to set before operating through the tunnel and this time was required in finishing the items of conduits, paving and wiring about the work. On August 10, just nine months after its beginning, the subway was thrown open for travel.

Some interesting data regarding the work are as follows: The forces employed have averaged about 150 men. The length of the work is 1,700 feet, while the length of the subway from end to end of masonry walls is 1,479 feet. Of this distance, 559 feet is between retaining walls, while 920 feet is

the arched and covered section. The grade of the tracks is uniformly 7 per cent; the alignment straight, except the curve from Selby avenue into Third street, which has a radius of 500 feet. The maximum height of retaining walls is 20½ feet and the clear height in the tunnel 15 feet; width, 23 feet. Tracks are 10 feet from center to center and the width of the tunnel will allow an ordinary sized person to stand between the car and the wall. The extreme depth of excavation was near Summit avenue, 50 feet to bottom of trench. The subway is entirely in open cut, a wide and deep trench being excavated, in which the masonry was built. This saved considerable time in the construction. The excavation required taking out 43,200 cubic yards of earth and 2,100 cubic yards of rock. For a considerable distance the walls are founded on rock, but at the lower end the retaining walls are on pile foundations.

The structure is built of reinforced concrete in accordance with the latest ideas. It contains 10,300 cubic yards of concrete, in which were used about 12,000 barrels of cement. Embedded in the concrete are 164 tons of steel rods and 252 tons of steel rails.

The floor of the tunnel section is flat and strongly reinforced to take care of the bending stresses. On this floor the tracks are laid and also embedded in concrete. The track consists of 80-pound T-rail, five inches in height, laid on creosoted ties and fastened with screw spikes. The concrete floor can be kept clean and thus avoid the usual trouble from the dust and odors from decaying matters in ordinary stone ballast. An extensive system of pipe drains extends under the tunnel and is connected with the city sewers.

In the floor on each side of the subway is a tile conduit of four ducts for electric wires and cables; connections are made from these through conduits in the concrete to the trolley wires and electric lights.

The lighting is furnished by 32-candlepower incandescent lamps in the roof. These are spaced 10 feet apart and set in the center of the arch.

The work of repaving the street, putting in permanent gas mains, electric conduits and other changes will amount to about 30 per cent of the cost of the work, and this, as well as the track and all electric work, was done directly by the street railway forces.

The completion of this subway gives to St. Paul a much-needed improvement in its transportation facilities, and, in accordance with the usual practice of the Twin City Rapid Transit Company, is in design and execution of the very best type.

Inter-Urban Railway Advertises Battle Maneuvers.

The United States army battle maneuvers held August 8, 9 and 10, near Des Moines, Ia., were the subject of an attractive poster, 14 by 22 inches, issued by the Inter-Urban Railway Company, Des Moines, Ia. In these maneuvers 6,000 trained soldiers comprising infantry, cavalry and artillery divisions, took part in an extended campaign. The location of the maneuvers was along the Des Moines river and Beaver valley within easy walking distance of various stations on the Inter-Urban Railway. This attractive poster included a map showing the location of the maneuvers with reference to the city of Des Moines and the several interurban divisions radiating therefrom.

The last quarterly report of the Illinois Tunnel Company shows that nearly 1,000 trains a day, carrying 1,100 tons of freight, are now being operated in the Chicago subway. The traffic is between the large stores and warehouses and the railroads and between the postoffice and the railroads. The trains have replaced 953 mail wagons.

Should one read, and preserve what he reads? To take knowledge into one's hand temporarily, and then not afterward have that knowledge available for desired use, is as foolish as once to have seen a life preserver and not be able to find it at midnight collision.—Exchange.

VALUATION OF MILWAUKEE PROPERTIES.

While the Wisconsin railroad commission has not disclosed the figures of the valuation of physical properties of the Milwaukee Electric Railway & Light Company and the Milwaukee Light Heat & Traction Company, made by engineers and accountants to guide the commission in its decision in the fare cases, some of the results have been made public from other sources. These indicate that the experts employed by the commission value the system in its existing condition at \$14,864,849. The value of the property when new is placed at \$18,435,960. In computing the value of the physical properties, which alone were considered, the representatives of the commission inspected land and right of way, track and track structure, cars and car equipment, distributing system, electric, heating and power plant equipment, buildings and miscellaneous structures, office furniture and appliances, tools, implements and machinery, horses and wagons, and miscellaneous property. To the appraised value of these items the following percentages were added: For engineering and superintendence, 4 per cent; interest during construction, 3 per cent; organization and legal expenses, 2 per cent; contingencies, 3 per cent; making a total of 12 per cent which was allowed in fixing the valuation of tangible assets.

The value of the Public Service building (described in the Electric Railway Review of July, 1906) is reported at \$883,232, which does not allow for architect's fees or other contingencies. These items, it is held, are included in the 12 per cent allowed for engineering and superintendence. The land occupied by the building is valued at \$313,795, making a total of \$1,197,027.

The representatives of the commission made an inventory of all the tangible property owned by the companies and applied to the various properties unit values representing the average cost for the five years from 1902 to 1906, inclusive, this method having been agreed upon with the company. The expense of reproduction was figured by taking the first cost, and, after the inspection of the property, deducting an allowance for depreciation from the cost price as ascertained.

In an interview published in the Milwaukee Free Press of August 10, John I. Beggs, president and general manager of the Milwaukee companies, is quoted as follows:

Suppose you add up all the money you have put into your own business and have issued securities for, and then let the state commission appraise the present value of it and see what the result is. That would be as practical an explanation as I could make of this matter.

The public mind should run back to the time when we purchased the old street railway properties here, which were of no more value in building up the present system than two streaks of rust. Milwaukee has the finest street railway system in the world today. It has the finest cars running over the best roadbed. In the beginning some one did not see far enough in advance to meet present requirements. The equipment put in at that time was not sufficient to meet the present needs. Since 1896 we have disposed of hundreds of better cars than are being run on the Chicago street railways. They cost money, but when we disposed of them to put in the higher type of cars, the highest type now being constructed, we could get nothing for these old cars. And so with other things. It takes money to keep a street railway up in the condition in which it should be for an advanced service.

We are not in the stock-watering business. We are not promoters. We are in the street railway and transportation business to make money out of the operation of our line. We intend to build up an interurban system here with Milwaukee as the hub of a large and comprehensive system. We have some large plans to carry out, which will require money to consummate.

It was with the thought of giving the city the best possible service on interurban business that we recently authorized the increase of the capital stock of the Milwaukee Light Heat & Traction Company from \$1,000,000 to \$30,000,000. A part of this \$30,000,000 will have to go to pay for improvements and extensions already made, and some of it can be used to develop the network of interurban lines throughout the southern and eastern part of the state, which we already have outlined and now are building up as fast as we can. Not all of this new stock will be issued at once, but we authorized the

increase and filed the amendment to our articles to meet future contingencies.

We decided to increase the stock because we did not know what turn the legislature might take in framing a stock and bond measure. We did not know but that it might do something sudden and radical, like it did in the 2-cent fare matter, and we wanted to be provided for. The legislature of Missouri some years ago passed a law that no corporation could have a capital stock of more than \$10,000,000. The last Missouri legislature increased the amount of capital stock one corporation might invest to \$50,000,000. But we did not know but that the Wisconsin legislature might attempt to limit the amount of capital a corporation might invest. If it should have done that the only way we could have carried out our present plans for development would have been to organize a number of small corporations, or, more probable, give up the project altogether. So you see it was no stock-watering scheme. We are not in that kind of business.

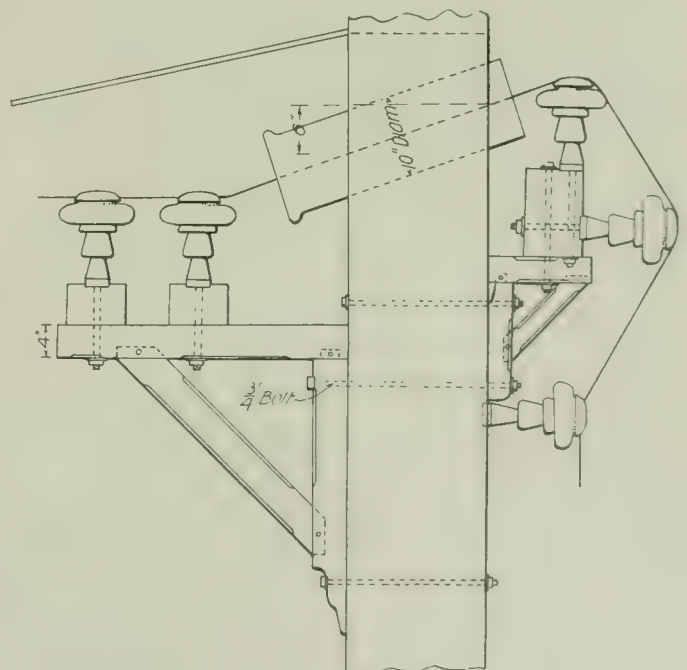
A SUGGESTION FOR A HIGH-TENSION WIRE ENTRANCE.

BY H. C. REAGAN, ELECTRICAL ENGINEER PITTSBURG & BUTLER STREET RAILWAY.

The methods for taking high-tension transmission lines into buildings have been reported upon by a committee of expert engineers. Various suggestions have appeared from time to time in the technical press and some of them have been adopted. In trying to remedy faults it is not unusual to introduce troubles greater than the ones obviated.

The writer believes that air is the most serviceable insulator. A high-tension wire entirely free from any substance in entering a building is then the safest and in the condition of highest insulation, provided the distance from surrounding parts is enough to prevent the current from jumping on a surge if lightning should strike the line.

In designing the outlets for the Pittsburg & Butler



Taking in High-Tension Wire.

Street Railway Company's installation, considerable thought was given to this matter and various types were investigated. The writer believed that it was not necessary to have any complicated device or a practically closed entrance, recalling an instance that came under his direct attention in which the outgoing lines, carrying 26,400 volts, passed through large corrugated porcelain insulators. These insulators were constantly breaking; sometimes where the short-circuit would take place the insulator would burst into innumerable pieces and be fused as glass. After re-

peated renewals they were omitted, and the wire entering through the opening was fastened in the center. No further trouble occurred from this source.

The outlets for the Pittsburgh & Butler Street Railway Company were designed with this experience in mind. The illustration herewith shows the general design, which is a terra cotta pipe, 10 inches in diameter, 38 inches long, glazed inside and out and free from checks or cracks. Such tile pipes should have the flange or flare on the outside of the building as shown. They were given a pitch of 6 inches to insure perfect drainage for condensation, the flare on the end preventing water running into the pipe. To keep the wire centered, brackets were placed inside and outside of the building, carrying high-tension insulators adjacent to the center of each tile, with the tops central with the opening. The wire was tied to each insulator and drawn tight. A double set of insulators was provided on the outside of the building to take the strain off the line.

The main and substation wire entrances are all arranged in the same manner. A roof or overshoot is placed above the brackets as shown, to shed water or snow. The substation entrance, however, has none, just the tile, and no trouble has occurred. The line was put in operation in midwinter and under extreme weather conditions—heavy rains, followed by freezing and blowing snow. Through it all no trouble appeared. The writer observed that the difference in temperature between the inside and the outside of the building would cause condensation, which would freeze in the form of a frost and would extend from the outer end of the tile pipe to near the inner end, mostly on the upper side. This was not of sufficient quantity to cause any trouble. Upon the change of the outside temperature to warmer, this frost would disappear in the form of moisture adhering to the tile and running to its end.

Birds, such as sparrows and robins, building nests in the pipe have caused no trouble up to the present time. The transmission line of this system is remarkable in the fact that since the current of 22,000 volts was put on, and during the extremely hard winter, only one insulator has broken down. The insulators are the Knowles triple petticoat type, using a steel pin, and were tested to 75,000 volts before installing. The transmission line material in general was selected and the line erected under the general supervision of Charles Gibson, Jr., now vice-president of the road, who thinks that the record of few insulation failures is worthy of note.

Long Island Electrification.

After finally securing a franchise from the board of estimate the Long Island Railroad has undertaken the construction of the Glendale cut-off, a four-track line between Glendale Junction and Woodside. The importance of the cut-off lies in the fact that on it depends the extension of the electrical service to other parts of the road. The line will also enable the company to separate its passenger and freight service, all passenger traffic between Glendale Junction and the mouth of the East river tunnels in Long Island City going by way of the new line through Woodside, and the freight traffic between Long Island City and the interior of the island going over the existing line. Electricity is to be installed and grade crossings eliminated between Jamaica and Woodside and it is expected that by another year or a little later electric trains will be sent into the Pennsylvania terminal.

It is also planned to electrify the lines to Whitestone landing and Port Washington. The Port Washington branch is being double-tracked as fast as the right of way can be obtained as far as Great Neck. The Oyster Bay branch is also being double-tracked between Roslyn and Glen Head. On the main line electricity is used as far as Belmont Park and when the Glendale cut-off is completed the electrification will be continued to Garden City and around the loop through Hempstead Gardens to Valley Stream. From the latter point back to Jamaica the line is already electrically equipped.

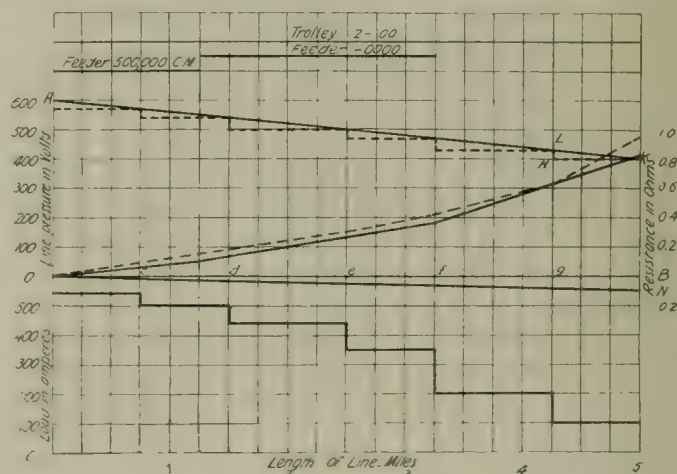
DETERMINING THE SIZE OF FEEDERS.

BY HENRY DOCKER JACKSON, E. E.

It is true that the design of all parts of the electrical generating and distribution system for an electric railway depends directly or indirectly on the number of passengers to be handled. In an earlier article (Electric Railway Review, February 9, 1907, page 188) the value of properly designed feeding and return systems was discussed. Such systems, of course, include not only the trolley wire, rails, rail bonds and other returns, but any supplementary trolley feeders that may be required for maintaining an even potential on the trolley wire under the varying conditions of traffic.

After the bond question has been settled by choosing a type with sufficient carrying capacity so that the loss over the joints shall not exceed, for any given time, the interest cost on the outlay for purchasing and installing the bonds, there can next be determined the resistance of the completed track.

To complete the study of traffic conditions and thus be able to intelligently discuss the subject of the proper sizes for trolley and feeders will require the construction of a train sheet showing the location of the cars during all hours of the day. From this information and the characteristics of the motors and cars which will be operated over the road,



Plot Showing Electrical Quantities for Feeder Layout.

curves can be plotted to show the power required on the various portions of the line and during all parts of the run. Such curves are useful for determining the cost of power wasted or spent in overcoming the resistance of the feeders and returns. The location of the cars during the hours of heaviest traffic will probably determine the size of the feeders, although it is necessary to consider to some extent the operating conditions during the hours of lighter traffic.

In the earlier days of electric railway construction the feeder systems of new roads were copied almost entirely from those of older roads operated under similar conditions. Later on a more careful study was made and the average power required per car was determined, to be used in feeder calculations. Such calculations, however, were very crude, since each car was assumed to be in operation all the time and utilizing the average current as already determined. The proper size of the feeder was obtained by spacing the cars on a map according to schedule and obtaining the load at critical points in this way.

A step in advance of this method just described was the substitution for the average current per car of that current which experience had demonstrated was most likely to be required at various locations along the line. A current curve was made by placing the cars on a map according to schedule and estimating the current for different times during the entire run.

This method can best be described in connection with

the accompanying illustration showing the current required by the cars at different points along the line. Cross section paper is preferable for use in making such curves. The horizontal line is drawn to represent the full length of the road as OB. This diagram assumes that the cars are spaced along the line according to schedule, each car being represented by one of the letters b, c, d, e, f, g. We assume that the car, b, is on its return trip from the end of the line. The location of the car, together with a knowledge of the grades and curves, will enable us to determine the amount of power required to operate it. In the same way the cars c, d, e, f, g, are figured.

On the sheet the amperes are plotted below the resistance plot. From right to left each successive step shows the addition of a car to the line load, the vertical height at any point representing the total load on the line at that point.

To determine the resistance of the feeder system at each point on the line we will assume that O is the feeding station and B the other end of the line. The point A indicates the voltage at the station. The point K shows the voltage which we have arbitrarily determined as the lowest which will be allowed at the end of the line. Joining AK we have a line showing the voltage drop from the station to the end of the line. At the point L we have the load of car B, which we know to be 90 amperes. From the voltage line AK we find the drop in voltage shown by LH. The resistance is the drop in voltage divided by the current of the car B. Resistance is 30, divided by 90. At the point F we have a drop of 40 volts. The current is 190 amperes. The resistance at this point therefore will be 40, divided by 190. This calculation can be continued back to point A, making a similar calculation at each car. The broken line OK represents the resistance as calculated in this manner.

The resistance of the track is shown as line ON. In figuring for the feeders we must allow for the trolley wire, thus cutting down the size of the feeder.

To make the actual feeder layout we should use commercial sizes such as 1,000,000-circular mils, 500,000-circular mils, No. 0000 and No. 00. On a city line the trolley wire should be No. 00 for most work. The resistance of the trolley wire and feeders should be as near as possible the resistance as figured by the previous method. The solid line from O to K shows the resistance of the feeder and trolley as actually laid out according to the scheme shown; a 500,000-circular mil feeder and trolley for $1\frac{1}{4}$ miles, a No. 0000 feeder and trolley from the $1\frac{1}{4}$ to the $3\frac{1}{4}$ mile mark, the trolley alone from there to the end of the line.

In checking up this work it is well to bear in mind that the interest on an increased amount of copper should be less than the cost of the power lost. If the line is a complicated one, having a considerable number of branches, each branch should be figured separately in the manner as indicated, assuming its junction with the main line as a power station, and having a voltage which can be held up by the feeder capacity. The trunk or main line feeder can be figured as already shown, by assuming that each junction point is a car requiring a current equal in amount to the current required in the branch line. It will not take long to make a calculation of this character, and the time required is well spent, as it will bring the economy of the feeder system much more nearly on a par with that of the power station, the motors and other parts of the system.

If, in the actual layout of the copper, it is found necessary to use more than one feeder, it is advisable that all of these feeders should be tied together wherever there is a trolley tap in order to get the full benefit of all the copper.

In the foregoing we have considered only a line over which it is possible to feed at a reasonable loss, without the use of a booster or a supplementary feeder. In many cases where cars run infrequently over a long line, it often pays to run a single feeder not tied into the main feeders, for some distance beyond the average feeding distance of the section,

and there tap into the regular feeder. The tendency of this supplementary feeder under most conditions is to hold up the voltage on the line at its tapping-in point, since it simply feeds at that point when the voltage is sufficiently low to allow power to be transmitted over it. If the line is so long that it is impossible to feed in this way when operating at the station voltage, the feed wire may be cut clear from the main section by an insulating joint, and the supplementary feeder be fed through a booster. It is well to consider at the start that all power put into the booster is power lost, it being entirely used in the transmission line. Therefore, in the use of a booster, it comes to a question of whether or not it is worth while to spend a certain sum of money for a line and booster with a large loss in transmission or install a large amount of copper and have a small line loss with no additional machinery.

POWER FOR THE PHILADELPHIA & EASTON.

The Philadelphia & Easton Railway, which connects Easton and Doylestown, Pa., passing through nine intermediate villages, is a 32-mile line, completed in 1904, which has been in the hands of three receivers. The road has just been sold to a reorganization committee of bondholders at foreclosure sale. The sale has been confirmed by the court. One of the important matters given attention under the new management was that of economically securing adequate power.

The power plant was operated by steam in a region where water power was available and was so located that coal could be delivered at the plant only at high rates. The power problem was satisfactorily solved through the contemporary reorganization and rehabilitation of the property of a defunct company known as the Lehigh Power Company, but now known as the Clymer Power Company.

The power plant of the Philadelphia & Easton is located at Raubsville, Pa., and the equipment consists of two cross-compound 550-horsepower Pennsylvania Iron Company's engines, direct connected to 400-kilowatt Stanley revolving field, three-phase, 25-cycle generators, producing current at 375 volts. This station serves also as a substation for the line to Easton, having one 250-kilowatt rotary converter, taking current from the generators at 375 volts. The remainder of the current is stepped up to 15,000 volts and transmitted to two substations 10 and 20 miles distant, respectively, each of which has one 250-kilowatt rotary converter.

The plant of the Lehigh Power Company, which was organized some years ago, was also located at Raubsville, about 1,800 feet from the plant of the Philadelphia & Easton. It was built originally to supply power to the Alpha Portland Cement Company, $2\frac{1}{2}$ miles distant, across the Delaware river in New Jersey. The company became unable, however, to meet its bond interest, and in 1904 the property was sold at a sheriff's sale. It was bought in by Morris Brothers and Christensen, representing the bondholders, and was resold to B. F. Frackenthal, Jr., and Lee S. Clymer of Riegelsville, Pa.

This plant was originally equipped with 12,000-volt, 60-cycle generating apparatus, which was scrapped by the new owners. The new equipment of the plant includes one 938-horsepower and one 400-horsepower pair of water wheels, supplied by S. Morgan-Smith Company of York, Pa. Direct connected to the former is a 500-kilowatt National Brake & Electric Company three-phase, 25-cycle, 375-volt alternator.

The smaller wheel is direct connected to a 250-kilowatt alternator operated at 187½ revolutions per minute. Notwithstanding the fact that the load is extremely variable and that no storage batteries are used, almost perfect regulation is secured, so the engineers state, by the use of Lombard governors.

An interesting feature of the design for water power supply at this plant is the fact that the water which operates

the two sets of wheels is taken from the Lehigh canal at a point above the lock, and after being utilized at a 16-foot head for the smaller turbine is discharged again through the tail race to the canal below the lock. The tail flume from the wheel serving the 500-kilowatt machine discharges into the Delaware river, the fall here being 32 feet.

Under the arrangement by which the Philadelphia & Easton now secures its power from this new plant of the Clymer Power Company, the current from the step-up transformers at the Clymer Power Company's plant, of which there are three of 250-kilowatt capacity each, is tied in on the high-tension line serving the Philadelphia & Easton substation. The steam plant of the Philadelphia & Easton is held in reserve for use in case of accident or in the event of a possible interruption in the service of the water power plant by reason of an ice jam in the canal in winter or an account of high water. In case of necessity, the employes of the water power plant would simply transfer to the steam plant.

Since the plant had suffered severely in times past by floods on the Delaware, the three worst floods in the history of the valley having occurred during the first few years of its operation, which contributed largely to the failure of the original installation, a reinforced concrete wall with central rib and cross brace was designed for protection. This extends well above the high-water mark. Since the displacement of the inclosed area is approximately 1,000 tons, and the height 17 feet, the pressures to be withstood by the wall are enormous. The three transformers, weighing over 20 tons, are placed on an elevated platform at the corner of the building most exposed to flood pressure, and contribute to its stability.

Prior to the three floods mentioned, there had been none for 15 years, nor have there been any for four years past which would have injured the plant in any case, so that the wall will rarely be called upon to exercise its function.

The rehabilitation of the Clymer Power Company's plant was conducted under the supervision of M. A. Maxwell, of Beadle & Maxwell, consulting engineers, Easton, Pa., New York and Philadelphia.

INVESTIGATION OF NEW YORK TRANSPORTATION FACILITIES.

The investigation of the Interborough-Metropolitan Company by the New York public service commission, which was begun on Thursday, August 1, was continued up to Friday of last week. Abstracts of the testimony of President Shonts of the Interborough-Metropolitan and of President Bryan and General Manager Hedley of the Interborough Rapid Transit Company at the first hearings were published in the *Electric Railway Review* of August 3, page 135, and of August 10, page 165. The investigation is being conducted by William Ivins, special counsel to the commission, and Commissioner Willcox. Although financial questions were touched upon to some extent, the investigation has been confined almost entirely to the physical operating questions and the methods of handling the congested traffic.

At the hearing on Wednesday, August 7, Frank Hedley, general manager of the Interborough Rapid Transit Company, was questioned with the idea of ascertaining whether additional trains could be run on the elevated and subway lines with the present facilities. He admitted that there was crowding on the elevated trains during non-rush hours, on account of the vagaries of the traffic, but stated that whenever such a condition was observed the service was increased and that on 60 per cent of the trains run there were no standing passengers. Much of the session was taken up in getting on record the schedules of the various lines. Mr. Hedley said the road had increased its service 40 per cent at times to meet an increase in travel and that a schedule was now being worked out which would provide for a 17 per cent increase on the Ninth avenue elevated line as soon as equipment is received. He said that on the elevated lines in rush hours a one-minute headway was maintained but that the headway in the subway was limited to two minutes by the block system. However, the service in the subway could be increased one-third by additional tracks at the Ninety-

sixth street station. This improvement had been approved by the old rapid transit commission, but the board of estimate had not yet passed on it.

Feasibility of Side-Door Cars.

Mr. Hedley's examination was continued on Thursday and he was questioned at length in regard to the probable results to be obtained from the use of the Illinois Central type of side-door cars. He said that in his opinion these cars would be dangerous in the subway because of the curved platforms and that although they had experimented with various forms of sliding platforms to cover the space between the cars and the station platforms a satisfactory device had not been found. Mr. Ivins said that in Boston such a device was used very satisfactorily, but the witness said he had not examined the Boston device, although he believed the company's engineers had a set of the plans. He said that should the commission direct the replacing of the 491 wooden cars in the subway the change could be made in 12 or 14 months.

No-Seat-No-Fare Provision in Charter.

In the course of the inquiry Mr. Ivins brought out the fact that under the original charter of the Manhattan elevated road it was provided that passengers not provided with a seat, except in rush hours, shall be entitled to ride without payment of fare. Mr. Hedley said he had never heard of such a provision, that at present passengers were required to pay fare before entering the cars and that he could think of no system that could be applied in New York whereby the passengers obliged to stand could ride free.

Mr. Hedley's examination was resumed on Friday. He was asked whether the danger from fires caused by a short-circuit in the event of a collision would be lessened if the power were taken from the roof of the subway, instead of from the side of the track, and replied that there was a difference of opinion among engineers on the subject.

Lengthening Station Platforms.

Mr. Ivins advanced the suggestion that the lengthening of the station platforms in the subway so as to permit two trains to be accommodated at one station at a time might prove a means of relieving the congestion. Mr. Hedley said the matter had been discussed by the officials, but no action had been decided upon. He admitted such a plan would permit of handling more passengers, but thought it would be dangerous to send a train into a station while another was unloading, and said it would be necessary to have a space of 150 feet between the trains, which would require a platform length of 1,000 feet.

The Belmont Tunnel.

E. P. Bryan, president of the Interborough Rapid Transit Company, was then called to the stand to testify in regard to the Belmont or old Steinway tunnel now being built under the East river at Forty-second street. He was unable to give the details of the purchase of the Steinway charter by August Belmont. He only knew that the stock of the tunnel company now belonged to the Interborough Rapid Transit Company. Paul D. Cravath, of counsel for the company, said that the commission would be supplied with all the details of the tunnel purchase in a few days. Mr. Bryan testified that it was not the present intention of the company to connect the tunnel with the Queens county lines or with the Manhattan subway. He said that only a shuttle service would be operated and that a separate 3-cent fare would be charged for the trip through the tunnel. He said it was the intention of the company to apply to the commission for permission to operate the line when finished. The question of the legal rights of the company is now before the courts and the city is seeking to enforce payment of compensation for the franchise.

Mr. Bryan showed that there were 137,919,632 passengers carried in the subway during the year ended June 30, 1906, and 166,363,611 for the year ended June 30, 1907.

Brooklyn Rapid Transit Hearing.

The commission began on Wednesday of this week its investigation of the Brooklyn Rapid Transit Company.

President E. W. Winter and Vice-President T. S. Williams were the two witnesses called for the first hearing. Documentary and other evidence was accepted with regard to the financial control, and the franchises of constituent companies. The hearing then turned to the transportation of freight, mail, express and garbage to determine if the handling of freight did not interfere with passenger traffic. It was stated that under normal conditions such interference did not exist and that the operation of freight, mail and express cars was not permitted during the rush hours. Mr. Winter testified that much of the city's garbage was moved in the daytime because,

although the company was under contract to move it by night, it had found it impossible to do so, and that the street cleaning department had recognized the situation and assured the company that it would not be held strictly to the written terms. Mr. Winter again said he did not think the carrying of garbage affected passenger transportation except under extraordinary conditions. Mr. Ivins then went into the history of the American Railway Traffic Company. The terms of the acquisition of that company by the Transit Development Company, which in turn was acquired by the Brooklyn Rapid Transit Company, were brought out.

The Brooklyn Rapid Transit officials answered all questions in a manner which indicated that the company willingly places all the facts in its possession before the commission.

LEASE OF CHICAGO UNION TRACTION PROPERTIES.

Judge Grosscup of the United States circuit court signed an order on August 12 authorizing the lease of the properties of the Chicago Union Traction Company and its subsidiary roads to the Chicago Railways Company. The order directs the receivers of the Union Traction company to convey the properties by lease for a term of 20 years, and provides that the new company shall have complete charge of the systems for that period unless an order of sale is decided upon by the court in the meanwhile.

Following the announcement of Judge Grosscup's order, F. H. McCulloch, representing the Merchants' Loan & Trust Company of Chicago, as trustee for over \$4,000,000 underlying bonds, applied for an appeal. A hearing will be held on August 19.

In the order of Judge Grosscup all claimants are permanently enjoined from interfering in any way with the management of the properties by the Chicago Railways Company, except as they may have recourse to legal action. The order points out that the franchises of a large portion of the lines in question have expired and that those remaining will

years, a clear title to the property will be given the Railways company.

In the meantime the cost of the receivership, though it will nominally be continued, will cease, for there will be no active work for the receivers to perform.

The Chicago City Railway Company has filed with the city authorities a certificate showing that from February 1 to July 1 it expended towards rehabilitation \$729,700.17. The certificate fixes the present value of the property at \$21,729,700.17. The expenditures for rehabilitation were computed as follows:

Actually expended	\$683,604.69
Residue of 70 per cent of gross receipts set apart for maintenance, operating and repairs.....	49,082.80
Balance	\$634,521.89
Brokerage and construction.....	95,178.28

Total to capital account.....\$729,700.17

In computing these figures the board of supervising engineers made an inventory of the materials and labor, and the auditors checked the costs as shown on the books of the company.

Bondholders of the West Chicago Street Railroad Company have appointed a committee to act in their behalf in the reorganization. The committee is composed of J. N. Wallace, president of the Central Trust Company of New York; Hugo Blumenthal and Frederick H. Ecker. Bondholders who desire to participate in the action of the committee may deposit their bonds with the Central Trust Company until September 16, 1907.

TRANSFERRING AUTOMOBILES ON TRAIL CARS.

The accompanying illustration shows one of the cars of the Atlantic City & Ocean City Railroad hauling a trailer, which carries an automobile.

S. S. Neff, superintendent of this line, proposes to transfer



Handling Automobiles on Flat Car Trailers at Atlantic City.

expire from time to time until March 1, 1908. It states also that the present condition of the lines and their equipment is not such as to enable adequate transportation service to be rendered. The point is emphasized that it is impossible to secure the necessary means to improve the lines except by procuring a loan sufficient for reconstruction, and that such money can only be had under the provisions of the plan submitted by the Railways company and approved by the arbitrators.

After signing the order Judge Grosscup said:

After every reorganization of consequence there inevitably appears a number of bushwhackers, who seek to delay proceedings and harass the new company. Though the lease authorized will be drawn for 20 years, it was not our idea that it would run for that length of time, for after all obstructions have disappeared, which we hope will be in two or three

automobiles and automobile parties between Atlantic City and Ocean City on single-truck flat cars, hauled as trailers behind the high-speed cars. The present trip by automobile between Atlantic City and Ocean City is nearly an all-day journey through the sand, and it is believed that many automobile parties will be glad to avail themselves of the privilege of the rapid transfer between the two resorts made possible by Mr. Neff's plan. It is proposed to build inclines at each end of the road, which will make it possible for automobiles to be run on and off of the flat cars without delay. One flat car will accommodate two machines. This unique service is undertaken somewhat in the nature of an experiment, but if the plan proves a success a number of additional flat cars will be ordered.

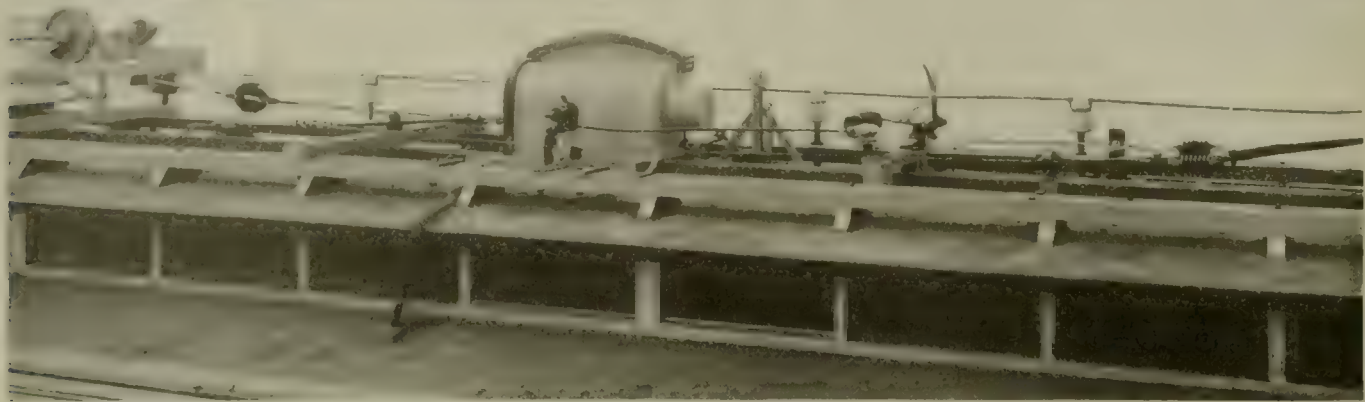
COLOGNE-BONN HIGH-VOLTAGE ELECTRIC RAILWAY.

The accompanying illustrations show the electrical apparatus, as utilized on the high-voltage direct-current electric railway between Bonn and Cologne. This new German electric road was recently constructed along the river Rhine for a distance of 17.3 miles. In the two terminal cities current is used at 550 volts pressure, but along the line the voltage is 990. The high-voltage section is fed directly from the

with double insulation. This special insulation consists of two ebonite insulators in series with two porcelain insulators.

Two bow current collectors are used, as will be seen by reference to the diagram of the car wiring. The mechanism for handling the bow collectors is placed on the top of the car with the lightning arresters.

Each motor car is provided with two four-pole motors of 130 horsepower each. They are designed for 990 volts, have reversing poles and wave-wound armatures, the bar winding

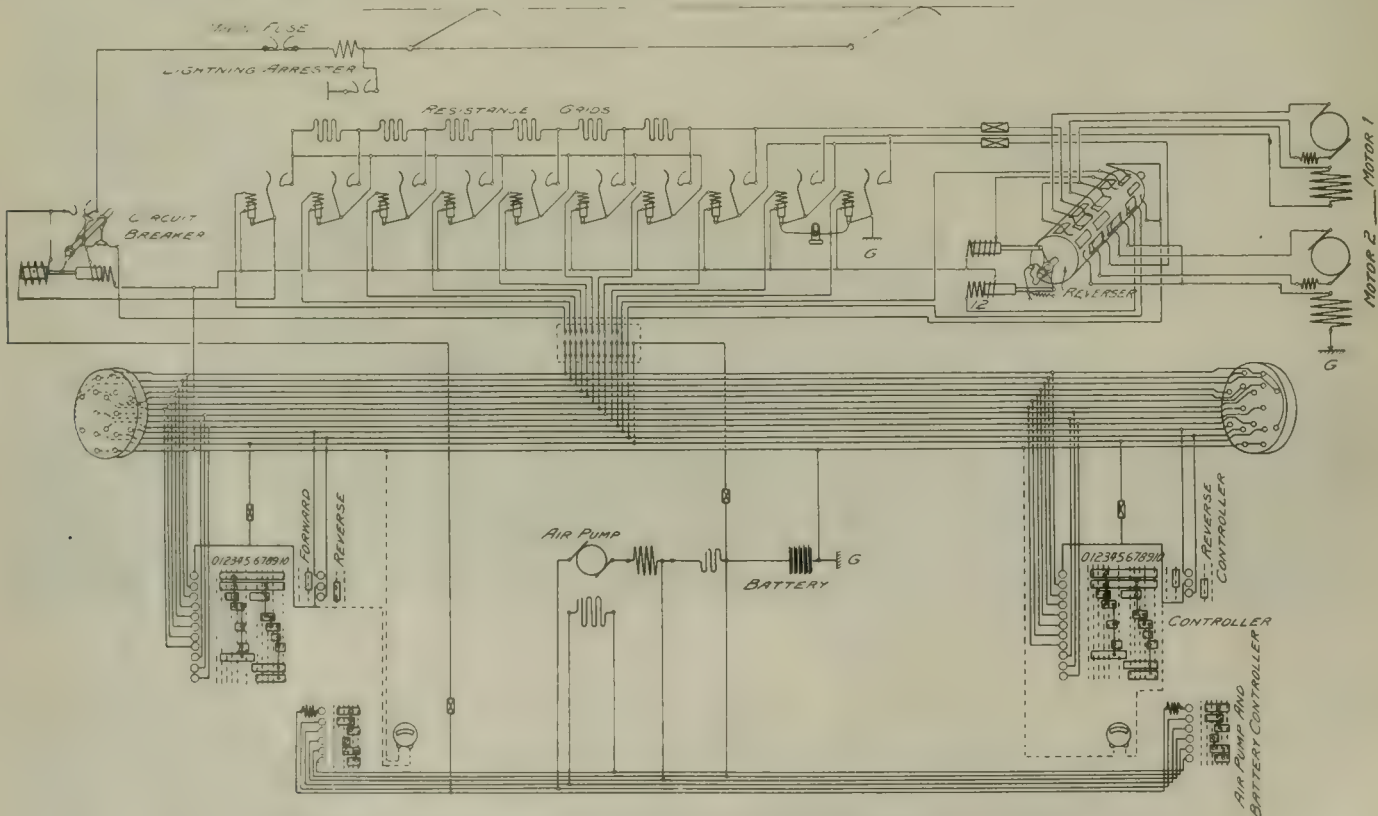


Cologne-Bonn Electric Railway—Apparatus on Car Roof.

station generators and a storage battery, but the two end sections are fed from storage batteries only.

At the power station a Birani booster is used for controlling the buffer action of the battery. The two generators are of 330 kilowatts capacity at 990 volts pressure. It is stated

being arranged in open slots, wedged up with paraffin boiled wooden wedges. The brushes are so connected that the motors can be operated on the 550-volt section or the 990-volt section. The cars are equipped for multiple-unit control and double-end operation. The air pump, rheostat and a large



Cologne-Bonn Electric Railway—Diagram of Control and Motor Connections.

that either generator is capable of handling four trains of four cars each at speeds of from 37 to 43 miles per hour.

The motors and other electrical equipment were constructed at Berlin by the Siemens-Schuckert Werke, by which this high-voltage direct-current railway system was designed.

Catenary suspension is used for the trolley wire. Both the trolley wire and the stranded catenary cable are provided

part of the control apparatus are placed in the usual position underneath the car.

It is stated that this two-voltage direct-current system was adopted in preference to the single-phase system on account of the heavy, costly and complicated equipment required for use with single-phase alternating current between terminal sections and direct current in the terminal cities.

PIPING AND POWER SYSTEM STATIONS—XLIX.

BY W. L. MORRIS, M. E.

A convenient form of cart is shown in Figure 301 (M 2-1). Each 50-foot length of hose should be laid in the top of the cart and the lower shelf used for tools, etc. For use around power stations and shops it is quite inconvenient to have all the hose on one reel. The house in which the cart is kept should have a glass-closed opening over a spring lock, with a notice above the glass: "In case of fire break glass and unlock the door." Another method is to have a sliding bolt lock with a conspicuous sign: "Slide this bolt to open door and give alarm," there being another door which could be

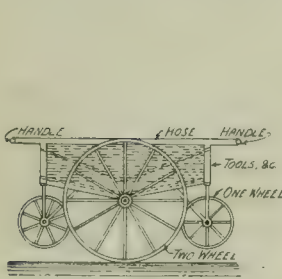


Figure 301 (M 2-1).

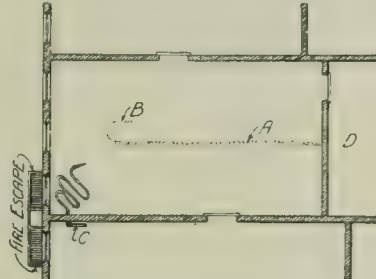


Figure 302 (M 3-1).

used without setting off the alarm. In many respects the latter form is preferable, as there is less liability of its being molested. It also would bring additional help more readily.

Fire Service to Interior Connections, Class M 3.

A branch of the fire main with its indicator post is shown in Figure 298. The indicator simply consists of a slide showing a sign, "Open" or "Closed," according to the position of the valve. Indicator posts avoid uncertainty and confusion, as few men can tell by the movement of a valve wheel whether it is open or closed. In case of fire the few who know would probably become confused and think a valve was open when in reality it was closed. If an indicator post must necessarily be placed close to the building it should be located at one of the corners, so that it could be operated from either side, permitting the operator to avoid the heat and smoke.

The interior fire lines should be supported on brick walls or in such a manner that they will remain serviceable for the longest possible period. The placing of the hose reels should receive the most careful consideration, since much depends upon where a man is located when using the hose, and to what extent the hose is exposed to danger. Figure 302 (M 3-1) shows the plan of a large room with one outside wall.

The hose shown by the dotted line, A, is connected to a reel mounted on the inside division wall. Although all the objectionable features of such an arrangement are evident there are probably more hose reels installed in this manner than in any other. The possible reason for this is that the designers wish to keep all the hose and pipe lines near the center of the building to protect them from freezing. The economy of such an arrangement is extremely doubtful, as the efficiency of the fire service is greatly reduced.

If a fire were discovered in a room having the reel and hose attached as at A, in Figure 302, it would be necessary to pass through the greater part of the room to get at the hose, and there would be danger of the man taking down the hose and trying to put out the fire being blinded and overcome by the smoke. Even though the operator had the hose down from the reel and nozzle as at B, there would be serious danger of being overcome by smoke long before the fire had done any serious damage. There is in reality only one correct position for a hose reel or rack, and that is close to windows where air can be obtained, and where safe exit is possible. This permits a man to get to the hose in case a fire has made

considerable headway. He can also protect his hose from the fire as long as he is able to use it. The fire escape shown permits the hose C to be used in the next room by running the line out of the window and across the fire escape.

It is quite common practice to place hose racks in hallways back of the workrooms as shown at C D, and expect men to work from the center of the building. It may be an ideal place from which to suppress a fire, but in laying out fire systems the safety of the fire fighters should receive the first consideration, and the fire service should be designed to insure their safety, otherwise the money invested in fire protection will be useless for want of men to use it. There are many designs of hose racks, reels, valves, etc., used. The following conditions should be fulfilled by satisfactory hose racks and reels, but they are difficult to combine in one device.

1. The device must permit the hose to be quickly and easily removed.
2. Leakage past the hose valve must not be discharged into the hose, causing it to be injured.
3. The hose should not lie with short-radius bends in it, as the material of which hose is made will in time assume the forms in which it has been held for any length of time and is easily broken when straightened out.
4. The hose should lie so that it will drain itself.
5. The hose should be enclosed where oil is extensively used.

These conditions are quite exacting and the nearest approach to them is shown in Figure 303 (M 3-2). This arrangement consists of a shelf or shelves each large enough to hold 50 feet of hose laid straight, one or more lengths on



Figure 303 (M 3-2).

a shelf and the hose supported preferably in a U-shaped trough. The hose is detached from the hose valve and the supports are pitched to permit water to drain from the hose. To further protect the hose there should be a sectional drop door protecting the shelves from the circulation of air. This is an ideal support, and like most ideal arrangements, as a rule, it does not fit into the place where it is wanted.

One of the most practical forms of hose support is that shown in Figure 304 (M 3-3). This form of hose reel can

be used in almost any location. As shown by the illustration, it is placed in a vertical position, the hose being wound in the form of a spiral, the nozzle being at the top. The hose is supported over its entire length. The shortest curve in the hose is that of

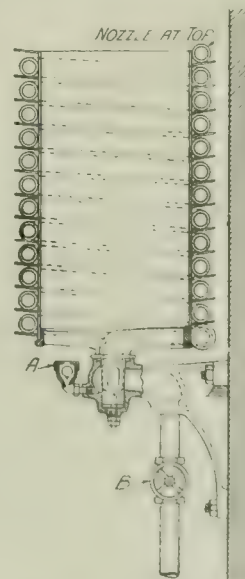


Figure 304 (M 3-3).

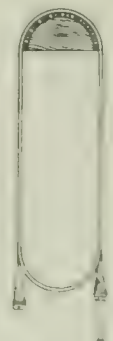


Figure 305 (M 3-4).

the drum. The hose is attached to the swivel joint. A check valve is placed at A, which remains open as long

as there is no water passing through the valve B. Water which may be in the hose, or which leaks past the valve B, would be discharged through this open check valve. If the hose is kept in a room where oil is extensively used, a sheet of heavy wrapping paper may be put around the outside to protect the hose. This can readily be torn away when the hose is required.

The form of support shown in Figure 304 (M 3-3) has all the desirable features except that the hose is held in a curved position. The radius of the drum is, however, so great compared with that of other supports used, that the injury resulting from this curvature must be very slight. The hose may be permanently attached to the service line in the arrangement of Figure 302 and nearly all other forms, provided a check valve is fitted, as shown at A, in Figure 304. There are hose reels in use with a central water connection as shown in Figure 303, the drum, however, revolving on a horizontal axis.

Such an arrangement is open to the same objections as the style of hose support shown in Figure 305 (M 3-4). The entire weight of the hose is carried on only a portion of its length and the weight of the hose thus tends to flatten it. If there is any water in the hose in such forms it drains to the lower loops and remains there, this being the difficulty in practically all forms of hose support. It is a very difficult detail to remedy. Another form of hose support is shown in Figure 306 (M 3-5). This support is objectionable on account of the sharp bends necessary in piling the hose and the weight resting on the bottom layers tending to flatten them. Further there is no method of draining a hose piled in this manner, and in this respect it is even worse than that shown in Figure

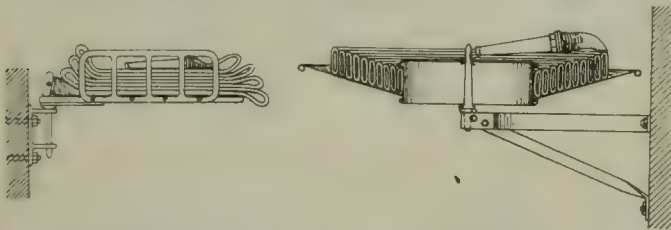


Figure 306 (M 3-5).

Figure 307 (M 3-6).

305. This form of hose support is very largely used and the only excuse for it is that it is cheap and can be folded back against the wall and thus occupies very little space. The form of support shown in Figure 307 (M 3-6) could be made quite cheaply and would avoid the sharp bend in the hose, would drain properly and is supported throughout its entire length.

Fire Service on Roof—Class M 4.

Though this class of fire protection is very efficient, it is generally neglected. A power house, with the exception of the roof, is quite easily constructed in a fireproof manner. This is equally true of many shops. If a power plant is located where it is in danger from surrounding buildings, it may be advisable to use the roof-wetting pipes shown in Figure 297. But ordinarily a hose and standpipe at each end of the building are sufficient.

A very efficient manner in which to install a roof standpipe is shown in Figure 308 (M 4-1). The hose and valve are on a shelf or rack on the inside of the building, the heat of the room preventing the water pipe and parts from freezing. The cast-iron doors and frames are built in the wall, and the doors open out on to a platform, which is set sufficiently low so that a man will be protected somewhat from the heat of the fire. The ladder which reaches this platform and is continued on and over the wall to the roof permits easy access to the hose and the roof.

Men working on top of a burning roof would soon leave it rather than run the risk of being dropped into the burning building because of the roof sheathing giving way or the trusses buckling. The most secure point at which to locate

the platform shown in Figure 308 is at the outside end of the power plant and at a division wall, as is shown by the dotted lines. This location gives a better range of both the boiler and engine room roof, and is the safest position along the end wall, as it is braced by the division wall.

Another method of supplying water to the roof is by means of an outdoor standpipe, ladder and platform, as shown

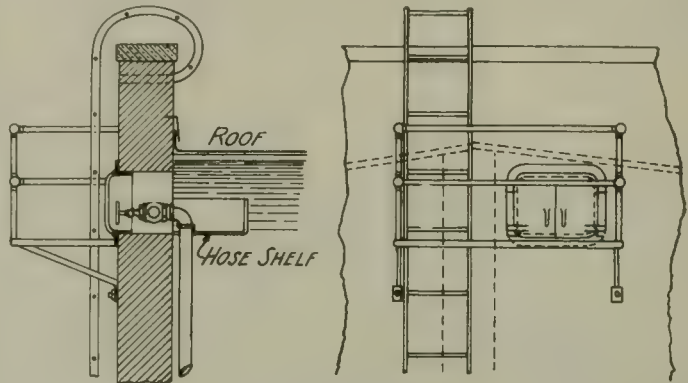


Figure 308 (M 4-1).

in Figure 308, but without the hose and the hose valve located inside the wall. The standpipe in this case would have an underground connection and a valve fitted with a drain which could be opened when the line is shut off. Such a line would be fitted with an indicator post. With the latter arrangement it would be necessary to carry a hose up the ladder whenever it was needed.

The outdoor standpipe would ordinarily be placed alongside the fire escape if used for factory protection, and there would be one or two hose connections with valves at each floor, and possibly two hose connections at the roof. This standpipe would be made of large diameter, as all water used for fire protection might be taken from this pipe. For power plant protection the system shown in Figure 308 can more easily and quickly be put into service, and it is also somewhat cheaper to install. In attempting to economize, however, the utility and reliability of operation must not be overlooked, as the value of fire protection depends largely upon what provisions have been made to prevent serious loss of pressure in case the interior pipe lines should be broken, as may happen in the system shown in Figure 308. There should be some means provided to permit shutting off all pipe lines which may be accidentally broken, and it should further be provided that all such lines can be shut off from the exterior of the building, even though the walls of the building have fallen. If such means cannot be provided for, the arrangement in Figure 308, an outside standpipe with an underground valve located some distance from the building, should be used.

Fire Service from the City Supply—Class M 5.

The extent to which city pressure can be applied in fire protection depends upon the available pressure and the extent of the fire protection intended by the system. In the larger cities comparatively low pressure is maintained, and the necessary pressure for fire service is obtained by means of a fire engine or pumps. Smaller cities and towns resort to a system of fire alarm and increase the pressure on the main during times of fire. This increase of pressure is generally quite small compared with that obtainable from fire pumps, a pressure of 150 pounds per square inch being quite general in the latter. The usual pressure in towns is 20 pounds per square inch and this is seldom increased above 60 pounds. The plumbing and water lines would be strained if a higher pressure were carried.

If a pressure of 60 pounds is quickly available on the city water system, there would be no real necessity for an independent fire pump, provided the building were not more than

30 feet high or about 50 feet wide. A pressure of 60 pounds at the hydrant will give a discharge of about 122 gallons per minute through a $\frac{3}{4}$ -inch nozzle at the end of a 100-foot $2\frac{1}{2}$ -inch hose line. The stream of water will rise vertically to a height of about 70 feet and reach horizontally to a distance of about 50 feet under these conditions. A $1\frac{1}{4}$ -inch nozzle will deliver about twice the amount of water that a $\frac{3}{4}$ -inch nozzle will deliver, and, though it will not project it to the same height, it will project it a greater horizontal distance.

"More pressure" is always the cry of firemen, and, though there may be sufficient pressure at the pumping station, there is a considerable loss of pressure through friction in the pipe line. In power station work it would probably be better practice in all cases to install a fire pump to increase the pressure than to rely upon the city service. Plants located within the district protected by fire engine service would not ordinarily have their own outside fire system unless they were of considerable size and unless too large to be easily protected by fire engine service.

Plants located within the district of fire engine service should have their own inside fire service, and for this purpose the city pressure would in most cases be sufficient, as the height and general dimensions of the rooms would not be too great to permit water to be delivered to any part of the room. If the building is high it will be necessary to place a tank on the roof, using an ordinary hose pump to fill the tank if the city pressure is not sufficient to deliver the water to that height.

There are many difficult features to determine in planning a fire protection system, and it will therefore generally be best to get a set of recommendations from the fire insurance underwriters, stating what they require in order to give the minimum rate. By obtaining from the underwriters specifications covering the requirements for different ratings, the amount saved per year on insurance can easily be determined and it will thus be possible to calculate the amount of money which can economically be invested in a fire protection system.

Power plants cannot possibly be insured against all loss occasioned by fire, even though the insurance companies might pay an amount somewhat in excess of the actual cost of the property destroyed. For this reason an increased investment in fire protection is oftentimes justified even though the insurance rates are not reduced sufficiently to pay the interest on the additional investment. It will be the best plan in practically all cases to take up the subject of fire insurance with the underwriters at the earliest date possible before any final plans are drawn or work undertaken. The general scheme and contemplated details, such as roofs, floors, doors, piping systems, etc., should be discussed.

The owners of the plant may not intend to carry insurance, but these details should be arranged as completely as possible for two reasons: First, the details considered may reduce the danger of fire spreading, thus protecting the owner; and, secondly, the owner may at a later date wish to carry insurance, and it might then be very costly or difficult, if not impossible, to so modify the different details that they would comply with the underwriters' requirements. The usual method, however, is to design the building, let the contracts, and put up the work, without giving thought to insurance until the amount of machinery and the apparatus placed is so great that the loss which would be occasioned by fire is self-evident. This is altogether too late a time to take up the subject, when practically all the material is on the ground, even though not erected. Much information in printed form can be obtained from the National Board of Fire Underwriters, and the details are so fully shown and described that the designer can quickly grasp the importance of the directions given. Additional information can be obtained by securing a copy of the building ordinances in force in the locality in which the plant is to be erected.

(To be continued.)

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Duty of Conductor Before Giving Signal to Start.

Miller v. Metropolitan Street Railway Company, 102 Southwestern Reporter, 592.—The Kansas City court of appeals says that a cable train having stopped at a regular station for the reception and discharge of passengers, it was the duty of the conductor, before giving the signal to start, to look to all the places provided for the use of passengers in entering and leaving the cars to see that none was in a position to be injured should the train be started. He had no right to assume from the fact that the train had been stopped a time reasonably sufficient to transact the business at that point that no one would be endangered by starting it. It was his business to inform himself of the movements of passengers before giving the signal.

Court Not Concerned with Municipalization of Street Railways.

Lobdell v. City of Chicago, 81 Northeastern Reporter, 354.—The supreme court of Illinois, in holding that the proposed issue, under the "Mueller law," of \$75,000,000 in street railway certificates of the city of Chicago, and the execution of a trust deed or mortgage to secure their payment, would create an indebtedness of the city of Chicago beyond the constitutional limit, says that this court has nothing to do with the policy of the municipalization of street railways in the cities of this state. It is its duty, however, to enforce the provisions of the constitution as it finds them written in that instrument.

Right to Connect Elevated Station with Store.

Rothschild & Co. v. City of Chicago, 81 Northeastern Reporter, 407.—The supreme court of Illinois holds that the city of Chicago, having granted to a railroad company the right to construct and maintain an elevated railway station at State and Van Buren streets, and to connect its station by necessary construction and appliances for ingress and egress and the accommodation of passengers, it could, under contract with a company owning a department store, construct a passageway leading from the platform above the street into the second story of the building.

The circuit court found that the passageway was a necessary appliance and construction permitted by the ordinance, for the ingress and egress of the public to and from the elevated railroad structure. But whether the passageway was an appliance or not, it was certainly a construction and for the ingress and egress of passengers. It did not follow that the railroad company could make connections with buildings all along the line of its road and call them stations. Neither was it at all likely that the railroad company would seek to assume the responsibilities toward its passengers which the law imposes in respect to stations by making such connections. Moreover, whether the decree of the circuit court restraining the city from enforcing an ordinance prohibiting such structures could be sustained on the ground stated or not, the supreme court is of the opinion that the railroad company did maintain a station in the building mentioned, and that the decree was correct for that reason.

Nor does the court agree with the contention that the station must be the property of the railroad company, and contain its ticket office, waiting room, sanitary appliances, stairways, elevators, etc. The city could not grant the right to construct and maintain the passageway for a private use. But the use was not confined to the customers of the store, or to those who it might consent should use it. It was true, the passageway was only open for public use when the store was open; but the fact that it was not a greater benefit by being kept open all the time did not detract from the actual benefit conferred by it.

News of the Week

Increase of Wages.

The Georgia Railway & Electric Company of Atlanta, Ga., has announced an increase in wages for its conductors and motormen, to take effect on September 1. The new scale is 16 cents an hour for the first six months of service, 17 cents an hour for the second six months, 18 cents an hour for the second year, 20 cents for the third year, 21 cents for the fourth, and 22 cents for the fifth year. Under the old scale the men received 16 cents an hour for the first year and 1 cent additional for each succeeding year, including the fifth.

The Consolidated Railway of New Haven, Conn., has announced a new schedule of wages for conductors and motormen as follows: Twenty-one cents an hour for the first year, 21½ cents for the second, 22 cents for the third, 23 cents for the fourth, 24 cents for the fifth, and 25 cents thereafter. Overtime will be paid for at the rate of 30 cents.

Belmont Tunnel Bore Inspected.

On August 14 St. John Clarke, chief engineer of the New York & Long Island Railroad, who for two years has directed the engineering work of the tunnel built by this company under the East river from Forty-second street, Manhattan, to Long Island City, led a party through the bore. He was accompanied by A. A. Robins, principal assistant engineer, and by Robert Shailey, engineer for the Degnon Construction Company, and these gentlemen piloted a party of three professors and 25 students of Columbia University and an equal number of newspaper reporters. The contracting company expects to turn the finished tunnel over to the railroad company in October. The interesting feature of this tunnel is that the third rail will be located overhead. The tunnel will be operated by the Interborough Rapid Transit Company.

Connecticut Electric Railways.

The recent session of the Connecticut legislature granted charters of incorporation to 13 street railway companies, which are authorized to issue capital stock to an aggregate amount of approximately \$8,000,000. The capitalization ranges from a minimum of \$50,000 to a maximum of \$200,000. Nearly all the resolutions of incorporation were vetoed by Governor Woodruff, but the general assembly, with one or two exceptions, promptly passed the measures over the executive veto. The governor's vetoes were based upon the contention that the charters permitted stock watering and also that they contained no requirement that the capital stock should be sold for cash. The argument of the legislature, in overruling the vetoes, was that it would be impossible to secure the building of rural electric railways unless promoters were allowed to offer stock bonuses and that the state should not impose on new street railway companies restrictions that were not enacted on those chartered heretofore.

The principal companies which were chartered are the Bridgeport & Danbury, the Danbury & New Milford, the Danbury & Northern, the Meriden & Guilford, the Norwich Colchester & Hartford, the Orange Street Railway, the Putnam & Rhode Island, the Waterbury & Milldale, the Windsor Locks & Western Street and the Windsorville & East Hartford. These franchises are scattered throughout the state and they authorize the construction of several score of miles of additional rural lines.

Cleveland Traction Situation.

The Cleveland Electric Railway Company on August 13 sent a communication to City Solicitor Baker asking him to apply for an injunction against the execution of the contract which the Forest City Railway curative ordinance, passed by the city council on August 3, attempts to create between the city and the company. The curative ordinance, as described in last week's issue of the Electric Railway Review, re-enacts and regrants to the Forest City Railway all the franchises previously granted, whose validity has been attacked because of Mayor Johnson's financial interest in the company. In securing the passage of the ordinance the company stated that the mayor's obligations had been entirely canceled. The Cleveland Electric Railway, in its communication to the city solicitor, charges that the passage of the ordinance was an abuse of corporate power and that the contract thereby created was made in contravention of the laws of the city and was procured by fraud. Eleven reasons are given to show that the ordinance is illegal, chief of which are that the ordinance was passed in an irregular manner and was not properly published; that the ordinances which it seeks to amend are void because of the mayor's financial interest

in the company, and consequently its passage was an attempt to ratify previous void action of the council; that its passage was procured by Mayor Johnson; and that the consents of property owners were not secured.

The Cleveland Electric Railway has been active in securing consents on the streets in question while the Forest City attorneys have gone on the assumption that they were unnecessary. The ordinance went into effect on August 15, and it was expected that the controversy between the companies would come to a head at that time if the Forest City attempted to operate its cars on any of the streets occupied by the Cleveland Electric.

Will Not Use Storage Batteries for Lighting.—L. W. Jacques, master mechanic of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., advises us that there is no truth in the recent reports that this company was planning to install storage batteries on its cars for lighting.

Interurban Lines to Report.—The Indiana railroad commission is preparing a blank upon which the interurban lines of the state will be asked to make their annual report to the commission. The system of accounting formulated by the American Street and Interurban Railway Accountants' Association will be used.

Eight-Car Trains for Boston Elevated.—The Boston Elevated Railway Company has filed with the Massachusetts railroad commission a petition asking for permission to run eight-car trains when the new Washington street tunnel is completed. The company is now running five-car trains. The change will necessitate the lengthening of every station platform along the line.

Electricity for the St. Paul Road.—It is reported from Spokane, Wash., that the Chicago Milwaukee & St. Paul Railway is planning to develop hydro-electric plants along the St. Joe river in northern Idaho for the operation of its trains across the Bitter Root mountains and possibly on the entire line between Missoula, Mont., and the coast. It is stated that several sites have been acquired and that three dams will be built at once, one with a height of 86 feet.

False Representations of Employes Cause Arrest.—Harry Stuckey and Harry H. Hill, employes of the Rochester (N. Y.) Railway Company, have been arrested on the charge of obtaining employment by false representations. The arrest is the outcome of an investigation made by W. C. Callaghan, superintendent of transportation, which disclosed that the men had been employed in Altoona, Pa., and in Baltimore, where they were discharged. They made sworn statements to the Rochester company that they had never before been employed by a railway. The case has been adjourned until August 21.

New York Commission Inspects Electric Zone.—The members of the New York public service commission of the second district on August 6 made a trip of inspection over the electrically equipped division of the New York Central & Hudson River Railroad. Under the law the second district commission has authority over through lines and matter pertaining to through traffic, even within the limits of the first district or Greater New York. The commissioners traveled over the electric zone in a special train, accompanied by W. J. Wilgus, vice-president; A. H. Smith, general manager; G. Van Tassel, trainmaster of the Harlem division; and A. R. Whaley, general superintendent of the electric division.

Complaint Against New York Central Suburban Service.—The Bronx Civic League has sent a communication to the New York public service commission complaining of the small number of local trains operated and the high rate of fare charged by the New York Central, the New York & Harlem and the New York & Putnam railroads, and asking the commission to compel the roads to increase their service and reduce the rate of fare. It is asserted that the New York Central operates only 52 local trains each way during 24 hours, the New York & Harlem Railroad, 49 local trains, and the New York & Putnam Railroad, 41. It is stated that the needs of the local patrons have been sacrificed to the through traffic and it is claimed that if they were "properly operated" they would add largely to the transit facilities of the Bronx and practically solve its transportation problem.

Louisville Railway Franchises Attacked.—Robert F. Weimer of Louisville, Ky., on August 7 filed a suit in the circuit court against the Louisville Railway Company attacking the validity of the company's franchises to operate in Market, Eighteenth, Preston and Shelby streets, and seeking to enjoin the company from operating lines over those streets or allowing its tracks to be used by the Louisville & Interurban Railroad. The plaintiff holds that these franchises expired in 1896 and that the streets are consequently wrongly held by the company; that the rights are worth \$1,500,000 and

that they should be sold to the highest bidder under the state constitution. T. J. Minary, president of the Louisville Railway, said that he was confident the suit would be without effect, as an investigation of the franchises by the city attorney several months ago showed that the railway was within its legal rights in running cars on all the streets on which they are now operating.

Metropolitan Asks Court to Manage Loop.—The Metropolitan West Side Elevated Railway has filed a suit in the circuit court at Chicago against the Chicago & Oak Park Elevated Railroad, the Northwestern Elevated Railroad, the South Side Elevated Railroad and the city of Chicago, asking the court to assume the management of the Union Elevated Railroad. The Metropolitan company charges that 10,000,000 passengers on its line were unable to reach the loop last year on account of the congestion on the loop. The court is asked to determine the number of trains which the various roads are entitled to operate on the loop and the number of Metropolitan passengers who would be excluded if the loop were operated only to its proper capacity. The court is also asked to restrain the Northwestern and the Chicago & Oak Park companies from further participation in the affairs of the board of managers of the loop, and to cause an accounting to be rendered determining the damage sustained by the Metropolitan as a result of inadequate loop facilities.

Inland Empire System.—The advertising department of the Spokane & Inland Empire Railroad, Spokane, Wash., has just issued an attractive folder containing an excellent map of the system and seven half-tone illustrations of the company's various types of rolling stock, passenger and freight, city and interurban cars. With the inauguration on August 1, 1907, of passenger and freight service on the Spokane & Inland division, from Rosalia to Colfax, the lines of the Inland Empire system aggregate 200 miles. The Spokane & Inland division now reaches Oakesdale, Garfield, Palouse, Rosalia, Thornton and Colfax—all principal points in Whitman county. The Coeur d'Alene & Spokane division serves Spokane valley, Spokane's lake region and affords the most direct route between Spokane and the prosperous Coeur d'Alene mining country. The Spokane traction division now has 30 miles of city lines and is constantly extending and improving its service. With its superior equipment, both freight and passenger, the Inland Empire system offers prompt service to the shipper and the "clean, comfortable way" to the traveling public.

Geary Street Road Asks to Resume Operation.—The Geary Street Park & Ocean Railroad of San Francisco, through its president, H. E. Platt, has sent a communication to the board of supervisors asking permission to resume operation of its road under the conditions existing during the past three years, pending the use of the street by the city in carrying out its plans of municipalizing the road or the grant of a franchise to another company. The franchise of the Geary Street Park & Ocean Railroad Company expired November 19, 1903. Since then it has been operated under sufferance, the company paying to the city 5 per cent of its gross receipts from the operation of its road. This continued until May 5, 1907, when the carmen went out on strike. Subsequently the board of supervisors withdrew its permission to the company to any longer operate its road. The company wishes to resume operations until such time as the city may need the street for a municipal road or until it grants a franchise to some other company. The company is further willing to continue to pay the city 5 per cent of its gross receipts from the operation of its road during the time that it may be permitted to operate the same.

Office of Snohomish Valley Railway Burned.—Charles A. Barron, general superintendent, writes that on August 1 the office of the Snohomish Valley Railway Company in Snohomish, Wash., was destroyed by fire, the company losing all of its records, books, correspondence, maps, estimates and data, which will require a great deal of extra time and labor to replace and much of which it will be impossible to replace. In order to expedite the replacing of its records and the re-establishment of its working data, the Snohomish Valley Railway Company requests all dealers with whom it has had correspondence and from whom it had received specifications of equipment or had received special catalogues and prices, to duplicate those specifications, prices and lists without special request, and at their earliest convenience. The loss of the records, correspondence, specifications and data at this time was very unfortunate, as the company was expecting to commence construction between the first and fifth of August, which date of commencement will now be delayed until the records can be reproduced, which will be at the earliest possible moment, and the co-operation of those with whom the company had had correspondence and with whom it was negotiating for equipment and supplies will be greatly appreciated.

Construction News

FRANCHISES.

Arapaho, Okla.—It is reported that a franchise has been granted in Arapaho and in Clinton to Charles Goodwin, M. L. Holcombe and H. Smith, who propose to build a line connecting the two towns.

Atlanta, Ga.—The Georgia Railway & Electric Company has applied for a franchise for a double-track line on Capitol avenue from Bass street to Ormond street, and thence a single-track line to Haygood street.

Boise, Idaho.—The commissioners of Ada county have granted a franchise to the Boise & Interurban Railway to extend its line over many streets outside of the corporate limits of Boise. It is stated that the company proposes to spend \$150,000 this year on extensions.

Brooklyn, N. Y.—The public service commission has granted the Nassau Electric Railroad, a subsidiary of the Brooklyn Rapid Transit Company, permission to construct additional tracks in Lafayette and Livingston streets in Brooklyn.

Centralia, Wash.—The city council has granted a franchise to the Centralia-Chehalis Electric Railway & Power Company for its electric railway between those towns. Work is to commence within three months, to be completed within a year.

Cheyenne, Wyo.—A street railway franchise has been granted to W. J. Barker of Denver. The franchise granted some time ago to Eugene Sweeney of Denver has been revoked.

East St. Louis, Ill.—The East St. Louis & Suburban Railroad has applied for a franchise on Tenth street and an additional right of way to St. Clair avenue.

Elkhart, Ind.—The Chicago South Bend & Northern Indiana Railway has applied for a 50-year franchise for a city and interurban line.

Greeley, Colo.—The county commissioners have granted a franchise to the Interurban Construction Company of Denver, of which E. N. Reaser is president.

Greencastle, Ind.—The city council has granted a franchise to the Chicago & Western Indiana Traction Company, which is now building a line between Lafayette and Greencastle, Ind.

Joplin, Mo.—The Joplin & Pittsburg Street Railroad has filed its acceptance of the franchise recently granted by the city council and work on the construction of the interurban line between Joplin and Pittsburg will be started as soon as the right of way can be obtained.

Mansfield, O.—The Mansfield Railway Light & Power Company has been granted a franchise for an extension on Grace street from Wayne to Central avenue.

McKinley, Minn.—The city council has granted a franchise to the Mesaba Traction Company, which proposes to build from Biwabik to Hibbing, Minn. F. B. Myers, president.

Millburn, N. J.—The Morris County Traction Company has been granted a franchise for an extension of its line from Millburn to Maplewood, N. J. The company now operates a line from Millburn to Summit.

Owensboro, Ky.—Judge Wilfred Carico has applied for a franchise over the streets of Owensboro for an electric railway to connect Owensboro with Calhoun, Ky. Judge Carico is acting as attorney for a company whose name has not yet been announced.

Redding, Cal.—F. L. Evans has applied for a franchise for a double-track line through Redding, as a part of the Eureka & Redding Railway.

San Francisco, Cal.—The application of the Sutter Street Railway, controlled by the United Railroads, for a franchise for an electric line on Market street, from Sansome street to the ferries, has been denied by the board of supervisors. The company already has a horse car line on Market street and the United Railroads also has a double-track electric line. During the progress of some sewer excavation in the street the company has erected temporary trolley wires, pending its application for a franchise. This wire will be allowed to remain until the completion of the work in the street.

Springfield, O.—The Indiana Columbus & Eastern Trac-

tion Company is applying for a 12-year extension of its franchise in Springfield.

Waukegan, Ill.—The Chicago Waukegan & North Shore Railway has applied for a franchise, agreeing to build a new public bridge in return for the franchise.

Waynesburg, Pa.—W. J. Sheldon, promoter of the Brownsville Carmichaels & Waynesburg Street Railway, has secured a franchise to build a line through Waynesburg, promising to begin construction in six months.

RECENT INCORPORATIONS.

Arkansas Valley Traction Company, La Junta, Colo.—Incorporated in Colorado to build an electric railway from La Junta to Rocky Ford. Surveys have been completed between La Junta and Newdale and a franchise has been applied for in La Junta. Capital stock, \$150,000. Incorporators: E. S. Alnutt, J. A. Gauger, H. W. Potter, J. D. Pierce and R. I. Dalton.

Chicago & Interurban Electric Railway, Chicago, Ill.—Incorporated in Illinois to build an electric railway from Chicago south through Harvey, South Holland, Calumet, Thornton, Chicago Heights and Steger, in Cook county, and Crete, in Will county; thence west to Joliet, and from Blue Island, through Riverdale and Dalton, thence northeast through Thornton and West Hammond, and other cities and towns to be determined upon. Incorporators and first board of directors: J. M. McGill, John M. Humphrey, Claude E. Fitch, L. E. Eaton, J. M. Miller, H. D. Moreland and Fred F. Myers.

Interstate Transfer Railway, Superior, Wis.—Incorporated in Wisconsin to build an electric railway connecting Superior and Duluth, 20 miles. Capital stock, \$600,000. Incorporators: Sol L. Perrin and W. W. Savage of Superior, Joseph B. Cotton, George L. Reis and William A. McGonagle of Duluth.

Manchester-Davenport Interurban Railway, Davenport, Ia.—Incorporated in Iowa to make the preliminary surveys, etc., for a line from Manchester to Davenport, Ia. Capital stock, \$15,000. Officers: George T. Baker, president; J. A. Voorhees, vice-president; F. W. Rank, secretary; and T. F. Halligan, treasurer.

South Memphis (Tenn.) Light & Traction Company.—Incorporated in Tennessee with \$50,000 capital stock. Incorporators: W. E. Gage, K. D. McKellar, G. W. Edwards, James F. Hunter and W. C. Thomas.

Valley Transit Light & Power Company, New Philadelphia, O.—Incorporated in Ohio to build an electric railroad connecting Canton, Dover, New Philadelphia, Newcomerstown, Coshocton, Newark and Columbus. Capital stock, \$100,000. Incorporators: Clyde J. Kneisely, Michael Siebold, E. S. Rhoades, W. W. Snyder, F. G. Kneizli, W. J. Wise, T. F. Hynes and F. O. Richards.

TRACK AND ROADWAY.

Anderson (S. C.) Traction Company.—It is announced that as soon as the line from Belton to Donald's, 14 miles, is completed the company will electrify the road from Donald's to Due West, four miles, which has been partially completed by the Donald's & Due West Railroad.

Bakersfield & Ventura Railway.—We are advised by Oscar Lawler, administrator of the estate of Eben Smith, Los Angeles, Cal., that this company, which was reported in our issue of July 20 as contemplating several improvements, is absolutely without any assets whatever, all of its effects, including right of way, rolling stock, etc., having been purchased under foreclosure of a trust deed in favor of Eben Smith, now deceased.

Bartlesville (I. T.) Interurban Railway.—W. G. Thummel, chief engineer, writes that the contract was let on August 5 for the grading and culverts on this line from a point two miles west of Dewey, I. T., to a distance of seven miles. Two steel bridges will be necessary, one over the Caney river, with a 160-foot span, and one over Coon creek, about 100-foot span. Contracts will be let for tracklaying and for the electric power plant in a short time.

Beloit (Wis.) Traction Company.—This company has completed and is now operating over three miles of new city lines in Beloit and will build several miles additional. J. B. Dow is president.

Boise & Interurban Railway, Boise, Idaho.—The first car on the Boise-Caldwell line was operated last week between Boise and the car house, about four miles out of Caldwell. W. E. Pierce, president.

Boston Waltham & Weston Electric Railroad, Sudbury, Mass.—Charles E. Stevens is promoting an electric railway to

connect Waltham, Weston, Wayland, Sudbury, Maynard and Marlboro, Mass., 23 miles. The first section is to be built from South Sudbury to Maynard. The company is capitalized for \$240,000, but has not secured a charter. Surveys are practically completed.

Butler Saxonburg & Tarentum Street Railway, Butler, Pa.—William McDowell, attorney, writes that contracts are to be let in about a month for the construction of this line from Butler to Tarentum, Pa., 25 miles. Surveys have been completed.

Canandaigua-Southern Railway.—It is now stated that construction work will begin this fall on the line from Atlanta to Canandaigua, N. Y. Only the six miles between Atlanta and Naples will be completed at first.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—This company will begin operation this month in Milwaukee, from the southern city limits to the approach to the First avenue viaduct.

Chicago Union Traction Company.—Reconstruction of the tracks was begun this week on Lincoln avenue. For several days work has been in progress in laying new tracks on Fourteenth street.

Chester (Pa.) Traction Company.—This company is rebuilding much of its track and roadbed, particularly on the Media division. Rails and ties have been delivered for a new track on Edgmont avenue, between Fifteenth and Twenty-fifth streets. A. G. Jack, superintendent.

Claremore, I. T.—Plans are being made for an electric railroad system for Claremore and vicinity, and it is stated that the promoters will apply for a franchise at the next meeting of the city council. The line as planned will first be built to the Radium wells, and after encircling the city so as to reach the fair grounds, will be extended to Big Lake, about eight miles southwest of the city, and probably will be extended later to Tulsa and Muskogee.

Ensley (Ala.) Street Railway.—This company, which recently secured a franchise for an electric street railway system in Ensley, Ala., has purchased ties and rails and will begin construction this week. A contract has been let to Smiley Sons & Co.

Evansville & Eastern Electric Railway.—It is stated that the Richland branch will be completed and ready for operation this week.

Evansville, Ind.—Surveys are now being made for an electric railway from Evansville to Indianapolis, Ind., via French Lick, Huntingburg, Holland, Selvin, Hemenway and Millersburg.

Ft. Worth, Tex.—Surveys have been started on the proposed electric railway between Ft. Worth and Mineral Wells, Tex., via Springtown and North Ft. Worth. J. B. Beardsley of Mineral Wells is in charge of the work.

Galveston-Houston Electric Railway.—M. M. Phinney, who represents the Stone & Webster interests in Texas, is quoted as saying that everything is in readiness for beginning construction on the line from Galveston to Houston, 45 miles, as soon as the controversy over the Galveston causeway is settled.

Indiana Columbus & Eastern Traction Company, Columbus, O.—The work of tracklaying on the London cut-off has been completed and the work of ballasting will begin at once. The cut-off will shorten the line between Columbus and Springfield by five miles and will enable the company to considerably reduce its time between those cities. It is expected to be in operation this fall.

Iowa City, Ia.—Right of way is being secured for an electric railway from Iowa City through Ft. Madison, Ia., to Carthage, Beardstown and Springfield, Ill. W. R. Sturgeon and W. R. Tempe of Ft. Madison are interested.

Jacksonville, Fla.—George W. Clark will shortly begin work on a line out Main street from the city limits to Panama park and back by way of Cummer's Mill and Phoenix park to the city limits, for which a franchise was granted him over a year ago. The Jacksonville Electric Company is building an extension of its Main street line to the city limits to connect with the new line. The material for the construction of the suburban line is being delivered.

Juniata Electric Street Railway, Huntingdon, Pa.—This company, it is reported, proposes to build an extension from Huntingdon to Lewistown, Pa. The company also proposes to construct an amusement park.

Kansas City & Olathe Electric Railway, Kansas City, Mo.—The W. K. Palmer Company, Kansas City, will have charge of the engineering work in connection with the pro-

posed line from Rosedale to South Park, Merriam, Shawnee, Lenexa, Lackmaus and Olathe, Kan., 20 miles. F. B. Dickson, Gumbel building, Kansas City, is president. Right of way has been obtained and surveys made.

Keokuk-Columbus Junction Traction Company, Keokuk, Ia.—This company has been organized to build an electric railway from Keokuk to Columbus Junction, Ia., via New London, West Point and Montrose. Preliminary surveys are being made. The officers are: J. B. Peterson, president; T. A. Craig, secretary; and Ira Wells, treasurer.

Lima & Toledo Traction Company, Lima, O.—Tracklaying is practically finished between Leipsic and Deshlar, O., but the overhead construction has been delayed by non-arrival of material.

Little Rock & Pine Bluff Traction Company, Little Rock, Ark.—We are officially advised that this company, recently incorporated, proposes to build about 100 miles of electric railway, connecting Little Rock and Pine Bluff, Ark., with a branch to Stuttgart. Officers: President and general manager, J. J. Fiske; vice-president, W. H. Lankford; secretary and treasurer, J. W. M. Rose.

Los Angeles, Cal.—M. A. King of Los Angeles is taking the preliminary step toward the formation of a company to build an electric railway from Los Angeles to Pasadena, Cal., via Eagle Rock.

Ludington (Mich.) Southern Railway.—It is stated that this line from Ludington to Grand Rapids, Mich., will be completed this year. The promoters state that 80 per cent of the right of way has been secured and that eastern capitalists are ready to furnish \$285,000 if the property owners will subscribe \$15,000. Several miles have been graded between Grand Rapids and Pentwater. Thomas J. David of Fremont, chief engineer.

Massillon (O.) & Northern Electric Railway.—William Schuster, president, has been in Philadelphia recently arranging for the financing of the line from Massillon to Turkeyfoot Lake and Akron, O. It is also proposed to build a line from Massillon to Wooster.

Milner & North Side Electric Railway, Milner, Idaho.—The contract for grading from Milner to Jerome, Idaho, has been let to A. Kidwell of Heyburn and A. C. Lincoln of Twin Falls. This company was only recently incorporated and proposes to extend its line ultimately to Gooding, Idaho.

Milwaukee Northern Railway, Port Washington, Wis.—Work is being pushed as rapidly as possible to have the line from Milwaukee to Port Washington ready for operation early in September. From a point a little over two miles north of Milwaukee to the town of Grafton, a short distance from Port Washington, tracks are laid. All grading between these points has been practically completed. The force of men engaged in this work will shortly be put on the work between Port Washington and Sheboygan, where another force has been clearing the right of way.

Mineral Wells, Tex.—J. W. Beardsley of Mineral Wells has awarded a contract to the American Engineering Company of Indianapolis, Ind., for the construction of the proposed interurban line from Ft. Worth to Mineral Wells, Tex. Surveys were started last week and it is understood that the work of construction is to begin at once.

Montgomery & Chester Electric Railway, Phoenixville, Pa.—It is stated that this company, which has a line from Spring City to Phoenixville, Pa., has decided to erect a bridge over the Pickering Valley Railroad at Ironsides. Heretofore the company has been unable to cross the railroad tracks. I. J. Brower, president.

Muskegon, Mich.—James Flood of Hart, Mich., and W. E. Osmun of Montague are promoting an electric railway to connect Ludington and Muskegon, via Whitehall and Montague.

New Jersey & Pennsylvania Traction Company, Trenton, N. J.—This company is now making progress on its line between Princeton and Somerville, N. J., 17¾ miles. The work involves some very heavy grading and will require about 60 bridges on the line. T. G. Kitchen of Trenton, N. J., is the engineer in charge of the work.

New Orleans Railway & Light Company.—It is stated that this company is contemplating an extension of its Orleans street line, from the City Park race track to the lake shore and then to the west end.

Northern Electric Railway, Chico, Cal.—This company has begun tracklaying on the Chico-Hamilton City line.

Northwestern Interurban Railway, Grand Forks, N. D.—J. L. Lamprecht and Dr. Stewart of Minneapolis are organiz-

ing a company to build electric railways in Grand Forks and Crookston, N. D., with an interurban line connecting the two cities and a continuation eastward from Crookston to connect with the Soo Line.

New York & Queens County Railway, Long Island City, N. Y.—This company is said to be planning extensions in the near future to Whitestone and Bayside.

Ohio & Southern Traction Company, Columbus, O.—This line from Columbus south to the Hartman stock farm is expected to be completed by the first of September, and plans for the extension of the road still farther south are being considered. Surveys have been made to Mt. Sterling and Washington Court House, but it is not considered probable that the line will be built this year.

Oregon Electric Railway, Portland, Ore.—It is reported that work is progressing rapidly on the electric line from Portland to Salem, Ore., and it is now announced that the line will be in operation for the handling of both freight and passengers not later than November 15. Work is now in progress on the bridge across the Willamette river at Wilsonville. The first two spans have been erected and it is expected to have the structure completed by the end of August. The grading between Portland and Wilsonville is expected to be completed early in September and the grading between Wilsonville and Salem is still nearer completion. The line is being built by W. S. Barstow & Co. of Portland and New York. R. L. Donald, chief engineer.

Pascagoula, Miss.—Martin Turnbull is promoting an electric railway from Mobile to Pascagoula, Miss., 40 miles. It is intended to organize a company with \$500,000 capital stock, probably under the name of the Grand Bay Electric Railway.

Peninsular Railway, San Jose, Cal.—Work on this line, which will ultimately connect San Jose and San Francisco, Cal., by way of Cupertino, Mayfield, Palo Alto, Redwood City and San Mateo is progressing rapidly. The grading has been completed from Mayfield to Vasona, near Los Gatos. It is expected that tracklaying will be commenced within a short time.

Philadelphia Rapid Transit Company.—It is announced that by September 1 every station on the line of the Market street elevated road will be completed. The last one will be the station at Forty-sixth street, on which work is now being rushed.

Pine Bluff, Ark.—It is reported that the Southern Engineering & Construction Company of Pine Bluff will construct an electric railway from the Arkansas river north to Dover, Ark.

Pittsburg & Westmoreland Railway, Pittsburg, Pa.—Thomas M. Evans of McKeesport, Pa., is reported to have purchased a large interest in this company, which is now building from McKeesport to Irwin, Pa.

Portland Gray & Lewiston Railroad, Portland, Me.—This company, recently incorporated to build an electric railway through Falmouth, Gray, New Gloucester, Auburn and Lewiston, Me., has voted to increase its capital stock to \$1,000,000 and to employ an engineer to make the preliminary survey at once.

Quitman Valdosta & Thomasville Electric Railway & Power Company, Quitman, Ga.—This company has started work on its line from Valdosta to Thomasville, Ga., and about two miles out of Quitman has been graded. Grading has also been started near Blue Springs.

St. Louis Terre Haute & Quincy Traction Company, Springfield, Ill.—E. E. Barclay, secretary, states that contracts will be let about September for building this line from Terre Haute, Ind., to Marshall, Mattoon, Taylorville, Virden, Roodhouse, Pittsfield and Quincy, Ill. Edward Yates, president.

San Antonio (Tex.) Traction Company.—This company has begun construction on its extension of the North Flores street line and a loop, which will amount to about two miles of new track.

Southern Wisconsin Light & Traction Company.—This company has petitioned the Wisconsin railroad commission for a certificate to construct an interurban electric railway between Madison and Stoughton, Wis., by way of McFarland. F. W. Montgomery of New York is president.

Texas Traction Company, Dallas, Tex.—It is announced that about 50 miles of grading has been completed on the line from Dallas to Sherman and that tracklaying will begin about September 1.

Toledo (O.) Urban & Interurban Railway.—General Manager Charles F. Smith has announced that it is the intention

of the company to extend its line south from Findlay to Kenton, O.

United Railways of St. Louis.—Work is now in progress on the Hodiament line, which was included in the purchase of the St. Louis & Suburban Railway system on January 1. The entire line from De Hodiament to Kirkwood will be practically rebuilt. About 100,000 new ties will be required and several miles of the line will be rebalasted. All curves will be strengthened and the trolley poles on curves will be strengthened or new ones installed. All of the conduits will be repaired or rebuilt. New rails will have to be laid in several places. Robert McCulloch, general manager.

Utica Southern Railway.—This company has filed maps in Oneida and Madison counties, and is preparing to extend its line from Hamilton to Norwich, N. Y., about 22 miles. Surveys will be started at once.

Waterbury, Conn.—John Fagan's Sons have been awarded the contract for building four miles of the Woodbury-Waterbury Electric Railway, from Quassapaug to Woodbury Center.

POWER HOUSES AND SUBSTATIONS.

Buffalo Lockport & Rochester Railway, Albion, N. Y.—The power house at Albion, N. Y., is nearly completed. The building is built of cement blocks. The substations on the line will be at Gasport, Medina, Albion, Brockport and South Greece.

Consolidated Railway, New Haven, Conn.—Plans are being made to place new equipment in the power station at New Britain, Conn., in order to make it independent of the Bull's Bridge plant. The equipment will include a 400-kilowatt, 2,300-volt, 60-cycle, three-phase generator, with switchboard. J. K. Punderford, general manager.

Illinois Traction Company, Champaign, Ill.—It is stated that two substations will be built on the Springfield-Lincoln line, one at Selbytown and one at Lincoln.

Indiana Columbus & Eastern Traction Company, Columbus, O.—The power house at Springfield, O., is said to have been destroyed by a recent electrical storm.

Indiana County Railways, Indiana, Pa.—It is reported that this company has placed a contract with the Westinghouse Electric & Manufacturing Company for the equipment for the power house near Tivolick, Pa., and for two substations at Chestnut Grove and Chamberville. The equipment will consist of 500-horsepower boilers, 1,000-kilowatt turbines, rotary converters, condensers, pumps, etc.

United Railways, Portland, Ore.—It is reported that this company is now making financial arrangements for building an immense power plant on the Upper Sandy river, for the operation of the company's proposed system in and around Portland, and that water rights have been secured. E. E. Little, president.

Vera Cruz (Mex.) Electric Light Power & Traction Company.—It is reported that the Westinghouse Electric & Manufacturing Company has a contract for furnishing equipment for this company's power house, including six generators, two motor generators and appliances for a 30-panel switchboard. The contract also includes 11 double motor equipments.

Washington Baltimore & Annapolis Electric Railway.

Officials of the Washington Baltimore & Annapolis Electric Railway announce that train service will be inaugurated on the new line by November 1. It is now stated that the road will cost when completed about \$6,000,000, of which \$1,250,000 represents the cost of building the 4½-mile terminal line in Baltimore and vicinity. The line to Washington will be double-tracked and 41 miles long. The road is built as a high-speed line, the maximum curvature of the main line being 1 degree and the maximum grade 2 per cent. The equipment used will be the very highest class and cars will be operated on a 15-minute schedule, both local and limited cars being used. Limited cars will make the run from the business section of Baltimore to the treasury department in Washington in 72 minutes. The entire system to be operated comprises the Washington Baltimore & Annapolis Electric Railway, 41 miles, between Washington and Baltimore; the Annapolis Washington & Baltimore, 21 miles, now operated as a steam line between Naval Academy Junction and Annapolis, and which is in process of reconstruction as an electric line, and the Washington Berwyn & Laurel, now in operation between Laurel and Washington. It is said that the system when in complete operation will serve about 1,000,000 people residing in Washington, Baltimore and Annapolis. The officers of the company are: President, George T. Bishop; vice-president, John Sherwin; secretary and treasurer, Charles F. Gladfelter; second vice-president and general manager, J. N. Shanahan.

Personal Mention

Mr. Alfred B. Nelson has resigned as engineer of construction for the Conestoga Traction Company of Lancaster, Pa., to become chief engineer of the Columbus (Miss.) Railway Light & Power Company.

Mr. Walter Morehouse has resigned from the Cincinnati Northern Traction Company, Cincinnati, O., to become assistant superintendent of construction of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., succeeding Mr. A. S. Swank.

Mr. Harry A. Moore, for the past five years claim agent of the Public Service Corporation of New Jersey, has resigned, and will be succeeded by Mr. Harry Down, assistant claim agent. Mr. Down was formerly connected with the Cincinnati Traction Company and the Rhode Island Company of Providence, R. I., in a similar capacity.

Mr. Cecil G. Rice has been appointed to the newly created position of general agent of the Pittsburgh Railways Company. He will have charge of the appointment of all conductors and motormen, and will have his office in the Philadelphia Company building, Sixth avenue, Pittsburgh, Pa. Mr. Rice was formerly a newspaper man and for the past six months has been private secretary to J. D. Callery, president of the company.

Mr. Edward A. Evans, president of the Canadian Street Railway Association, announces that at the annual meeting, June 14 and 15, Mr. Allan H. Royce declined re-election to the secretary-treashership of the association and that at a meeting of the executive committee on July 31 Mr. Acton Burrows was unanimously elected to the position. Under the constitution of the association its office will be at the place where the secretary-treasurer resides, 33 Melinda street, Toronto, Ont.

Mr. Marcy L. Sperry, who, as previously announced in the Electric Railway Review, has been appointed manager of the Savannah Electric Company, Savannah, Ga., to succeed Mr. L. R. Nash, transferred, was connected with the auditing department of Stone & Webster in Boston from May to November, 1902, at which time he went to Savannah, Ga., and remained there until August, 1903, as purchasing agent of the Savannah Electric Company. From August, 1903, to December, 1905, he was with the Ponce Railway & Light Company, Ponce, Porto Rico, first as assistant treasurer and afterwards as manager. From February, 1906, to July, 1907, he held the position of superintendent with the Minneapolis General Electric Company, leaving that position to return to Savannah as manager.

Mr. J. M. Yount, who, as previously announced in the Electric Railway Review, has been appointed assistant to the master mechanic of the Rhode Island Company, Providence, R. I., is a graduate of the school of electrical engineering of Purdue University, of the class of 1896. He entered the service of the Citizens' Street Railway, Indianapolis, Ind., in July, 1896, and held that position for about two and one-half years. He resigned to enter the service of the Metropolitan Street Railway, New York, during the change from cable to electric operation. A year later he resigned to enter the service of the New Jersey Street Railways under the management of Mr. David Young, first as assistant to Mr. H. H. Adams, master mechanic of the North Jersey Street Railway, and later as master mechanic of the Jersey City Hoboken & Paterson Street Railway and of the North Jersey Street Railway. When these roads were consolidated into the Public Service Corporation of New Jersey Mr. Yount was appointed superintendent of rolling equipment in charge of that company's 21 car barns. He resigned from that position to enter the service of J. H. Fogarty in the sales department. In April, 1906, he was appointed assistant master mechanic of the Pittsburgh Railways Company, which position he left on August 1, 1907, to become assistant to Mr. W. D. Wright, master mechanic of the Rhode Island Company.

New Georgia Tax Bill.—The lower house of the Georgia legislature on August 9 passed an amendment to the tax law imposing a tax of 1 per cent on the gross receipts of all railroads and street railways, payable on the tenth of each month for the preceding month.

Winona Interurban to Enter South Bend.—The city council of South Bend, Ind., on August 14 granted to the Chicago South Bend & Northern Indiana Railway Company the right to allow the cars of the Winona Interurban Railway to enter the city over its tracks. Within a week through service will be established between South Bend and Warsaw, Ind., and it is stated that in the near future connection will be made with Wabash.

Financial News

Fitchburg & Leominster Street Railway, Fitchburg, Mass.—At a meeting of stockholders on August 6 it was voted to increase the capital stock from \$450,000 to \$700,000 for the purpose of redeeming floating indebtedness. Application for approval of the issue of stock will be made to the Massachusetts railroad commission.

Lima & Toledo Traction Company, Lima, O.—The Lima & Toledo Traction Company has executed a mortgage to secure an issue of \$2,750,000 of 5 per cent bonds. This supersedes a mortgage executed recently to secure an issue of \$2,500,000 of bonds.

Philadelphia & Easton Electric Railway, Doylestown, Pa.—This company has been formed to operate the Philadelphia & Easton Railway, which was purchased recently at foreclosure sale. David P. Ayars of Wilkesbarre has been elected president and Joseph S. Rawson of Philadelphia, secretary and treasurer. The directors are: David P. Ayars of Wilkesbarre, A. H. Sickler of Philadelphia, W. J. Lescure of Harrisburg, A. E. Pendergast of Trenton, Henry R. Rush of Lancaster, A. C. Patterson of Philadelphia.

Toledo Ann Arbor & Detroit Railroad, Toledo, O.—On July 25 the receivers of the Toledo Ann Arbor & Detroit Railroad were directed by the court to sell the Michigan section of this line at public auction some time during the two weeks between September 3 and September 17. The upset price has been fixed at \$80,000.

Windsor Essex & Lake Shore Rapid Railway.—The stockholders of this company, which is building from Windsor to Leamington, Ont., will vote on August 29 on the question of a loan from the Union Trust Company, Limited.

ELECTRIC RAILWAY EARNINGS.

Chicago & Milwaukee Electric Railroad Company, Chicago.			
	Gross Earnings.	Operating Expenses.	Net Earnings.
July, 1907	\$117,096.12	\$ 42,559.15	\$ 74,536.97
July, 1906	97,424.64	33,485.32	63,939.32
Increase	\$ 19,671.48	\$ 9,073.83	\$ 10,597.65
January 1 to July 31, 1907..	551,604.23	236,913.67	314,690.56
January 1 to July 31, 1906..	429,297.52	177,278.61	252,018.91

Increase	\$122,306.71	\$ 59,635.06	\$ 62,671.65
Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.			

	June, 1907.	June, 1906.	Per cent Inc.
Gross earnings	\$107,307.14	\$ 93,648.45	14.5
Operating expenses	64,237.56	57,285.05	12.1

Net earnings	\$ 43,069.58	\$ 36,363.40	18.4
January 1 to June 30—			
Gross earnings	569,227.64	491,885.77	15.7
Operating expenses	348,995.05	307,090.38	13.6

Net earnings	\$220,282.59	\$184,795.39	19.2
Lexington & Interurban Railways Company, Lexington, Ky.			

	June, 1907.	June, 1906.	Per cent Inc.
Gross earnings	\$ 45,474.99	\$ 47,507.55	*4.2
Operating expenses	30,964.35	30,113.87	2.8

Net earnings	\$ 14,510.64	\$ 17,393.68	*16.5
January 1 to June 30—			
Gross earnings	249,695.73	231,641.26	7.7
Operating expenses	169,528.95	163,451.34	3.7
Net earnings	\$ 80,166.78	\$ 68,189.92	17.5

*Decrease.

Norfolk & Portsmouth Traction Company, Norfolk, Va.

	June, 1907.	June, 1906.	Per cent Inc.
Gross earnings	\$ 254,247.83	\$150,750.17	68.6
Operating expenses	149,235.13	102,772.19	45.2
Net earnings	\$ 105,012.70	\$ 47,977.98	118.8
January 1 to June 30—			
Gross earnings	1,100,180.28	788,274.98	39.5
Operating expenses	700,481.68	520,048.26	34.6
Net earnings	\$ 399,698.60	\$268,226.72	49.0

Manufactures and Supplies

ROLLING STOCK.

Bloomington Pontiac & Joliet Electric Railway, Pontiac, Ill., will probably be in the market for a few interurban cars.

Chicago-New York Electric Air Line Railway, Chicago, Ill., is in the market for a locomotive for construction service.

Chilean Government has ordered 217 cars from the St. Louis Car Company. Forty-two of this number are motor cars.

Knoxville Railway & Light Company, Knoxville, Tenn., will be in the market a little later for several cars for city service.

Philadelphia Rapid Transit Company, Philadelphia, Pa., it is reported, has ordered 40 more steel passenger cars from the Pressed Steel Car Company.

Redlands & Yucaipe Electric Railroad, Redlands, Cal., it is reported, has placed an order for four passenger cars, two express cars and four trailers. O. D. Collins, chief engineer, Redlands, Cal.

Camden & Suburban Railway, Camden, N. J., has placed its order for 41 motor cars, mentioned in the Electric Railway Review of June 22. It is reported that The J. G. Brill Company will build them.

Clinton Street Railway, Clinton, Ia., which was reported in the Electric Railway Review of March 2 to be in the market, has ordered two single-truck, semi-convertible Brill cars from the American Car Company. The cars are to be 20 feet 8 inches in length.

Toledo Fostoria & Findlay Railway, Fostoria, O., which was reported to be in the market, in the Electric Railway Review of July 27, has placed an order with the Niles Car & Manufacturing Company for four Pullman interurban cars. The order was placed August 9 and delivery is to be made in January, 1908. The specifications call for the following details:

Seating capacity	Width, over all.....	8 ft. 6 in.
.....50 passengers	Body	Wood
Length, over all.....	Underframe	Steel
.....51 feet		

Special Equipment.

Air brakes	Heating system..	Peter Smith
...Westinghouse automatic	Motors	
Center bearings...Baltimore	...Four Westinghouse 93-A	
Fenders	Trucks	Baldwin
Providence		

SHOPS AND BUILDINGS.

Atlanta (Ga.) Northern Railway.—This company will soon have its station at Atlanta in the new building of the Atlanta Birmingham & Atlantic Railway at Fairlie and Walton streets.

Fresno (Cal.) Traction Company.—This company, which asked for bids for the construction of a car house at Fresno street and California avenue, as reported in the Electric Railway Review of June 29, has refused all the proposals offered and in all probability will have the work done by the day. The building is to be 250 by 257 feet.

Illinois Traction System.—This company, which was reported in the Electric Railway Review of March 9 to have bought property at Decatur, Ill., on which to erect shops, has begun work on the construction of them.

Joliet & Southern Traction Company, Joliet, Ill.—It is reported that this company will erect a \$40,000 station at Joliet and Van Buren streets.

New York & Queens County Railway, Long Island City, N. Y.—This company recently purchased six acres of land on the Flushing Meadows, to be used for the laying out of storage yards and the construction of car houses and repair shops.

Old Colony Street Railway, Boston, Mass.—A 1-story building is being erected by this company in Taunton, Mass., at the rear of its car house, for the accommodation of its express and freight cars. The building will be 115 by 40 feet, of reinforced concrete construction.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—Several different sites for this company's new car houses, previously mentioned in the Electric Railway Review, were recently inspected by the officials and a decision will be made within a few days.

TRADE NOTES.

Westinghouse Air Brake Company, Pittsburg, has established an office at Columbus, O., in charge of D. Hutchins.

Allis-Chalmers Company, Milwaukee, Wis., will hold the annual meeting of its stockholders at Jersey City, N. J., September 5.

Boston & Lockport Block Company has moved its office from 160 Commercial street, Boston, Mass., to 100-102 Condor street, East Boston, Mass.

National Malleable Castings Company, Twenty-sixth and Rockwell streets, Chicago, is contemplating the erection of a 2-story office building at 1 to 15 West Twenty-fifth street.

F. L. Matthews, formerly with the New York sales offices of the Republic Iron & Steel Company, has become assistant sales agent in the Chicago office of the Lackawanna Steel Company.

Curtis Motor Truck Company, Decatur, Ill., whose incorporation was noted in the Electric Railway Review of March 9, will begin work in the near future on the erection of a plant for the manufacture of the Curtis truck.

American General Engineering Company, 253 Broadway, New York, will establish some English and continental agencies. George E. Austin, president of the company, sailed for Europe on August 10 for this purpose.

Kansas City Lock Nut Company, 818 Scarritt building, Kansas City, Mo., will erect and equip buildings at a cost of \$35,000. The buildings will be 90 by 120 feet and devoted to the manufacture of lock nuts and machine nuts.

Jones & Laughlin Steel Company, Pittsburg, Pa., has obtained a permit and is making preparations for the erection of an 8-story brick and steel office building on the site of its present office and warehouse on Ross street.

H. F. Vogel Contracting & Railway Supply Company, St. Louis, Mo., western agent for the Danville Car Company of Danville, Ill., has moved its office and warerooms to 417 Walnut street, where it occupies the entire building.

F. D. Laughlin, formerly vice-president of the Atlantic Brass Company, has been appointed eastern sales manager of the Pittsburg Pneumatic Company of Canton, O., manufacturer of pneumatic tools, with headquarters at 90 West street, New York City, succeeding Glenn B. Harris, recently in charge.

United States Steel Corporation's earnings for the second quarter of the year exceeded by nearly \$4,000,000 the largest earnings of any previous quarter. The net earnings of the United States Steel Corporation for the quarter ending June 30, 1907, were \$45,503,705, as compared with \$41,744,964 earned in the last quarter of 1906, which has been the record holder.

C. Lembcke & Co., 80 Wall street, New York, representatives in America of the Rueping process for treating timber, state that the owners of the process have closed a contract with the Italian government for Rueping treatment of the ties to be used upon the railways of that country. It is estimated that during the first year 1,500,000 ties so treated will be placed in the track.

American Locomotive Company, New York, has recently received an order for 101 four-wheel motor trucks for the Brooklyn Rapid Transit Company. These will be built entirely to designs prepared by the builder and will follow closely the M. C. B. standards, and embody so far as possible the practices of locomotive construction, thereby insuring strength, combined with easy-riding qualities.

Robert Lucas has been appointed assistant purchasing agent of the Jeffrey Manufacturing Company, Columbus, O., to succeed J. V. L. Bonney, resigned. H. S. Van Alyke has become assistant to R. Grosvenor Hutchins, manager of the mining department, succeeding Walter C. Floyd. Mr. Bonney and Mr. Floyd retired from the Jeffrey company in order to devote their entire attention to the new steel castings plant which they have established in Columbus.

Pawling & Harnischfeger, Milwaukee, Wis., are completing a brick and steel addition, 100 by 355 feet, to their main plant. The crane runways and sprinkler system of the main

building will be extended and new machinery will be installed. Enlargement of the power plant will also be necessary and for that purpose the firm has bought an Allis-Corliss compound engine of 150 horsepower, an Allis-Chalmers dynamo of 100 kilowatts and a 400-horsepower Heine boiler fitted with a Hawley down-draft furnace.

Power Specialty Company, 111 Broadway, New York, has recently concluded arrangements whereby it has secured the exclusive sale of Duval metallic packing in this country, Canada and Mexico. It will carry a complete stock of this packing in standard sizes, enabling it to fill orders promptly. This company has just received from the press a new and enlarged catalogue descriptive of the Foster superheater and other steam specialties, including the packing mentioned, copies of which will be forwarded upon request.

ADVERTISING LITERATURE.

Pacific Coast Pole Company, Spokane, Wash.—A neat paper weight, advertising Idaho cedar poles, is being distributed by this company.

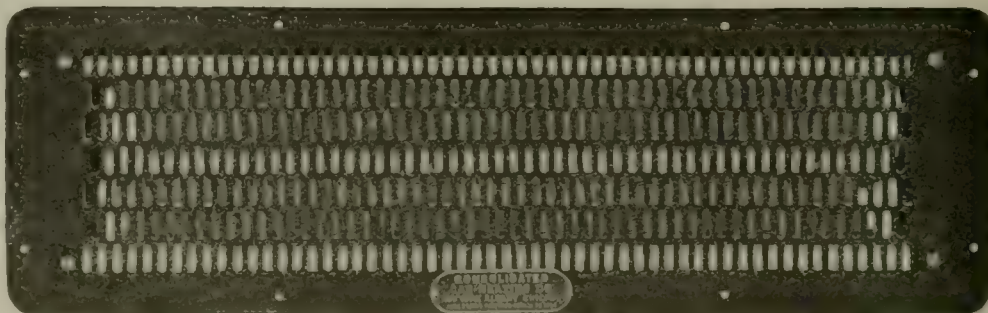
Allis-Chalmers Company, Milwaukee, Wis.—Bulletin No. 1412 is a very complete publication devoted to crushing rolls, the various styles of which are illustrated and described.

Boston Gear Works, Norfolk Downs, Mass.—This concern's 1907 catalogue, just issued, is packed with a great deal of interesting information about gears, chains, sprockets, bearings, etc.

A. S. Cameron Steam Pump Works, New York.—A neat booklet illustrates various phases of the Pennsylvania Railroad tunnels in New York City and particularly the part played by Cameron pumps in their construction.

ELECTRIC HEATER WITH REMOVABLE BACK.

The accompanying cut illustrates a new electric heater of the panel type, recently developed by the Consolidated Car-Heating Company, Chicago. The heater backs are removable, the ends made with openings for metal conduits and fitted with double clamps for holding the conduits. Where desired, each



New Type of Consolidated Heater.

alternate heater is fitted with long lead wires, to reduce the cost of equipping, as it is then necessary to remove the backs from but one-half of the heaters in order to make connections to binding posts.

The heater front is of heavy steel, with openings sufficient for thorough ventilation, but made somewhat narrower than standard openings, to prevent the placing of umbrellas or canes in contact with the heater coils.

This heater has recently been adopted by the following railroads:

	No. of cars.	No. of heaters.
Interborough Rapid Transit Company—		
Manhattan Elevated division	200	4,400
Subway division	50	1,300
New York City Railway	195	3,120
Hudson Companies	50	900

Similar heaters have recently been adopted by:

	No. of cars.	No. of heaters.
Chicago City Railway	300	6,000
Brooklyn Rapid Transit Company	100	600
Consolidated Railway of New Haven	103	1,142
International Railway of Buffalo	49	980
Boston Elevated Railway	29	174

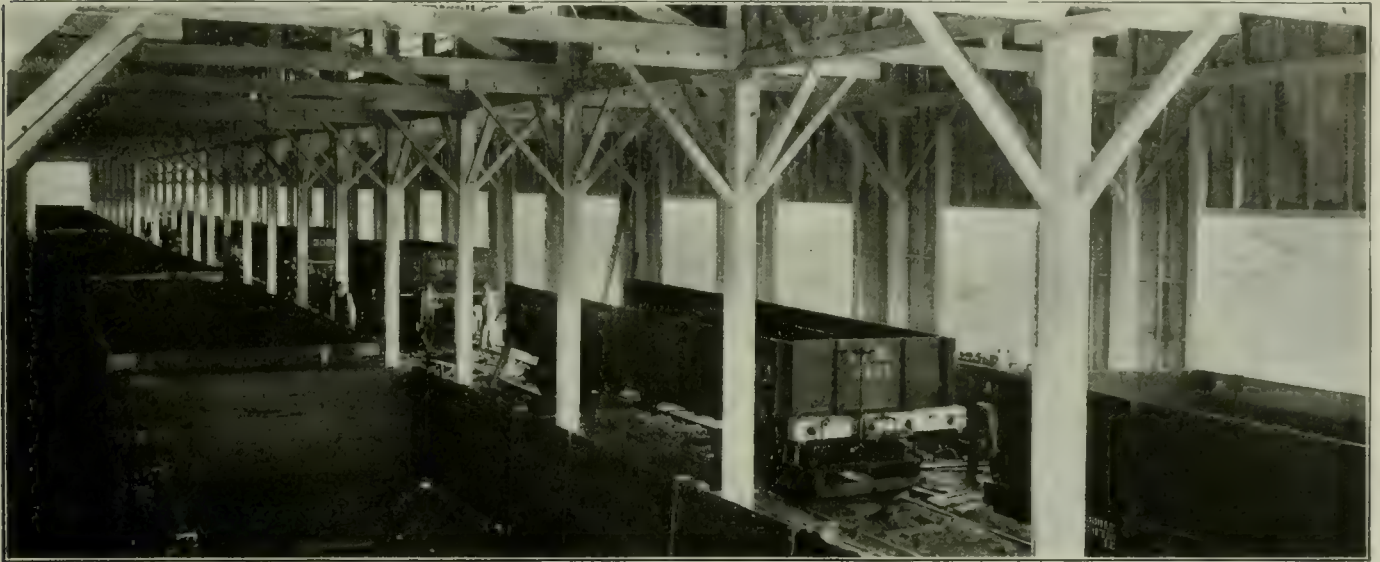
This company now has in various stages of manufacture more than 20,000 electric heaters, which number surpasses all its previous records for this season of the year.

PROGRESS OF THE DANVILLE CAR COMPANY.

In the Electric Railway Review for April 6, 1907, page 478, announcement was made that the new plant of the Danville Car Company at Danville, Ill., was nearing completion. The shop facilities of this company are now in an operative

while time has not permitted the perfecting of all operating details in the shops, yet facilities are available and being utilized for handling a complimentary amount of new work.

Accompanying halftone illustrations will serve to show the general appearance of the plant and some of its individual shops. Before beginning construction the company



Danville Car Company—Freight Car Shop.



Danville Car Company—General View of Plant.



Danville Car Company—Blacksmith Shop.

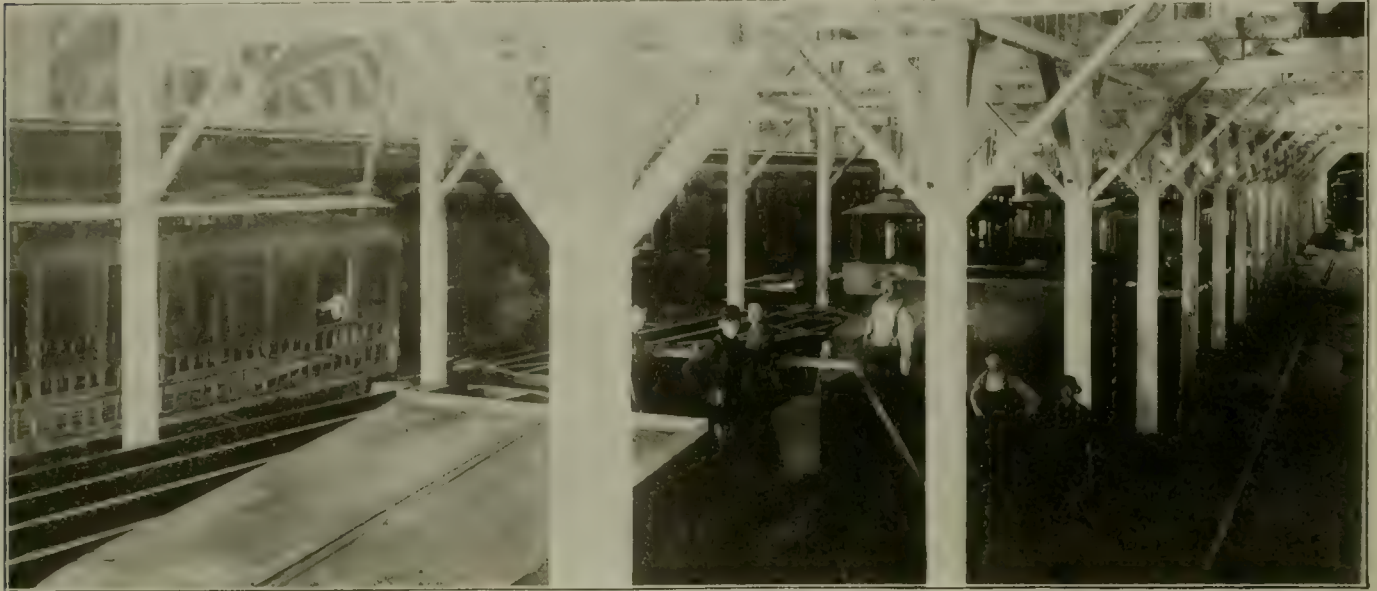
condition, as is evidenced by the statement that already the plant has repaired 115 freight cars, several passenger cars and is now, among other orders, completing six 40-ton steel locomotives for the Illinois Traction System. Orders are also booked for the construction at this plant of 130 new passenger and freight equipments. It is thus seen that

purchased 250 acres of land. Fifty acres were reserved for the use of the plant, 80 acres were sold in individual lots and there are still quite a number of acres left to dispose of, the proceeds from all of which go toward the development of the plant.

Ground was broken for the plant on November 17, 1906.

Since then the buildings, which provide for 10 distinct departments and cover 160,000 square feet, have been erected. The machinery is now installed, each tool being individually driven by an induction motor. The buildings include an erecting shop, 150 by 320 feet; freight car shop, 90 by 320 feet; wood working department, 60 by 180 feet; cabinet shop, 60 by 120 feet; varnish and trimming room, 60 by 120 feet; power house,

The president and general manager of the Danville Car Company is H. F. Vogel, who about a year ago severed his connection with the St. Louis Car Company as vice-president and general manager. Mr. Vogel has associated with him E. H. Gorse, formerly secretary of the Missouri Lincoln Trust Company, of St. Louis, who holds the office of secretary and treasurer. W. L. Primm, formerly general manager of the

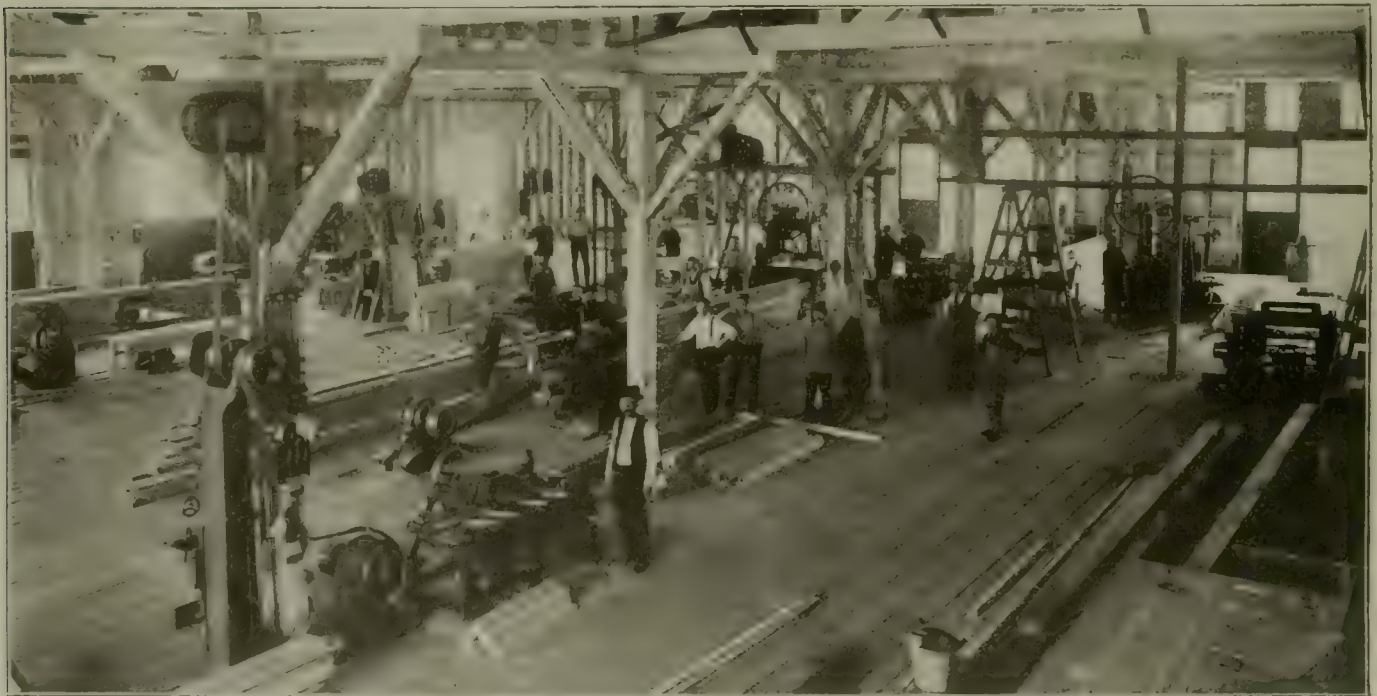


Danville Car Company—Erecting Shop.

60 by 120 feet; blacksmith shop, which is entirely of steel construction, 82 by 120 feet; dry kilns, 18 by 160 feet; office building, 130 by 120 feet; truck and machine shops, 120 by 120 feet.

The plant, which is located on the outskirts of Danville, is connected with the tracks of the Wabash, Cleveland Cincinnati Chicago & St. Louis, and of the interurban lines of

Merchants' Association of St. Louis, is purchasing agent and auditor, and E. J. Lawless, formerly with the American Car Company and the John Stephenson Car Company, is general sales agent; G. A. Moffat, formerly with the Philadelphia Traction Company and the Metropolitan Street Railway Company of New York, is general superintendent. The other mem-



Danville Car Company—Mill Shop.

the Illinois Traction System. Particular attention will be paid to the construction of cars for interurban electric lines. The equipment installed makes it also possible to build cars for steam lines, and attention will be paid to this feature of the car building business, as well as to the construction of trucks and freight cars, and particularly to the repair of steel cars.

bers of the operating staff are equally well known as successful men in their respective departments.

An insurance company obtained a verdict in New York City against a central-station company for loss sustained by a fire said to be due to negligent wiring, and the verdict has quite recently been affirmed by the supreme court of the state.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 8

CHICAGO, AUGUST 24, 1907

WHOLE No. 226

TABLE OF CONTENTS.

Editorial:		Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	230
—"Don'ts" for Substation Operators.....	211	News of the Week:	
—New York City Abandons a Luxury.....	211	—Suggested Changes in Chicago Elevated Loop.....	231
—A Reproach to the City of San Francisco.....	211	—Minneapolis Low-Fare Case Argued	231
—Signals for Following Section.....	212	—Truce in Cleveland Low-Fare Controversy.....	231
—Liquid Fuel	212	—Appeal Granted in Chicago Decree.....	231
—The New Franchise in Philadelphia.....	212	—Fined for Failure to Provide Fenders.....	231
The Atlantic Shore Line Railway (Illustrated).....	214	*Construction News:	
Shop Management	219	—Franchises	233
Wilson Avenue Terminus of the Northwestern Elevated Railroad, Chicago (Illustrated)	220	—Recent Incorporations	234
The Joplin & Pittsburg Railway.....	221	—Track and Roadway	234
Trail Car Operation in Paducah (Illustrated)	221	—Power Houses and Substations	236
Don'ts and Questions for Substation Operators.....	221	Personal Mention	236
Mechanical and Electrical Drafting Room Records, Pacific Electric Railway (Illustrated)	223	Financial News	237
Reinforced Concrete Structures on the Kansas City Outer Belt & Electric Railroad. By W. W. Colpitts (Illustrated)...	225	—Electric Railway Earnings	237
A Simple Commutator Press (Illustrated)	227	Manufactures and Supplies:	
Investigation of New York Transportation Facilities.....	228	—Rolling Stock	238
Piping and Power Station Systems—L. By W. L. Morris, M. E. (Illustrated)	228	—Shops and Buildings	238
		—Trade Notes	238
		—Advertising Literature	240
		An Improved Stage Pocket (Illustrated)	240

In another part of this issue of the Electric Railway Review will be found a list of "don'ts" and questions which should be read by substation operators. There is a tendency for men employed in this class of work to get into a rut. They are usually located at more or less remote points and the necessarily long hours and usual seven

days per week allow but little time for the substation operators to find out what is taking place in the electrical world about them. By reading and study operators may learn how to take charge of other apparatus than the types which they happen to be operating. A thoughtful reading of these "don'ts" and questions should show operators where their knowledge of substation practice and apparatus is deficient. Then by study of one of the more simple books on electrical subjects operators may ascertain the reasons for any peculiarities of construction or arrangement in the apparatus under their charge. Men who continually handle electrical machinery will learn very rapidly from observation if they will supplement their observation with study. While the opportunities for advancement of substation operators are not so good as those of central station operators, there is no reason why substation men cannot become railway electricians if they have sufficient energy and ambition to keep out of the rut.

The luxury of a municipal electric lighting plant has been abandoned by New York City. After experiments in illuminating Williamsburg bridge, the city has discontinued the use of the plant for the purpose of generating power, and, by advertisement in the City Record, has asked for bids for lighting the bridge. Through this advertisement it is disclosed that the city has not been developing power at the plant for the last six months. The New York Edison Company is said to be lighting the bridge at a cost of about \$25,000 annually, while the expense to the experimental municipal plant is believed to have been double that amount. The history of this plant is the old story of too much promise without fulfillment. The reason assigned by the city authorities for their

recent action is that the street refuse burned too slowly and that the cost of providing the light was too high. When the incinerator was established the city officials estimated that the cost of operation would be \$45.22 a day and that the net saving to the city would be about \$30,000 a year. The plant will be continued in use as an incinerator. Facts showing the failure of municipal enterprises may not be the fiber of which some political platforms are made, but they are extremely important in any fair consideration of the municipal ownership question. On account of willful or ignorant failure to provide for depreciation, many municipal enterprises begin their mistaken careers with an unjustified showing of profits, which are heralded far and wide as triumphant examples of successful municipal ownership, and there is always danger that the inevitable sequels of disaster may never be freely announced, because the facts are so disagreeable to the public ownership enthusiasts.

In the San Francisco Chronicle of August 14 an editorial is published which calls attention to an unappreciated feature of the recent strike situation affecting the United Railroads of San Francisco. From letters which the Chronicle has received from union members, both men and women, it reaches the conclusion that much further persecution of persons who ride on the cars is likely to prove more dangerous to unionism than to the railroad company. It adds that the letters of some of the working girls are pitiful. On account of a fear of revenge that is a reproach to the city which owes them protection, the girls and women have felt that they were compelled for three months past to walk to their homes or to ride in uncomfortable wagons at 10-cent fares. If they ride on the cars they risk losing their positions. If they walk or take the wagons which cover irregular routes, "they break down from overwork; and their doctor bills are not paid from any strike fund." The Chronicle has a signed letter from one girl giving the name of a firm which discharged four girls because the union spies reported them as riding to their homes on the cars. It is not a happy picture which is thus presented. In its union affiliations and sympathies San Francisco is unique among the large cities

of the country. The Chronicle says that the public at large has no sympathy whatever for the corporation or its officers and that people ride in cars solely for their own convenience, although the editorial adds that it seems to be considered by all that the strike was unjustifiable at the time. We believe that the attitude of the company with respect to this strike has been without a flaw and that it not only deserves no censure for the course which it has followed, but that it is worthy of the fullest support. Its officers have made a praiseworthy effort at this juncture to resist exorbitant and unjustified demands and to maintain a public service of which the city was in absolute need. These facts should be recognized.

A good plan for safeguarding car movements on single-track interurban roads, where the junction of lines makes it necessary for a dispatcher to run two or more cars as sections on one schedule, is that adopted by the Atlantic Shore Line Railway. This line, as stated in our article in this issue, displays a sign reading "Car Following" on the rear of all cars when one or more cars are behind. In addition, both members of the crew of each car must notify the members of the passing crew as to the condition of the line by the words "Car Following" or "Clear Line." In one instance it happened that the crews of one car called "Clear Line," while displaying a sign reading "Car Following"; but the passengers of the car, remembering that there was a car behind them, arose in a body to correct the mistake, as did also some of the passengers on the passing car, who had observed the "Car Following" sign. The car was thus prevented from proceeding into an occupied block. Under the system followed the patrons of the line become thoroughly familiar with the position of cars and are ready at all times to correct any slip of this nature on the part of the crew.

LIQUID FUEL.

After years of experimenting many of the difficulties first encountered in burning oil have been overcome, and most of the largest plants recently constructed in California and other western states are now equipped with oil-burning apparatus. An example of such an installation, the Georgetown power house of the Seattle Electric Company, was recently presented in the Electric Railway Review. Though it is usual to fit the boilers with grates and provide coal bunkers and coal and ash handling machinery as a provision against possible failure of the oil supply or increase in the price, the question of the cost and the probable available supply of oil is of great importance. The oil supply of the United States, and especially of the western oil fields, is only partially known. No doubt new oil fields will be discovered and opened, thus constantly increasing the available supply so that an ample supply of oil for the plants now constructed, and many more, will probably be available at a sufficiently low price for some time to come.

This economical side of the fuel oil question was very thoroughly investigated by the United States bureau of steam engineering about six years ago, when it was conducting fuel oil tests with a view to adopting liquid fuel for use in the navy. At that time the government experts decided that if all the vessels of the United States navy were to burn oil the available supply would be materially reduced and the cost greatly increased. For this reason, and because of the dangers accompanying the use of liquid fuel, it was decided that it was not advisable to adopt oil for fuel except for torpedo boats, destroyers and possibly a few of the dispatch boats.

It may therefore be asked whether, in spite of the cheapness of oil fuel at present, it is advisable to install oil-burning apparatus in plants under construction, for, in addition

to the cost of the oil, the interest on the coal bunkers and coal and ash handling machinery held for emergency purposes must be considered. There are many advantages attending the use of oil which make it a very attractive fuel even at a slightly higher cost than coal. Liquid fuel presents the most perfect and most simple solution of the mechanical stoking problem, requires about one-fourth the boiler room force, can almost instantaneously be regulated to meet an increase or decrease in the demand for steam, is capable of smokeless combustion, permits extreme forcing of the boilers and eliminates all stand-by losses.

The feature of instantaneous control of the fire suggests the consideration of an auxiliary oil-burning system in power houses where coal is used, employing the oil burners to meet sudden demands for steam during peak loads. This would considerably decrease the smoke nuisance and avoid working up thick fires during peak loads, which causes a loss when the load decreases. Its use would also save considerable coal used for banked fires held for the peak load. Further, the efficiency of the oil-burning apparatus would be considerably higher than that of the grates, when the boilers are being forced, for a thick fire worked up rapidly gives very poor economy.

THE NEW FRANCHISE IN PHILADELPHIA.

In the brief agreement which attests the franchise relations which were entered into on July 1, 1907, between the city of Philadelphia and the Philadelphia Rapid Transit Company, it is stated that "a large sum of money is required to improve, complete and extend the present system of the company in order that it shall better serve the public." For this purpose it is declared to be "essential that the position of the company be clearly defined, and the securities of itself and its underlying properties unquestioned, and its right to make extensions in the future assured, in order that it may obtain credit to finance the increased transit facilities so necessary for the welfare of the public and the development of the city."

This contract is the direct result of conditions which had seriously disturbed the credit of the company. Some of its franchises were in question and it was unable to borrow money on favorable terms in order to provide additional facilities which were needed. The company was harassed by the authorities and the public, and the only peaceable solution seemed to be an entirely new franchise arrangement. The settlement that was made is due to the efforts of the Retail Merchants' Association of Philadelphia, which suggested in January last the basis for a new contract. With minor changes the terms recommended to both the company and the city by this organization of business men are embodied in the signed agreement.

As the annual report for the fiscal year ended June 30, 1907, has not yet been issued, the provisions of the arrangement cannot be discussed now in the light of the most recent operations, upon which the company must have based its negotiations; but earnings of the past years afford a substantial foundation for review of the conditions of the contract.

To assure a clear understanding of the situation the terms of the agreement so far as they relate to the finances of the company may be restated. Apart from the clause which gives the city the right to purchase the property, leaseholds and franchises of the company on July 1, 1957, or thereafter by payment of \$30,000,000 (representing the par value of the stock), plus an additional amount represented by other stock issued with the consent of the city, the most important feature is that which prescribes a conditional division of profits with the city. The company may pay dividends of 6 per cent per annum on its actual cash capital, cumulative from January 1, 1907, but shall not pay larger dividends without appropriating from earnings at the same time and paying to the city a sum equal to that portion of

the total dividend which is in excess of 6 per cent per annum. A sinking fund under the control and in the custody of the city shall be established by the company with payments as follows: For 10 years from July, 1912, monthly, \$10,000; for the ensuing 10 years, monthly, \$15,000; for 10 years, monthly, \$20,000; for 10 years, monthly, \$25,000; for the rest of the term, monthly, \$30,000. This term will extend for 50 years from July 1, 1907, or longer if the city does not avail itself of the option of purchase at the end of that period. The sinking fund payments are to be treated as fixed charges. The city reserves the right at any time after the fund may have reached \$5,000,000 to require by ordinance that it shall be paid over to the city treasury and become the absolute property of the city, and that further payments toward such fund shall thereafter be paid directly to the city treasury.

In addition to these payments the company shall pay into the city treasury each year for the 10 years beginning on July 1, 1907, the sum of \$500,000; then for 10 years, \$550,000 annually; then for 10 years, \$600,000 annually; then for 10 years, \$650,000 a year; and for the fifth term of 10 years, \$700,000 a year. These payments are to be in lieu of payments by the company and its subsidiary companies for paving, repaving and repairing of streets occupied by surface lines, and of the obligations respecting the removal of snow and of all license fees on cars. Such payments prohibit the city from imposing similar charges in the future; but if additional streets are occupied by surface extensions there shall be added to the yearly sum seven cents per square yard of macadam pavement, eight cents per square yard of asphalt pavement and six cents per square yard of other pavement for the streets so used. There shall be a corresponding reduction for abandoned streets. The payments do not relieve the company or its subsidiaries from taxation on real estate or dividends, but the city shall credit upon the taxes and assessments that may be imposed upon other than real estate or dividends all payments made under this clause as well as the sums which may be paid to the city as a division of surplus earnings.

As affecting the gross revenue of the company it is important to note that present rates of fare may be changed only with the consent of both parties thereto. Under the contract it is clear that the city will have an equal interest with the company in building extensions which will develop new sources of traffic, for only through increased revenue, both gross and net, can dividends to stockholders or division of surplus profits with the city be assured. From the fiscal year ended June 30, 1903, to the year ended June 30, 1906, gross revenue from all sources increased from \$15,436,574 to \$17,676,249, a total of \$2,239,675, or 14.5 per cent. The gain is equivalent to 4.8 per cent, average, each year. During the same period operating expenses increased from \$7,234,893 to \$9,153,604, or \$1,918,711, equivalent to 26.5 per cent, or an average of 8.8 per cent per year. This left for net revenue \$8,201,681 in the earlier year and \$8,522,645 in the latter year, an increase of \$320,965 or 3.9 per cent, being an average of 1.3 per cent each year. As taxes and payments for licenses, however, increased from \$990,702 to \$1,075,216, and interest, rentals and other expenses from \$6,805,090 to \$7,143,432, the final income applicable to dividends was reduced from \$405,889 in the fiscal year 1902-1903 to \$303,997 in the year 1905-1906.

Assuming that the final results of operation in the fiscal year ended June 30, 1907, will not be materially different from those for the preceding 12 months, shown in the foregoing, it is probable that beginning with the current year, owing to the opening of the Market street elevated road and the investment of new capital which will be received from the recent assessment on the capital stock, gross revenue will be increased in greater proportion than the average normal increase in recent years. It may be assumed that the Market street elevated will do more than yield sufficient revenue to pay operating expenses, interest on the capital investment,

and the expense of maintenance. This new road will be of especial value in relieving the prevailing congestion, and the expectation that the elevated line will result in more satisfactory collection of fares during rush hours should be realized. Interests connected with the company have felt that revenue has been lost by reason of the inability of conductors to collect fares during the rush hours.

The company has five years from the execution of the agreement until July 1, 1912, the date on which the city sinking fund requirements will begin to accrue at the rate of \$120,000 a year. In that period the investment of the \$9,000,000 to be received from the stock, plus such additional amount as may be authorized, the growth of the city in districts which are not so densely populated, and improvements in operating methods or saving in expenses by other legitimate means, must be depended upon to yield a balance for dividends on the stock. It is likely that the requirements as to taxes and license fees will not be far from the proportional cost of these expenses in other recent years. If maintenance expenditures have been adequate, covering depreciation as well as wear and tear, the company, to earn 6 per cent on the \$25,500,000 stock which will be outstanding from September 9 to the end of the current fiscal year, must have a surplus above charges, expenses, etc., of \$1,530,000. On the full \$30,000,000 stock which will be outstanding after September 7, 1908, the dividend requirements of 6 per cent, the maximum amount possible before division with the city, will be \$1,800,000. As the earnings applicable to the stock in the fiscal year 1905-1906 were only slightly over \$300,000, it is plain from the figures presented that material increases in both gross and net revenue must be effected before there can be more than a small return for shareholders.

The effect of the clause which provides for sinking fund payments is to place the city in a position to acquire the valuable plant of the Philadelphia Rapid Transit Company by an expenditure but little, if any, in excess of the funds which are to be received from this corporation during the term of its franchise. The sinking fund payments, if invested semi-annually at 3 per cent interest per annum and allowed, with the interest, to accumulate, will amount, when the city may exercise the right to purchase, to \$23,400,000. The requirements as to investment of the funds are not rigid, however, and if no losses of principal are sustained, the actual accruals should be at a greater rate of interest than 3 per cent per annum. Except that the stock of the company may be purchased at not over par and the bonds and underlying securities on a 4 per cent income basis, the funds may be invested only in securities which are legal investments for trustees. The provision that the city may appropriate the sinking fund for other uses at any time after the total reaches \$5,000,000 is a loophole through which the sinking fund payments may be dissipated and the opportunity of purchase lost. The contract continues until the right of purchase is exercised, and the conditions affecting the disposition of the sinking fund indicate the confidence of the representatives of the company that the ownership of this large surplus will be a temptation to extravagant appropriations for general purposes which future city officials will not resist, and that the sinking fund payments may in fact be regarded as a rental.

Subway for Buenos Aires.

It is reported that the municipal commissioners of Buenos Aires have approved of a plan for the construction of a network of underground railways. Tenders for construction will be invited in the home and foreign newspapers, during six months, which may be accompanied by the presentation of independent tenders for exploitation over a period of not exceeding 25 years. Tenders must specify mode of payment required. The estimated cost of the whole network of lines, which will have a length of 101 kilometers, is \$2,700,000 Argentinean paper currency (\$1,188,000 United States gold).

THE ATLANTIC SHORE LINE RAILWAY.

The recent opening by the Atlantic Shore Line Railway of a new electric railway connecting York Beach, Cape Neddick, Bald Head, Ogunquit, Webhannet, Wells Beach, Elms and Kennebunk, 16½ miles, united the western and eastern divisions of this system, and established the connection necessary to make possible a through trolley trip from New York City to Lewiston and Bath, Me., by way of Boston and Portsmouth, a distance, roughly, of 300 miles.

History and General Character.

The western division of the Atlantic Shore Line Railway was formed by the consolidation of the Portsmouth Kittery & York, Berwick Eliot & York and the Kittery & Eliot Street railways as the Portsmouth Dover & York Street Railway. The eastern division was a union of the Sanford & Cape Porpoise and the Mousam River railways. Both divisions were taken over by the present company and were operated as separate divisions until the completion of the present new connection, which is being effectively advertised by the company as the "missing link."

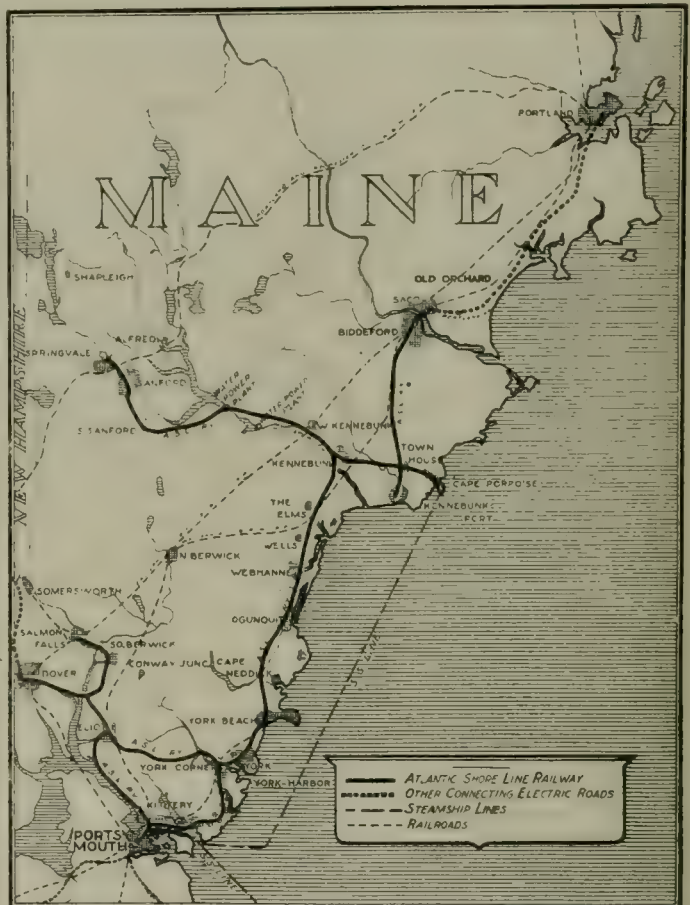
The total length of the line, including the new link, is 97 miles, or 100 miles including spurs and sidings. This is a standard-gauge, single-track line, with regular turnouts, with telephone booths every 15 minutes apart on the entire system, and extra turnouts for late cars every 7½ minutes between Portsmouth and Kennebunk. Power is secured from a variety of sources, controlled by the company or by A. H. Bickmore & Co., bankers, New York City, the principal interest controlling the road.

The construction work on the new line between York Beach and Kennebunk is of excellent and substantial character, and is designed for high-speed operation. The line runs for a greater part of the distance on private right of way, 66 feet 8 inches wide, which begins at a point between York Beach and Cape Neddick. The road necessarily returns to the side of the highway at Ogunquit and continues thence to Kennebunk, six miles.

Roadbed, Bridges, Etc.

The roadbed is of gravel and well designed for drainage. In instances where rock was encountered in the cuts this has been used on the fill and for ballast. As the country is

It will be noted that the slope of the subgrade begins at a point 7 feet from the center line of the track. The depth of the ballast at the center of the track, from the top of the



Atlantic Shore Line Railway—Map of Line and Connections.

tie, is 14 inches, and it slopes from the rail to a point 1 foot from the slope of the subgrade. The ties are mainly of chest-



Atlantic Shore Line Railway—Fill and Concrete Abutments.

quite rolling excessive cuts were not attempted, and the company has a number of long grades on the private right of way section, the maximum grade being 4 per cent, as well as two or three 4-degree curves.

nut and cedar, 8 feet long, with 6-inch face, spaced 2 feet apart on centers, but oak ties are used on some of the curves.

The track is laid with 80-pound T-rail of 33-foot lengths, joined with angle joints and American Steel & Wire Com-

pany's riveted copper bonds under the fishplates, where they cannot be seen or stolen, and is cross bonded with No. 0000 flexible special bonds.

Concrete has been employed for bridge abutments, and there are two or three instances where gullies of considerable depth, bridged by short spans, required a large amount of concrete. Over these the track is carried on built-up steel girders 2 feet 9 inches deep, supporting hard pine ties $9\frac{1}{2}$ feet long, spaced 18 inches on centers. The ties are bolted through the top flanges of the girder and are held by 8-inch hard pine guard timbers.

The principal bridge is over the Cape Neddick river channel, and is 600 feet long. The bents for this bridge are 14 feet apart and consist of four live oak piles, rigidly cross braced and battened and capped with 12 by 12 inch timbers, supporting 8 by 14 inch stringers, two on a side. These carry 10-foot cross timbers of 8-inch face, spaced 18 inches apart, carrying the rails.

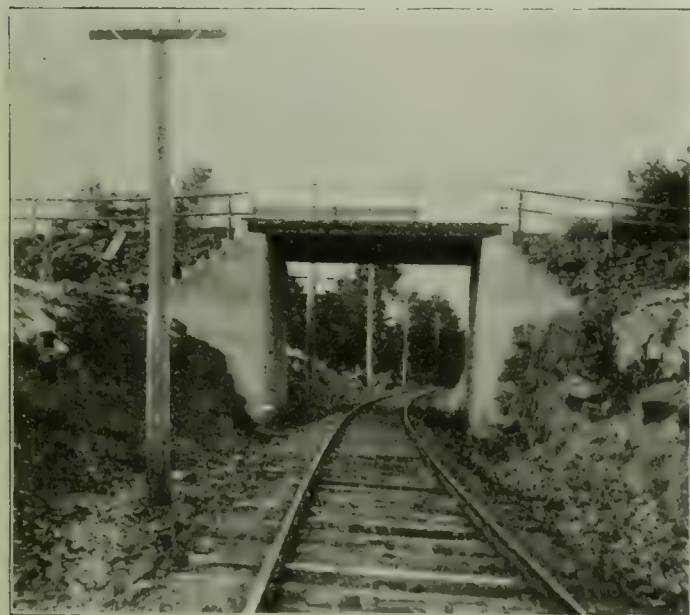
The bridge guards are 8 by 8 inch timbers, bolted to every fourth tie with $\frac{3}{4}$ -inch bolts. The poles supporting the trolley brackets are set on piling and the two halved together to allow the poles and piling to be bolted together through heavy batten timbers. The cap timber on every seventh bent is extended to face against a pole, and to these the poles are tied by 2 by $\frac{1}{2}$ inch iron straps bolted through the cap timbers. The poles on the bridge structure are guyed to each other by cross wires reaching from top to bottom.

Center guard rails of 80-pound section, joined at both ends by cast-iron heads, are used on the bridges.

Where stone was available cattle passes have been constructed of stone and masonry, while 18-inch tile, properly skewed, was used in some places instead of concrete for culverts where the drainage water to be taken care of was not of great amount. The right of way is fenced with 9-wire American Wire fencing, equipped with iron gates at roadways.

Pole Construction.

The poles are 35 feet long where required to support high-



Atlantic Shore Line Railway—Track Under Highway.

tension lines, and 30 to 33 feet long elsewhere, with butts 6 feet 6 inches in the ground. Every pole is firmly anchored by guys extending 6 feet 6 inches into the ground, Stombaugh guys being used wherever the soil is soft. In rock anchor bolts are employed, and about 850 of these were required. To prevent any escape of current through the guy wires they are insulated with wooden insulators.

The poles are placed 100 feet apart. On tangents the

poles support Frank Ridlon Company trolley brackets fitted with a special clamp around the bracket, instead of a screw to carry the bracket messenger wire. The trolley is supported 18 feet above the top of the rail.

On certain sections of the line the poles now carry one three-phase 10,000-volt circuit, and will later be called upon to carry an additional circuit of the same kind. Two crossarms are therefore provided for this purpose, one being 5 feet $3\frac{3}{4}$



Atlantic Shore Line Railway—Reverse Curve Under Boston & Maine Railroad.

inches long, and the lower 7 feet $2\frac{1}{4}$ inches long and placed 1 foot 6 inches apart. The direct-current feeder wire is carried on a crossarm of the same length as the shorter one mentioned, placed 3 feet 4 inches below the lower transmission crossarm, and two telephone circuits are carried on a crossarm of the same length, 3 feet 4 inches below this. At curves and turnouts the trolley wire is supported by wood-insulated span wires, the wires reaching from the regular poles to anchored poles on the other side of the track.

Power Equipment.

For operating reasons the feeder lines for both the eastern and western divisions and the new line are tied together with section insulators and switches at all junction and convenient points, and a consideration of the power for the new section requires a brief review of all the power sources.

The main power station of the western division is located at Kittery Point. This is a direct-current station, equipped as follows: One 250-horsepower Ball & Wood tandem compound engine, belted to a 225-kilowatt G. E. generator; one Ball & Wood tandem compound engine of 150 horsepower, belted to a 110-kilowatt G. E. generator; and one Erie City engine operating a 225-kilowatt G. E. generator.

At Dover is located the power plant of the National Light Heat & Power Company, controlled by A. H. Bickmore & Co. This supplies light and power for Dover and vicinity, and alternating current to the substations of the Atlantic Shore Line at South Berwick and York, delivering current at 3,400 volts to the former and 10,000 volts to the latter.

The station at South Berwick is equipped with a G. E. motor-generator set of 200-kilowatt capacity and a storage battery of 278 cells.

At York corner the substation is equipped with a Westinghouse 200-kilowatt rotary converter and transformers. At the York Beach car barn is located a 220-cell battery, put in by the Electric Storage Battery Company.

On the eastern division the power facilities consist of a

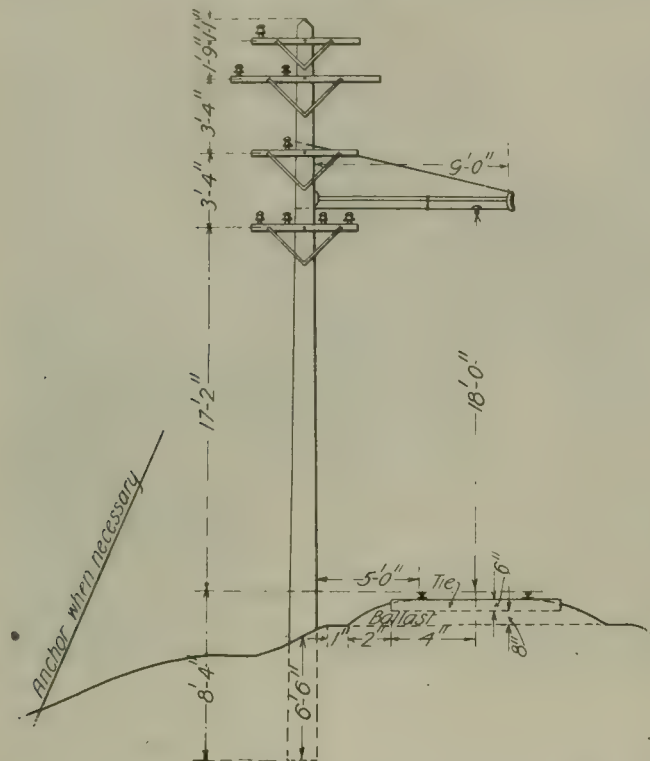
water power station at Old Falls, equipped with an S. Morgan Smith turbine, operated at a 60-foot head and direct connected to two 500-kilowatt alternating-current Westinghouse generators. In this station there is also a 500-kilowatt Westinghouse rotary converter. There was also a storage battery of 244 cells at Sanford, but this has been removed to Old Falls,

and the Mousam rivers at Old Falls. This dam, which is illustrated, is 850 feet long and 38 feet high, and the reservoir provided is three-quarters of a mile wide and five and a half miles long.

The station is a brick building 30 feet square, with a frame addition to house two 8-foot penstocks. This station contains two 500-horsepower Victor turbines, direct connected to two 300-kilowatt three-phase 60-cycle generators, producing current at 2,200 volts. Regulation is secured by the use of two improved Lombard governors. Step-up Westinghouse transformers are employed to secure 10,000 volts for the transmission lines.

Substations.

A high-tension circuit from this station is carried to Sanford, where the current is stepped down in a transformer station for the use of the Sanford mills, a large manufacturing establishment. At Sanford the current is stepped down to 400 volts for a 250-kilowatt Westinghouse rotary converter. From the new dam power station and the old plant at Old Falls three 10,000-volt 60-cycle three-phase circuits are carried on pole lines to a point near West Kennebunk. One line then proceeds to the substation at Town House, and in order to avoid the village of Kennebunk and to save distance the other two circuits are carried across country on an independent line



Atlantic Shore Line Railway—Standard Construction.

where it floats on the line. There is a 300-kilowatt steam plant at Kennebunkport, now used as an auxiliary plant.

Old Falls Power Station.

In order to provide additional power for the operation of



Atlantic Shore Line Railway—Crossing.

to a point near Elms, where a portable substation will be located. One line serves the portable substation and the other the substation at Ogunquit. This substation is equipped with one G. E. 300-kilowatt rotary converter and three transformers. The substation at Town House is equipped with a 300-kilowatt Westinghouse rotary converter and a Westinghouse type C induction motor. A new 300-kilowatt rotary will also be placed at Kennebunkport.

Portable Substation.

A portable substation will be placed for the present at a point near Elms. This station consists of a G. E. 200-kilowatt rotary converter and a transformer placed in an ordinary box car. In order to relieve the car springs and to keep the rotary, which has a speed of 1,200 revolutions, on a firm basis a jack is placed under each corner of the car.

Trolley and Feeder Wires.

The trolley wire on the new line will be No. 0000 copper and the feeders No. 000 and 0000 copper with No. 0 taps every



Atlantic Shore Line Railway—Typical Curve Construction.

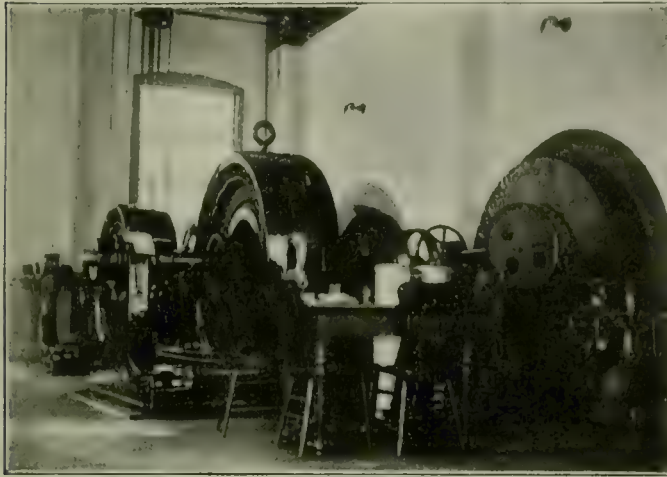
the new line and the operation of the system as a unified whole, as well as to take advantage of the opportunity to sell power to the manufacturing establishments at Sanford, the company erected a new dam to hold the waters of the Alfred

1,500 feet. The No. 0000 feeder and No. 00 trolley is used on the other parts of the system. Lightning arresters of the Garton-Daniels and General Electric types are placed every half mile and are giving good service.

Signals.

The present system of signals on the Atlantic Shore Line system consists of three block sets installed by the U. S. Electric Signal Company, and two spacing sets for the protection of cars at bad curves. One block protects the common terminal track leading to the Portsmouth ferry and another is located at York. The two spacing sets are also on the western division. On the eastern division there are two sets of Eureka automatic signals in operation.

On the new line block signals are installed at Kennebunk.



Atlantic Shore Line Railway—Interior of Old Falls Power Station.

The new block set is furnished by the Eureka Automatic Signal Company of Tamaqua, Pa. This set consists of two 12-inch disc semaphore signals at the entrance to the block. They are placed one above the other, each having two lights behind it for night operation, and a red semaphore blade for daytime indication. The normal position of the upper or dis-

"go ahead" signal before the car can proceed, making more remote the possibility of a car proceeding against a red signal which has changed to danger. It is declared to be impossible with this system for two cars to enter a block at the same time from opposite ends. To prevent an accident the system provides an intermediate signal in the middle of the block which under conditions of safety shows green, but which shows red if a car has entered the block from the opposite end. In this case the crew first reaching the intermediate signal will proceed with caution or wait a certain number of minutes according to the rules. Another feature of the signals is that in case of any accident to the apparatus



Atlantic Shore Line Railway—Exterior of Ogunquit Substation.

the signals will drop by gravity to danger. The rules provide that if the signals do not operate the crew must proceed under dispatcher's orders.

Dispatching System.

The new line will be included in the western division so



Atlantic Shore Line Railway—Dam and Old Falls Power Station.

tant signal is danger. If the block ahead is occupied both signals will show red. If unoccupied the upper or distant signal will show red, but the red blade behind this signal will fall to clear when the car entering the block has crossed a contact on its approach. The conductor must then give a

far as the dispatching is concerned, and the dispatcher for this division is located at Kittery Point, while the dispatching for the eastern division is located at Kennebunk. Each division has a local telephone circuit and there is a second independent through circuit to enable the dispatchers to communicate with

each other. Train crews are required to report to the dispatcher at the telephone booths located at turnouts when they are five minutes behind time. The motorman receives the dispatcher's orders and repeats them to the conductor, who in turn repeats to the dispatcher and receives his O. K. The dispatcher works with a progress board and pegs to indicate the position of all cars on the division. The "car following" practice is employed on this system when necessary to run cars as sections of trains, and the practice has been safeguarded by rigid rules. Every car operated as a



Atlantic Shore Line Railway—Combination Car.

train section must display a sign on the back reading "car following" if there are cars behind. This serves as a notice to the passengers waiting to take a car that another car is coming. When cars pass at turnouts the rules of the company provide that both the motorman and conductor shall call to the motorman and to the conductor of the passing car either "clear line" or "car following."

The attendants at all substations act as car starters and deliver the dispatcher's orders in writing to the crews, giving one copy to the conductor and one to the motorman.

Traffic.

With respect to traffic the system may be considered as three separate divisions. The western division, serving Portsmouth, Kittery, York and York Beach, Eliot, Dover and South Berwick, divides with the Boston & Maine the passenger traffic between these points, and, during the summer months at least carries the bulk of the business. Portsmouth, the only seaport in New Hampshire, is a city of 10,000 inhabitants, and Dover



Atlantic Shore Line Railway—Locomotive and Freight Car.

is still larger, while the small towns reached by the western division are permanent communities which provide traffic all the year round. During the vacation season the traffic from Dover and Portsmouth to Long Beach, York Beach and the hotels and resorts all along the coast above York Harbor is very heavy. The Portsmouth terminus of the division is on the main side of the Piscataqua river, but the company owns ample dockage facilities and transfers passengers by ferry. During the summer a ferry capable of carrying 500 persons is operated, but in winter a boat of half that capacity is used.

In order to encourage local movement, band concert parks are maintained at one or two points within easy reach of Portsmouth, Dover and York. Freight traffic on this division has not been developed to a very great extent, but it is intended to build up this branch of the business still more.

The eastern division serves the resorts at Kennebunkport and Cape Porpoise, and at the latter point the company maintains a casino, containing a dancing hall and a large public dining-room on the first floor and two private dining-rooms on the second floor. The company also maintains a park on its line at Old Falls for picnics, concerts and celebrations.

Particular attention is given on this division to freight traffic, which is fully as important as the passenger traffic. Two large mills are located at Sanford, namely, the Sanford Mills, and the Goodall Worsted Company, employing about 5,000 men. All of the coal for these mills is hauled by the Atlantic Shore Line from Cape Porpoise, where the company owns a coal pocket and receives coal by ocean barge. About 50,000 tons of coal were transported last year. The next principal items of freight traffic are lumber and the products of



Atlantic Shore Line Railway—Semi-Convertible Car and Telephone Booth.

the mills. Lumber is shipped west over the Atlantic Shore Line to Springvale, where the cars are taken by the Boston & Maine. Last year the road carried from 6,000,000 to 8,000,000 feet of lumber, and about 10,000,000 feet will be transported this year. In addition to this the company hauls all of the supplies reaching Sanford from the east, and local produce, meats, etc., are hauled largely from the Biddeford market. Local freight is hauled in cars owned by the company, which has six box and four flat cars. Other freight is handled in foreign cars, electric locomotives furnishing the motive power. The company contemplates the establishment of boat lines between Portsmouth and Cape Porpoise and Portsmouth and Boston. Freight from Sanford could then move eastward for transportation by water, thus giving the electric line also a long rail haul. In addition to the freight and passenger traffic mail cars are operated over the entire system to carry the United States mail.

Car Houses.

The old car houses of the company are located at Kittery Point, South Berwick, York Beach, Sanford and Town House, and a new car house has been built at Ogunquit. Shop work for the western division is done at Kittery Point and for the eastern division at the Town House barns. The building is of brick and contains eight tracks, with one full length pit and

two half pits. At this barn the company now does blacksmith work, carpentering and painting and armature winding.

The new car barn at Ogunquit has a concrete foundation and a frame superstructure. It has three tracks, under one of which is a concrete pit 30 feet long.

Car and Locomotive Equipment.

The passenger equipment consists at present of 52 passenger cars and the freight equipment of 10 freight cars and 9 work cars, 6 electric locomotives and 8 snow plows. The passenger cars are equipped with air brakes and 4-motor equipments. The cars for the new line are of The J. G. Brill Company semi-convertible type. At the Town House car barns material is being assembled to set up four new Brill semi-convertible passenger cars, two semi-convertible combination baggage, mail and freight cars, and two 15-bench high-speed open cars. These cars are equipped with four motors, each of 50 horsepower. The electric locomotives on the system are equipped with air brakes and four G. E.-80 motors, with multiple-unit control.

Schedules and Fares.

The present schedule over the new line from York Beach to Kennebunk, 16½ miles, is one hour, and the fare is 40 cents. Through cars are operated from Portsmouth to York Beach every half hour. From York Beach and Kennebunk half-hour cars are operated to Cape Porpoise. These cars make connections with cars to Sanford and to Biddeford and Kennebunkport.

It is the intention to keep the rates at an average of two cents per mile, though the rate on the new line is higher. The company is liberal in the matter of commutation tickets for workmen and children. These tickets make it possible for persons making trips four times daily between given points to travel at about three-fourths of the regular rate. These tickets are issued in books of 100 and if used by other than the original purchaser will be taken up by the conductors. The company has also an overlap system in the collection of fares by which persons taking a car near a fare collection limit may ride through the next zone without the necessity of paying two fares. The fare limit points are definitely located by means of signs on the poles.

A practice which familiarizes the public with the names of stopping places is that of suspending a sign from a span wire at each turnout, giving the name of the latter. Whistling points are plainly indicated on the poles, and unexpected crossings are thus protected.

Proposed Improvements.

A trip over the old line between Portsmouth and York Harbor affords one of the most beautiful trolley rides in the United States. The company has planned to eliminate some grades and curves. It is interesting to note that when this fact became known many of the patrons of the line made serious objection to these changes because it was feared they would spoil the scenic effect of the route. The company also contemplates an extension from South Berwick to Somersworth and Berwick.

The Atlantic Shore Line Railway is in the direct charge of W. G. Meloon, general manager, with headquarters at Portsmouth, who has been connected with the lines comprising the western division for the past 10 years.

The president of this company is E. M. Goodall of Sanford, Me.; vice-president, I. L. Meloon, New York; treasurer, Louis B. Goodall, Sanford, Me.; and secretary and general attorney, Fred J. Allen, Sanford, Me.

The Consolidated Railway Company of New Haven, Conn., has just completed at the New Haven shops a test car which will be used on its lines throughout New England.

Telephoning over power wires has been done with some success in Vienna. In this country telephoning from a moving car over the trolley wire has been made the subject of considerable experimenting.

SHOP MANAGEMENT.

The question of reducing shop costs by the introduction of systems for recording the cost of various shop operations and the amount of time, labor and materials required for each job is undoubtedly an important one. In the Electric Railway Review of August 3, page 129, was published an article by H. F. Schmidt entitled "Hints on Shop Management," which described some of the systems of ascertaining shop costs used by large manufacturing concerns. Such systems are considered applicable, to a certain extent at least, to railway shops. The Electric Railway Review will be pleased to open its columns for a further discussion of the subject by those who have adopted any such methods.

W. A. P. writes as follows:

I understand that shop management means electric car repair shops, and I do not think that the methods employed by large manufacturing companies are good methods for a car repair shop, because in the manufacturing shops quantity is more apt to be striven for than quality, while in car repair shops it is not so much the amount of work a man does as how well he does it.

The practice in our shop is to use forms and timecards with a view to simplifying everything as much as possible. Each man marks on a timecard each day just what part of a car he has been working on and how many hours. For example:

Working at changing armatures, four hours.

Repairing brakes and trucks, three hours.

Changing wheels, three hours.

All electrical repairs are charged to No. 10; all wheels and axles to No. 9; all brake and truck repairs to No. 8; and all woodwork and car bodies to No. 7. Thus we can tell at any time how much any one part of the car is costing. We also keep a record of all car wheels and make a running test of one or two trolley wheels from every new lot we receive. A test of brakeshoes is made about twice a year, and a record also is kept of when and by whom the armatures are repaired.

In my humble opinion the best results can be accomplished by having a good practical foreman, who has an interest in the work and is paid a fair wage; that is, a man who will see that each workman will do a fair day's work and do it well and, if necessary, show him how to do it. In closing, let me emphasize my earlier statement, that in car repair work it is not "how much a man does but how well he does it."

Otto R. Sturzinger, master mechanic Toledo Port Clinton & Lakeside Railway, Genoa, O., writes:

Referring to the article by Mr. H. F. Schmidt outlining "Hints on Shop Management," Electric Railway Review, August 3, 1907, page 129, our simple methods may be of interest. To the present date we are not keeping track of repairs to our rolling stock other than at the end of the month. The payroll for the shop is charged to maintenance of rolling stock. It is my desire some day to be able to tell just where every bolt went and how much time it took to put that bolt in its place, and then charge the bolt and time to the car number or account number to which it was applied. I hope that some day we may be in a position to thus obtain accurate and detailed costs.

Timetable of the Portsmouth Electric Railway.

The Portsmouth Electric Railway, which is controlled by the Boston & Maine Railroad, and which connects Portsmouth with Rye Center, Rye Beach, Little Boar's Head, North Beach and North Hampton, N. H., is operating its cars on a regular published schedule similar to those issued by the steam roads, and the schedules have been maintained without serious difficulty. It is a commentary upon the relative manner in which steam and electric road schedules are maintained to note that the occasional interruptions to the published schedules of this line have been due chiefly to waits for delayed trains at steam road connections.

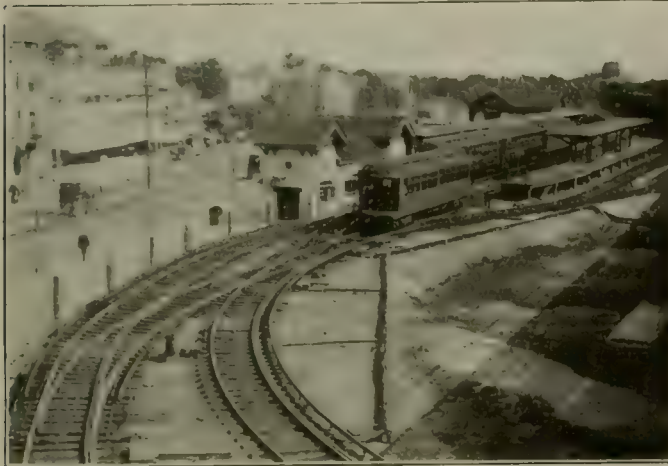
WILSON AVENUE TERMINUS OF THE NORTHWESTERN ELEVATED RAILROAD, CHICAGO.

In order to provide for the unusually heavy traffic at its Wilson avenue terminus the Northwestern Elevated Railroad in Chicago has recently completed a layout of surface tracks, terminal station and platforms which includes several interesting features.

The Evanston avenue surface cars serve as a means of

ning it down an incline of 2 per cent grade to the surface. It then makes a loop on a curve of 90 feet radius, coming to tangent just before reaching the loading and unloading platform. The tangent at the platforms is on a 1.23 per cent up grade. The main track then passes up the east incline on a 2.59 per cent grade and connects with the main line tracks above.

A loop of greater radius is built inside the main line loop on the surface and a system of double crossovers connects



Wilson Avenue Terminus—Tracks and Crossovers on East Side of Loop.



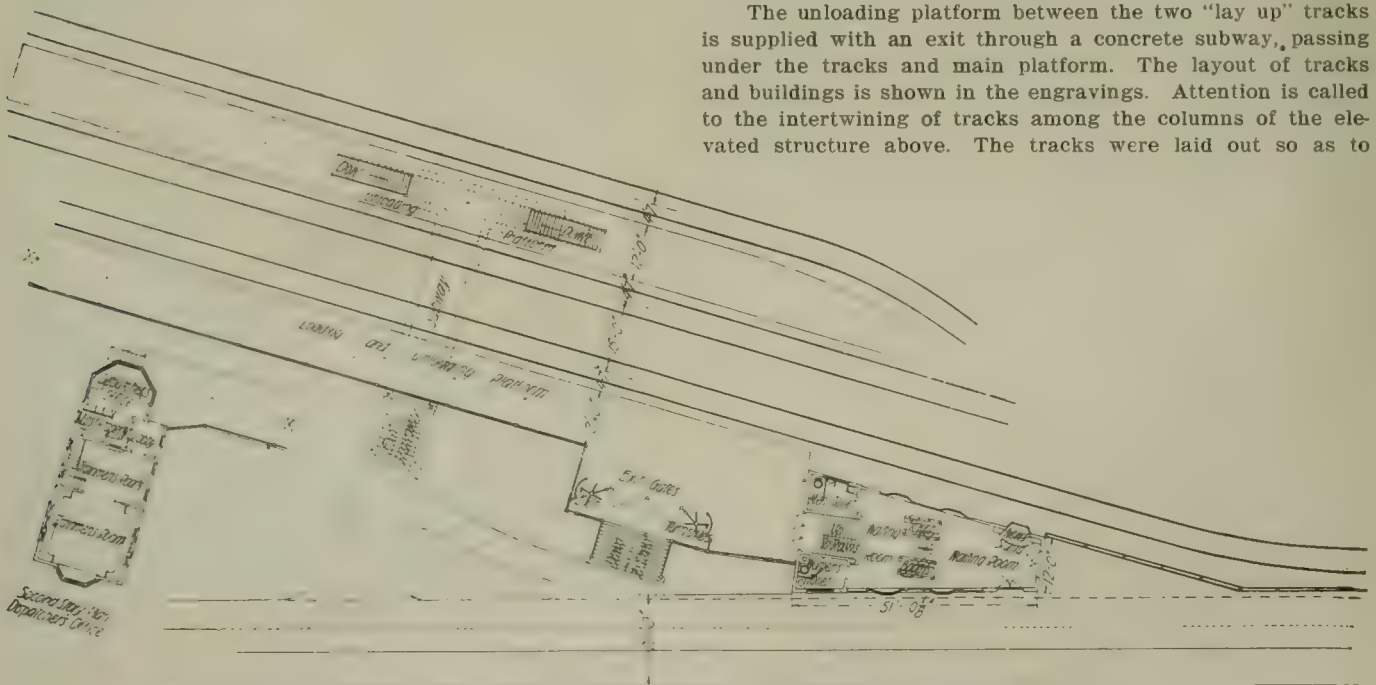
Wilson Avenue Terminus—Dispatcher's Office and Station Platforms.

transportation to the Wilson avenue station for many of those living in the northern suburbs of Chicago. Formerly the loading and unloading of this elevated railroad traffic was handled by four stub-end tracks, terminating at the end of the elevated structure at Wilson avenue. This method made

the two loops. This provides terminal tracks for both express and local trains which happen to be in the station at the same time and also affords an arrangement for "laying up" trains without delaying or interfering with the traffic.

Stations.

The unloading platform between the two "lay up" tracks is supplied with an exit through a concrete subway, passing under the tracks and main platform. The layout of tracks and buildings is shown in the engravings. Attention is called to the intertwining of tracks among the columns of the elevated structure above. The tracks were laid out so as to



Wilson Avenue Terminus—Plan of Station, Platforms and Subway.

it necessary to use a system of relay motors, which required the constant presence of one or more extra motor cars, with the usual crews and extra trainmen to couple and uncouple the motors from the trains. The new work as described eliminates this expense.

The present loop was built by constructing a turnout track from the main line on the elevated structure and run-

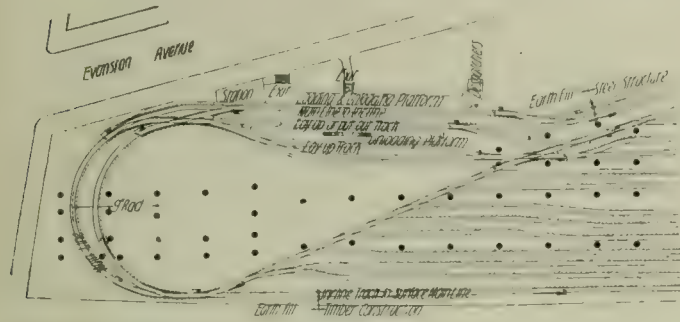
avoid these columns wherever possible. On the west edge of the inner loop it was impossible to do this without materially changing the design, and a single supporting column was replaced by two columns resting on either side of the track and bearing a transverse plate girder, which afforded support to the longitudinal girder of the structure above.

The west incline is built upon a wooden structure with

concrete foundations, while the incline on the east is of the ordinary steel construction. The loop is inclosed with an iron fence which bears an ornamental electric light upon each post. Cement sidewalks have been built along Wilson avenue and Evanston avenue in front of the station and loop.

The station building, subway and dispatcher's office are built of concrete, the construction of which is plain, except in the case of the subway, where I-beams were used to support the 8-foot span of tracks. Old rails were also placed vertically in the walls and horizontally in the floor of the subway. The plan of the station, dispatcher's office and subway is shown in one of the engravings.

All principal switches are controlled by a new electropneumatic interlocking plant, which was recently installed at a cost of \$13,000. The cost of the station, dispatcher's office and platforms was about \$12,500, and that of the subway about



Wilson Avenue Terminus—Layout of Surface Tracks.

\$2,500. The track layout and inclines cost about \$12,000 additional. The Paige Iron Works of Chicago furnished the switches and the Union Switch & Signal Company installed the interlocking plant. The design was made and the construction carried on under the supervision of C. M. Mock, chief engineer of the Northwestern Elevated Railroad.

THE JOPLIN & PITTSBURG RAILWAY.

D. L. Robinson, assistant secretary and treasurer of the Joplin & Pittsburg Railway, furnishes the following information in regard to the extensive plans of this company for inter-urban lines between Joplin, Mo., and Pittsburg, Kan. The Joplin & Pittsburg Railway Company has purchased the property of the Pittsburg Railway & Light Company, including about 32 miles of road connecting Pittsburg with Frontenac, Chicopee, Fleming, Weir City, Scammon and Columbus, Kan.; also the property of the Joplin & Pittsburg Street Railroad, which comprises an urban line in Joplin. It is now proposed to connect these two properties by an air line high-speed road from Joplin to Pittsburg, a distance of 26 miles, and also to build several branches, making a total of 85 miles of road.

Seven miles of track has been laid this year in Joplin and Pittsburg and surveys have been made for the line from Joplin to Pittsburg. The maximum grades will be from 1 to 5 per cent and curves will be light. Grading is now in progress on this line and on a line from Scammon to Mineral, Kan., six miles. Grading is to begin on the other lines in about two weeks. A. L. Register & Co. of Philadelphia have the contract for constructing about 50 miles of road.

Five bridges have been ordered from the Southwest Bridge Company of Joplin, Mo., and rails, ties, poles, wire and catenary equipment have all been purchased. Seventy-pound rails will be used. The company now has 31 cars and has ordered six high-speed cars for inter-urban service and six closed cars for city service in Joplin. Offices, shops and car barns will be established in both Pittsburg and Joplin, and a power house and car barn will be erected at Scammon.

The officers of the Joplin & Pittsburg Railway are: President, J. J. Heim; secretary and treasurer, John A. Pres-

cott; chief engineer, R. E. Richardson; all of 310 First National Bank building, Kansas City, Mo.; and D. L. Robinson, assistant secretary and treasurer, Buffalo, N. Y.

TRAIL CAR OPERATION IN PADUCAH.

The Paducah (Ky.) Traction Company operates under conditions which enable it to maintain an interesting system of trail car operation. The company has developed a pleasure resort which, during the past two seasons, has attracted a considerable amount of patronage from the residents of Paducah.

The resort, which is known as Wallace Park, is situated in a natural grove in the outskirts of the city and is provided with an artificial lake, auditoriums, pavilions and accessories which make it an attractive place of amusement. It was built during the year 1906 and has this year received improvements which make it one of the most desirable and popular parks of western Kentucky.

With the upbuilding of the park the traction company found that it had also built up a special travel that taxed its car capacity to its utmost to handle. Early in the park season last year a system of trail car operation was introduced that proved a success and has since been extended until now the heavy night travel is handled with ease and without changing the headway, increasing the speed or running the cars on a more frequent time schedule.

All park cars are started from the square in the center of the city bounded by Fourth, Broadway, Third and Kentucky avenues. The cars, after passing around this square, whence the heavy part of the park travel is drawn, run out



Motor Car Hauling Eight Trailers in Paducah, Ky.

Broadway past the car barns to the park. The trainmaster stations himself on the loop and carefully watches the travel. As the traffic increases he orders incoming cars to pick up trailer cars at the barn and proceed to the square. If the travel is sufficient to justify more than one trailer an extra motor car and two trailers are coupled to the regular and the four-car section proceeds on the running time of the regular.

After the outgoing travel has been successfully taken care of the trailer cars are set in on a siding at the park and held until the evening's entertainments are concluded, when one motor car hauls from 12 to 14 of the trailers up to the loading platform. The cars are loaded and the homeward journey is made with but the one motor car. In this way the crowd of people usually present is not required to crowd and fight for seats in order to get home on the first car.

The first half mile of track from the park is laid on a 2 per cent down grade and the balance of the track is practically level. This condition makes it possible for the one

motor car to haul the long string of trailers to the downtown district.

In the operation of trailer cars one conductor is usually provided for two cars. When four or more cars are coupled into trains the rear conductor signals by whistle to stop or proceed and the motor conductor signals the motorman by bell. This system of trailer operation has been in use two seasons and not a serious accident has been reported. The cars are operated on a 10-minute headway.

The Paducah Traction Company is one of the Stone & Webster properties, that firm having assumed control in the fall of 1905. Since that time the power house, tracks and overhead lines have been rebuilt and a number of new cars have been added to the equipment.

The company is now operating cars over 13½ miles of track. Its passenger car equipment consists of 30 motor cars, of which 15 are closed, 9 are open and 6 are of the semi-convertible type, and 14 trailers.

DON'TS AND QUESTIONS FOR SUBSTATION OPERATORS.

DON'TS.

Rotary Converters.

- Don't use emery cloth on commutator.
- Don't use oil that might gum on commutator.
- Don't allow alternating-current copper leaf brushes to cut.
- Don't allow copper dust to collect in armature.
- Don't allow connections to become loose.
- Don't start machine with rocker arm shifted from neutral point.
- Don't let dirt collect on brush studs or around bushings.
- Don't attempt to remove brushes while machine is running.

Switchboards.

- Don't open section switch unless feeder breakers and feeder switches are closed.
- Don't neglect to polish contacts on rheostats.
- Don't run rotary for any length of time on starting rheostat.
- Don't fail to see that secondary contacts in breakers always make before and break after main contacts.
- Don't splash oil or allow any grease on switchboard.
- Don't get excited or in a hurry when operating switches.
- Don't fail to keep lightning arresters in good condition.
- Don't fail to go over connections on board to see that all are good.
- Don't fail to open meter circuits during an electrical storm.

Transformers, Etc.

- Don't let oil get below coils.
- Don't let primary nor secondary leads get too near each other, or anything that might cause short-circuit or ground.
- Don't let dust collect on insulators.
- Don't let dust collect on lightning arresters.
- Don't let oil get low in oil cells.
- Don't let contacts drop or turn on oil switch rods.
- Don't fail to observe condition of all insulators, bushings and other insulations.
- Don't let nuts get loose on switch rods.
- Don't fail to open line switch each time power is off line.
- Don't close switch until power is on.
- Don't fail to look over all lightning arresters carefully after an electrical storm.

QUESTIONS FOR SUBSTATION OPERATORS.

The following questions have been prepared and used on a road where the substation operators when first employed are inexperienced men. The new men are placed in care of an old operator, who instructs them in regard to operation and care of substation apparatus. After the new man has made a satisfactory showing to the day and night operators

he is then asked to answer the following questions. If he gives satisfactory answers he is then given a shift at one of the smaller and less important substations:

Name the different kinds of transformers in a substation.

What circuits are taken from the high-potential transformer?

What circuits from the low potential?

What circuits from current transformers?

What is the voltage of the secondaries of each?

How will you distinguish between primary and secondary?

What is the object of reactive coils in primary of station transformers?

What clearance ought high-tension wires to have?

How will you disconnect a current transformer in case of trouble?

What takes place when your oil switches are knocked out during a short-circuit or ground?

Why should the high-tension line be grounded before attempting to work on or near it?

What care should be given transformers, oil switches and alternating-current lightning arresters?

What attention should be given to alternating-current and direct-current brushes on rotary converter?

Why should direct-current rocker arm never be moved from the position where it is marked to stand?

What would be the result if you started rotary with the brushes six inches forward?

Describe fully the difference between series and shunt fields.

What do you mean by series connections?

What do you mean by shunt connections?

What do you mean by parallel connections?

What do you mean by alternating current and direct current?

Give regular order of closing and opening switches in starting direct current and alternating current.

Give order for shutting down rotary.

What would be the result if you should start rotary direct-current and the alternating-current switch was in to half voltage?

What would be the result if you should close alternating-current switch to half voltage and shunt field break-up switch was closed?

How would you start machine if voltmeter was open circuited?

Define open, grounded and short circuits.

What would be the result if you should try to run two rotaries in parallel with equalizer switch open?

What attention should be given rotary when shut down?

What is the object of the oscillating device?

What is the object of the speed limit device?

What attention should be given to the circuit-breakers?

What attention should be given to the direct-current lightning arresters?

How would you test with voltmeter for a ground, open circuit and short circuit?

What would you do in case someone was seriously shocked in your presence?

How would you test for ground on trolley as to the direction of the ground?

What is the object of a section switch?

What is meant by positive and negative leads?

Why should the line switch be opened each time high tension is off?

The Galveston bridge and causeway, which it is proposed to build as a highway and railway structure leading from the mainland to the island upon which the city stands, will be nearly two miles long. The causeway will be about 8,000 feet long and the widths provided for various purposes are 50 feet for steam railways, 15 feet for electric interurban roads and 35 feet for highways. The bridge will be 2,000 feet long and 63 feet wide, and will be of reinforced concrete arches, with a draw span of 100 feet.

MECHANICAL AND ELECTRICAL DRAFTING ROOM RECORDS, PACIFIC ELECTRIC RAILWAY.

The mechanical and electrical department of the Pacific Electric Railway, Los Angeles, Cal., has charge of the power generating and distributing system, as well as the building and maintenance of rolling stock, for this extensive electric railway. With a view to minimizing the labor required in handling working drawings, a very practical system has been devised for indexing and filing all tracings used by this department.

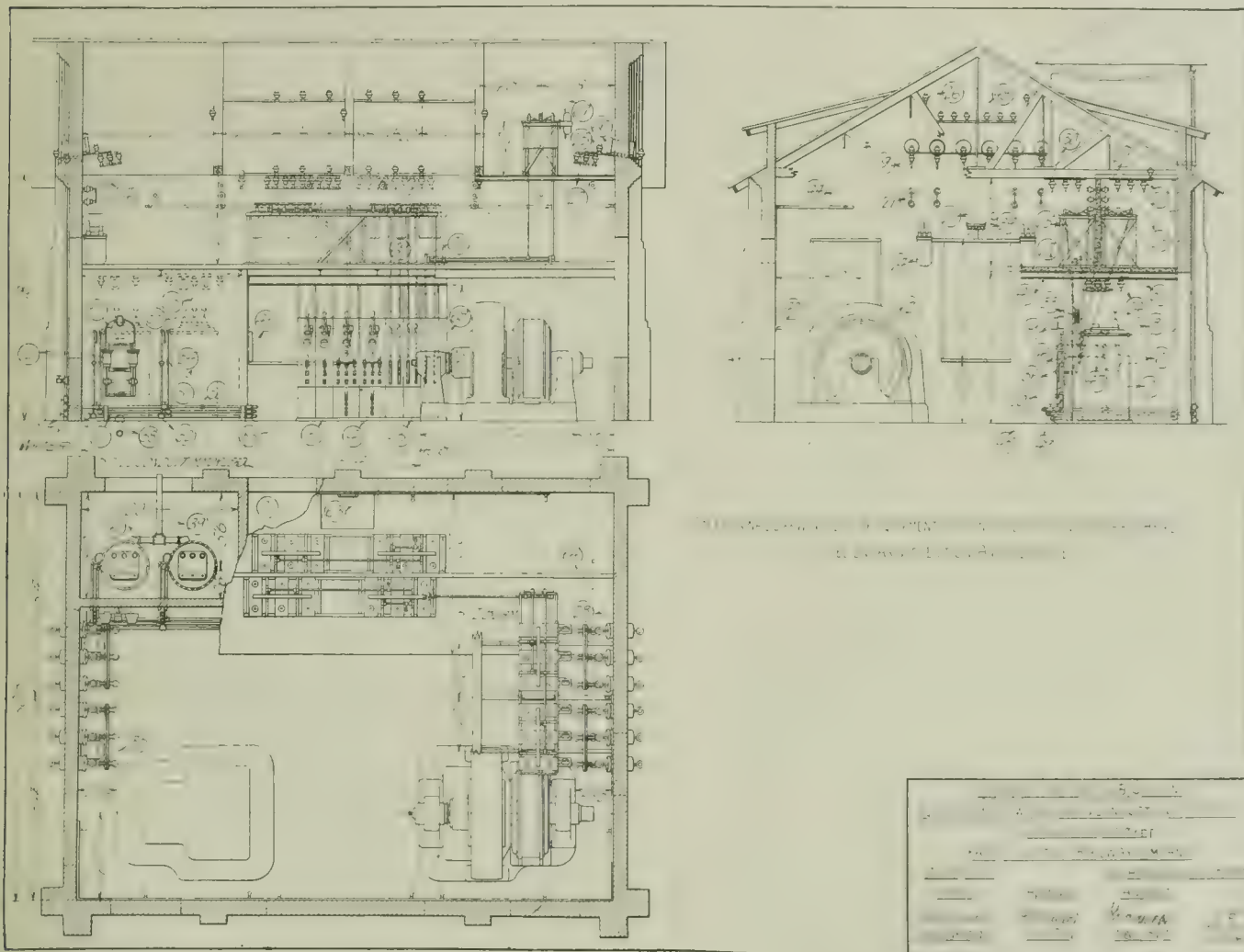
Standard Sheets.

Drawings are made to conform to standard sizes, as follows: 9 by 14 inches, 9 by 12 inches, 14 by 17 inches,

foreign drawings and one for especially large drawings and prints that cannot be made of standard size. The drawers in each case are subdivided into sections of a proper size to accommodate the standard size drawing. The drawers are made with extension slides so that they open and close easily.

The case devoted to power equipment is subdivided by drawers according to the following subjects: Passenger cars, freight and express cars, work and miscellaneous cars, trucks and brakes, electrical apparatus for cars, shop tools and a special drawer for large foreign drawings.

The filing case which contains index cards relating to rolling stock and shop drawings has separate drawers for each of the following subjects: Shop equipment, cars, trucks and brakes, patterns (shop and car), patterns (power house



Pacific Electric Drafting System—Standard Drawing (Original 36 by 56 Inches).

21 by 30 inches, 24 by 39 inches, 36 by 56 inches. The general appearance of one sheet of the largest size is shown in the accompanying illustration. It will be noted that this is an assembly drawing for a substation. The original drawing contains in the lower right-hand quarter a list of the equipment, which, for the sake of reference, has been enlarged and appears herewith as a separate engraving.

Large cases, each with several drawers, are provided for filing the drawings and a very complete card index is used. The power station and substation details of electrical apparatus have their drawings in one case with an individual file. All drawings relating to the steam side of power station work are filed in the second case and those drawings relating to cars, car shops and car electrical equipment are stored in the third case. There are two other large cases, one for

and electrical), power house, electric power and a blank drawer for future use.

Record Book.

Record books are used in which is kept all the information of a permanent character that appears on the cards. This record book is ruled for the following information: Initial of drawing, serial number, size, date, case and drawer. In the book which accompanies the card index for the rolling stock the following key letters are used: Passenger cars, P. C.; freight cars, F. C.; miscellaneous, including wreckers, etc., M. C.; shop tools, S. T.; and electrical equipment on cars, E. C. By means of these various classifications and the card index with its permanent record book there is little opportunity for the misplacement of a drawing.

Guide Cards for Index.

The following list will serve to show the completeness with which the guide cards are prepared and used in facilitating the handling of the reference cards comprising the index devoted to shop equipment drawings:

Machine Shop Tools.—Electric, track work, jacks, tem-

roof framing; general arrangement of truck; cast and wrought iron details of truck on separate sheets; and bolster, wheels and brake arrangement, the latter also on separate sheets. Each shop has individual drawings for its own use, which include such subjects on separate sheets as the details that are made of cast and wrought iron, wood and brass. In this

Case 5 DRAWER NO. 1	DRAWING NO. EP-1118-I
TITLE Details Of Standard 1200 Amp DC Switches	
REMARKS	
DATE 11-5-06	
SIZE DRAWING 24x39	
DRAWING NO. EP-1118-I	

Pacific Electric Drafting System—Index Card for Drawing.

plates and gauges, hoists and cranes (travelers), compressor and tanks for air.

Blacksmith Shop Tools.—Furnaces and forges, formers, hammers and dies, hoists and cranes.

Winding Shop.—Switch test boards, formers and dies.

Repair Shop.

Oil House and Tanks.

Case 5 DRAWER 1	GLASS L	PATT. NO. 774
TITLE Switch Blade Head		
REMARKS		
Cast Copper Item 8 On Drawg		
DATE 11-5-06		
SIZE DRAWING 24x39		
DRAWING NO. EP-1118-I		

Pacific Electric Drafting System—Index Card for Pattern.

way each shop can be required to work to exact details and therefore assurance is had that no adjusting will be necessary when the car parts are assembled.

The index for the drawer holding the cards referring to the passenger car drawings is subdivided according to the standard office scheme with the following heads: General arrangement, arrangement of frame, cast details, diagrams,

*1 LIST OF EQUIPMENT FOR ONE SUBSTATION—COMPLETE.				*1 LIST OF EQUIPMENT FOR ONE SUBSTATION—COMPLETE.			
ITEM NO. OF	REFERENCE	ITEM	REMARKS	ITEM NO. OF	REFERENCE	ITEM	REMARKS
ON DWG.	PCS.	DRAWING		ON DWG.	PCS.	DRAWING	
2	1	EP1201	BRICK BUILDING	46	100 FL.		1-IN. PIPE FOR WATER SYSTEM
3	2	EP1127	INDUCTION M. G. SETS SEE G. E. DWG., M210847	47	30 FL.		1/2 IN. PIPE FOR OIL GAUGE
4	2	EP1117	A. C. SWITCHBOARD USE LIRON 13A, 13B, DWG. EP1123.	48	80 FL.		1-IN. PIPE FOR INSULATOR SUPPORTS.
5	2	EP1091	D. C. SWITCHBOARD USE LIRON 13A, 13B, DWG. EP1123.	49	15		2-IN. GLOBE VALVES.
6	2	EP1091	FEEDER SWITCHBOARD USE LIRON 13A, 13B, DWG. EP1123.	50	25		2-IN. UNIONS, PLACE TO SUIT.
7	2	EP1137	FIELD RHEOSTATS FURNISHED	51	8		2 BY 2 BY 2 IN. TEES.
8	4		RHEOSTAT MOUNTING.	52	8		2 BY 2 IN. ELBOWS.
9	2		475 K. W. 15,000 2,250 VOLT WEST TRANSF.	53	25		1-IN. GLOBE VALVES
10	2	EP1112	WEST. POLYPHASE RECORDING WATTMETER.	54	4		1 BY 1 IN. ELBOWS.
11	4		SUPPORT FOR WM. SET.	55	16		1-IN. UNIONS, PLACE TO SUIT.
12	4		WEST. SERIES TRANSF., 200 5-AMP., FOR "9." STYLE 8310	56	8		HOOK FOR OPENING SEL. SW.—HANDLE 15 FT. LONG.
13	6		WEST. POT. TRANSF., CLASS O. D. 4,800-16,000 ALT.	57	1		HOOK FOR OPENING SEL. SW.—HANDLE 6 FT. LONG.
14	2		STYLE 10102, SERIES 168773, FOR ITEM "9."	58	2		TELEPHONE BOOTH.
15	4		WEST. SERIES TRANSF., 100 5-AMP., FOR A. C. AMMETER.	59	1	EP1115	OPERATOR'S DESK.
16	2		G. E. POT. TRANSF., 15,000 125-V., 25 600-9 FOR LIGHTING.	60	1	EP1114	WORK BENCH.
17	2		KELLMAN OIL SW. NO. 1, 3P., 30,000 V., KELL. DWG. NO. 128	61	1	EP1144	LADDER, SECURED TO WALL.
18	2		USED ON TRANSF. CIRCUIT IN GALLERY.	62	1		3-IN. TILE BUSHINGS, 24 IN. LONG.
19	2	EP1128	SAME AS "15," USED ON MAIN LINE. THROUGH STATIONS.	63	12		2-IN. W. I. PIPE BUSHINGS, 10 IN. LONG. FOR PULLEY ROPE.
20	1	EP1128	OIL SW. FRAME FOR 15.	64	30		12 BY 24 IN. TILE EXITS.
21	12	EP1082	OIL SW. FRAME FOR 16.	65	6		WEST. SERIES TRANSF., 250 5 AMP., FOR AM. ON 68.
22	12	EP1082	LINEMAN'S GROUNDING SWITCH. ONE BLADE.	66	1	EP1136	A. C. PANEL FOR MAIN LINE.
23	12	EP1082	SELECTOR SWITCH.	67	1	EP1132	OIL SWITCH CONTROL—TRANSF. SW.
24	12	EP1082	FUSE SWITCH, 15,000 VOLTS.	68	1	EP1132	OIL SWITCH CONTROL—MAIN LINE SW.
25	12	EP1082	STATION LIGHTING SWITCH.	69	1	EP1132	PUMP, 2 1/2 BY 2 IN. DEMING TRIPLEX, 8.89 GAL. PER MIN.
26	12	EP1082	TWO INSULATOR, 15,000-V. GALLERY BUS SUPPORT.	70	1	EP1132	3/4-IN. PIPE FOR LINKS AND WIRING.
27	12	EP1082	CEILING SUPPORT FOR 15,000-V. WIRING.	71	1	EP1132	NO. 12 COPPER WIRE—STATION AND INST. WIRING.
28	12	EP1082	INSULATOR AND PIN FOR OUTRIGGER.	72	250 FL.		ONE 3-IN. NIPPLE, ONE 15-IN. NIPPLE.
29	12	EP1082	INSULATOR, PIN AND PIPE CLAMP FOR 15,000-V. WIRING.	73	1,500 FL.		LOCKER—CLOTHES.
30	12	EP1082	OUTRIGGER.	74	2	EP1153	MEDICINE CHEST—EQUIPPED.
31	4	EP1113	LINEMAN'S GROUNDING SWITCH SUPPORT.	75	1	EP1162	SHIPPING BOXES
32	4	EP1113	SELECTOR SW. SUPPORT IN REAR GALLERY.	76	1	EP1163	26-FT. LADDER, KNOCKED DOWN IN TWO 10-FT. PARTS.
33	4	EP1113	SELECTOR SW. SUPPORT IN FRONT GALLERY.	77	1	EP1161	8-FT. STEP LADDER.
34	4	EP1113	SELECTOR AND CEILING INS. SUPPORT IN TRANSF. ROOM.	78	1		WIRING DIAGRAM
35	4	EP1113	CLIPS FOR SECURING LIRON TO I-BEAMS.	79	1		VM. BRACKET.
36	4	EP1113	SECONDARY WIRE INSULATOR SUPPORTS.	80	1	EP1161	D. C. VOLT METER.
37	4	EP1113	LIGHTING SW. SUPPORT, 2 PCS. ITEM 6A AND 2 PCS. ITEM 6B	81	1	EP1161	FUNNEL FOR TRANSF. DISCHARGE.
38	4	EP1113	U-BOLTS WITH NUTS.	82	1		NOTES.
39	4	EP1113	KNOBS WITH 3/4 BY IN. BOLTS AND NUTS.	83	1	EP1161	*1 MATERIAL LIST AS SHOWN: COMPLETE FOR SANTA ANA STATION.
40	4	EP1113	3/4 BY 8 IN. WALL BUSHINGS.				
41	4	EP1113	DUCT SYSTEM.				
42	4	EP1113	OVERFLOW PIPE.				
43	4	EP1113	OVERFLOW PIPE FUNNEL.				
44	4	EP1113	600-VOLT INC. LAMPS.				
45	4	EP1113	110-VOLT INC. LAMPS.				
	4	EP1113	STATION LIGHTING SWITCHBOARD.				
	4	EP1113	MOLDING FOR LIGHT WIRING.				
	4	EP1113	2 IN. PIPE FOR WATER SYSTEM.				

Pacific Electric Drafting System—List of Equipment from Standard Drawing.

Charts, Tables and Locations.

Carpenter Shop and Mill.

Miscellaneous.

Drawings Made.

In making car drawings it is the practice to draw sheets showing constructional features of the following: General arrangement, arrangement of frame, cast details, diagrams,

lettering, wrought details, body bolster, wood details, gates and fenders, draft gear, bill of material. In a separate drawer with a similar set of cards the trucks are classified in like detail.

When a drawing has been superseded the old card is stored at the back of the drawer and a notation made on the drawing. There is also a record book in which a notation is

made for each revise and so, when a drawing has been revised, the old prints that have been issued can be recalled and new ones distributed. To facilitate this recalling of drawings, a record is kept of those to whom prints are issued. When prints are issued a receipt is taken, having the form shown in the accompanying engraving. This revision book after a time becomes very useful because it indicates how service conditions have required changes in the original design of parts.

The accompanying illustrations show the form of card used in indexing. These cards are 5 inches wide by 3 inches high and are ruled as shown. It will be noted that the pattern number appears on one of the cards, which card, with others of the same type, forms a complete index for all castings. To facilitate the work in the shop all patterns for castings are made so that the castings will bear their identification numbers in raised figures. The patterns are also indexed in the reference book and cross-indexed with the drawing number.

PACIFIC ELECTRIC RAILWAY.		
Mr. P. F. Small, Chief Draftsman		
1907		
PLEASE FURNISH BLUE PRINTS OF THE FOLLOWING DRAWINGS:		
For	Title	
Number Required	Number of Drawing	Title or Description
Received the above described blue prints		
1907		

Pacific Electric Drafting System—Receipt for Drawing Issued.
(Original 8½ by 3¾ Inches).

In this way, in the event of changing a pattern, two sources are available for finding the drawing that shows that particular casting.

Only one man handles the cards of these various indexes as described, and no tracings leave the drafting room. Drawings when taken from the cases are not replaced by those using them, but are laid on top of the case, to be inserted in their proper drawer and order by the one attendant, who is responsible for this part of the work.

The system as here described has had an especially thorough test and it has been found that one part of the work so checks another that there is very seldom any possibility of confusion in handling drawings and prints.

Street Railways as Copper Consumers.

A General Electric authority says: "There is one phase of present railway development which is likely to furnish a steadily increasing demand for copper for the next few years, and this is the marked tendency to employ larger motors. A few years ago practically all the cars operated on Boston trolley systems were equipped with 20 and 30 horsepower motors. Today in replacements of worn-out motors nothing less than a 40-horsepower motor is installed, and in many cases 50-horsepower motors are used. The old motors were of a type which were expensive to maintain and which did not have the life of the newer and larger type.

"Few persons realize how rapidly copper figures mount up in motor construction. A 40-horsepower motor will contain about 800 pounds of copper, which means, for example, that a recent order for 1,000 motors placed with the General Electric Company by the Boston Elevated will require nearly 800,000 pounds of copper.

"The trend toward larger motors is becoming general throughout the country, and, in the heavy replacement orders which are increasing in number all the time, is destined to furnish a very considerable field for an enlarged use of copper."

REINFORCED CONCRETE STRUCTURES ON THE KANSAS CITY OUTER BELT & ELECTRIC RAILROAD.*

The Kansas City Outer Belt & Electric Railroad is planned to furnish an entrance into Kansas City and terminal facilities for the Kansas City Mexico & Orient Railway. When completed the main line will be seven miles long, with extensive yards at each end and branches to a number of existing industries, and traversing large tracts of land on the outskirts of the city, suitable for future industrial growth. The location of the line is such that satisfactory connections are made with existing belt lines and with practically every trunk line entering Kansas City.

The line was located by the writer, under the supervision of M. P. Paret, chief engineer. The designs of the reinforced concrete structures, with which this article is especially concerned, were based on calculations made by the writer. These calculations have been revised from time to time and the methods employed in determining the stresses in the various members of culverts and abutments will be given. The structures were built by Z. C. Mitchell of Kansas City, under the direct supervision of Dana Templin, resident engineer on the work.

The main line crosses the ridge between the Missouri and the Kansas rivers on 1 per cent maximum grades, at the summit of which is a 65-foot cut. Within the limits of Kansas City, Kan., the line is along Jersey creek, which it crosses five times in a distance of about a mile.

All the masonry work on the line is reinforced concrete, and was done by contract under the following conditions: The work of preparing foundations, including excavation, pile driving, diversions of streams, etc., was done by the railroad company, which also bore one-half the cost of keeping foundations dry while forms were being built and concrete placed. The railroad company also furnished the reinforcing bars at the site of each opening. The concrete work was let to L. J. Smith of Kansas City (who is also the general contractor for the whole line) at \$9.00 per cubic yard, which figure covered all the labor and materials necessary to complete the work, other than the exceptions mentioned.

The concrete proportions were 1-3-5.

The cement used was Iola Portland and Atlas Portland.

The sand was obtained from the bed of the Kansas river in Kansas City.

The rock used was crushed limestone, passing a 2-inch ring and freed from dust by screening.

Corrugated reinforcing bars, having an elastic limit of from 50,000 to 60,000 pounds per square inch, manufactured by the Expanded Metal & Corrugated Bar Company of St. Louis, were used exclusively.

The concrete in the smaller structures was mixed by hand, in the larger by a No. 1 Smith mixer.

In the first structures built 2-inch form lumber S1S2E was used, with 2 by 6 inch studs placed 3 feet on centers. This was abandoned later for 1-inch lumber with 2 by 6 inch studs, 12 inches on centers, and was found to be more satisfactory in producing a better face.

The structures were built in the period from April, 1905, to May, 1907, and the following figures of unit cost to the contractor give an idea of the conditions under which the work was done, and the variation in prices of material and labor:

CEMENT.

Cost at structure, April, 1905, \$1.25 per barrel.	
Cost at structure, April, 1907, \$1.92 per barrel.	
Average cost per barrel at mill.....	\$1.42
Freight per barrel .....	.21
Hauling (average distance 1½ miles) and storage. .12	

Average cost at site of structure\$1.75

Average cost per cubic yard of concrete.....\$1.93

*From an article by Walter W. Colpitts, assistant chief engineer Kansas City Mexico & Orient Railway, in The Railway Age.

SAND.

Cost at structure, April, 1905, \$0.62½ per cubic yard.
 Cost at structure, April, 1907, \$0.75 per cubic yard.
 Average cost per cubic yard at river bank.....\$0.30
 Freight, per cubic yard......22
 Hauling (average distance 1½ miles)......20

Average cost at site of structure.....\$0.72
 Average cost per cubic yard of concrete.....

\$0.36

STONE.

Cost at structure, April, 1905, \$1.10 per cubic yard.
 Cost at structure, April, 1907, \$1.75 per cubic yard.
 Average cost per cubic yard at crusher\$0.65
 Hauling (average distance, 4 miles)......84

Average cost at site of structure.....\$1.49
 Average cost per cubic yard of concrete.....

\$1.34

LUMBER.

Cost at structure, April, 1905, \$15 per 1,000 feet board measure.

INDIAN CREEK CULVERT.

14 by 15 feet, 250 feet long, completed November, 1905.

Cement	\$1.37	per cubic yard concrete
Sand .....	.34	" " " "
Stone	1.10	per cubic yard concrete
Labor	2.48	" " " "
Lumber .....	.76	" " " "
Miscellaneous .....	.18	" " " "

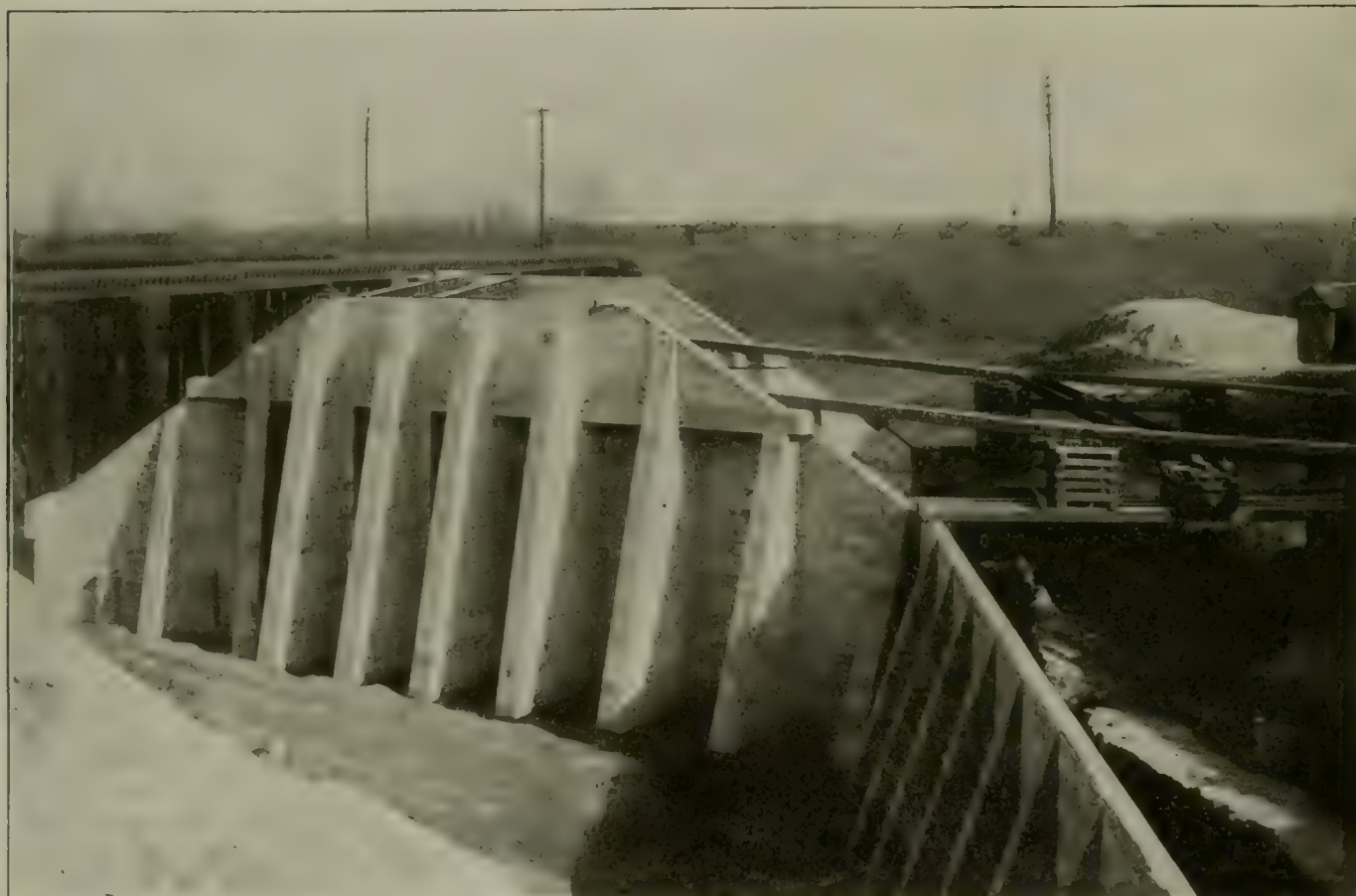
Total\$6.23 " " " "

THIRD STREET ABUTMENTS AND RETAINING WALL.

Completed November, 1906.

Cement	\$1.78	per cubic yard concrete
Sand .....	.35	" " " "
Stone	1.35	" " " "
Lumber .....	.74	" " " "
Labor	2.75	" " " "
Miscellaneous .....	.16	" " " "

Total\$7.13 " " " "



Reinforced Concrete Structures on Kansas City Outer Belt.—Third Street Abutment.

Cost at structure, April, 1907, \$22.50 per 1,000 feet board measure.

Average cost at site of structure, per 1,000 feet board measure\$19.00

Average cost per cubic yard of concrete..... \$0.49

LABOR.

Common labor, 20 cents per hour maximum.
 Common labor, 17 cents per hour minimum.
 Carpenters, 40 cents per hour maximum.
 Carpenters, 30 cents per hour minimum.
 Average cost form building and removing per cubic yard concrete\$1.98
 Average cost putting in concrete per cubic yard concrete .74
 Average cost placing steel, per cubic yard concrete... .10
 Average cost miscellaneous, wire, nails, water, etc., per cubic yard concrete......20

Total cost to contractors of concrete in place, per cubic yard\$7.14

The following unit costs to the contractor of specific structures built at different times are interesting:

ABUTMENTS, OVERHEAD CROSSING WITH UNION PACIFIC AND ROCK ISLAND.

Completed May, 1907.

Cement	\$1.92	per cubic yard concrete
Sand .....	.32	" " " "
Stone	1.74	" " " "
Lumber .....	.98	" " " "
Labor	2.96	" " " "
Miscellaneous .....	.16	" " " "

Total\$8.08 " " " "

The following are figures of total cost to the railway company of these same structures:

INDIAN CREEK CULVERT.

	Total.	Per cubic yard of concrete placed.
Excavation, pumping, etc.	\$ 1,920	\$ 1.84
Piles (389), 8,647 lineal feet	2,821	2.71
Reinforcing bars, 113,600 pounds.....	2,670	2.56
Concrete, 1,042 cubic yards at \$9.00.....	9,378	9.00

Total\$16,789 \$16.11

THIRD STREET ABUTMENTS.

	Total.	Per cubic yard of concrete placed.
Excavation, pumping, etc.	\$ 3,484	\$ 3.80
Piles (214), 5,228 lineal feet.....	1,686	1.84
Reinforcing bars, 70,400 pounds.....	1,668	1.82
Concrete, 915 cubic yards at \$9.00.....	8,235	9.00
Total	\$15,073	\$16.46

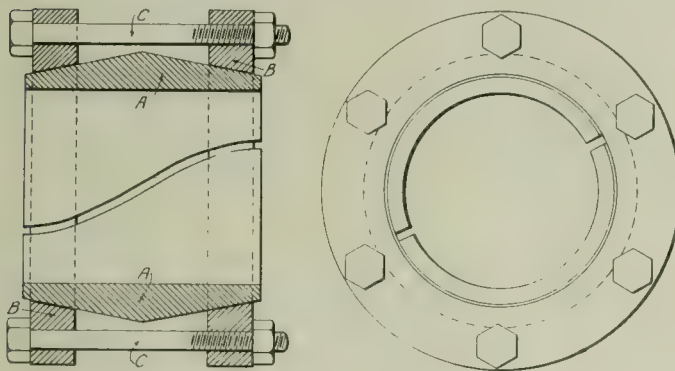
ABUTMENTS, OVERHEAD CROSSING.

	Total.	Per cubic yard of concrete placed.
Excavation, pumping, etc.	\$ 2,837	\$ 1.82
Piles (290), 6,953 lineal feet.....	3,067	1.96
Reinforcing bars, 118,716 pounds.....	2,986	1.91
Concrete, 1,560 cubic yards at \$9.00.....	14,040	9.00
Total	\$22,930	\$14.69

A SIMPLE COMMUTATOR PRESS.

One of the most essential operations in the building or rebuilding of commutators is to firmly press the segments together so as to hold the mica securely and prevent oil and dust from getting between the segments. In small shops it is often difficult to properly press the segments together with as great a pressure as is desired, therefore the home-made press here shown will be of interest.

This commutator press was designed by C. E. Viallan-



Plan and Section of Commutator Press.

court, foreman of the motor department of the West Madison shops of the Chicago Union Traction Company. The press consists of a diagonally split steel shell, A, tapered toward both ends, the slope being about one in ten. The inside diameter of the shell is just a little larger than the diameter of the assembled commutator which it is desired to press together. Two heavy steel rings, BB, fitting the shell, A, can be drawn together by means of six or eight wrought-iron bolts, CC. It will be evident that the force with which the commutator segments and mica can be pressed together is only limited by the strength of the rings, BB, which are made exceptionally heavy.

This clamp can be used either for rebuilding old commutators or for new work. The method of using it is as follows: The bolts, CC, and the rings, BB, are removed and one of the rings and the shell, A, are slipped over the assembled commutator bars and mica. The rings are then put in place and the bolts uniformly tightened. When sufficiently tight, the whole can be put in a lathe and the commutator bars can be bored out true to receive the commutator shell and its insulation. When this insulation has been properly placed in position the clamping ring is warmed and put on over the end insulating ring and the bolts tightened. The clamp can now be removed and the assembled commutator placed in a lathe and the face turned. A press of this kind can be cheaply made in almost any small repair shop and will be well worth the cost.

INVESTIGATION OF NEW YORK TRANSPORTATION FACILITIES.

The New York public service commission of the first district began its investigation into the financial and operating conditions of the Brooklyn Rapid Transit Company on Wednesday of last week, with President E. W. Winter on the witness stand, as briefly outlined in the Electric Railway Review of August 17, page 196. In the course of the hearing it was brought out that there are 70 subsidiary companies, operating 578 miles of track, now combined in the Brooklyn Rapid Transit system, and that the gross receipts of the system for the year ended on June 30, 1907, amounted to \$19,381,587, of which \$18,443,983 was derived from the passenger traffic, \$256,968 from the freight traffic, \$439,640 from the parcel traffic and \$34,694 from the carrying of United States mail. Mr. Winter also testified that in rush hours nearly 700 cars an hour pass the courthouse in Fulton street.

The examination of Mr. Winter was continued on Thursday morning, August 15. The examination began with the production of certain documents which William M. Ivins, counsel for the commission, had asked for at the previous session. These included a list of rentals, statements of interest on real estate mortgages, of interest on loans between companies, of interest on funded debt of all companies, numerous statements of debts of the individual companies, securities owned by each of the subsidiary companies, and a consolidated balance sheet of the entire system for June 30 last. The total assets were put at \$139,732,014, and on the liabilities side the total capital stock was put at \$45,835,908, and bonds and mortgages at \$85,557,930.

Mr. Winter's Testimony.

Mr. Winter explained in detail the many difficulties which confront his company in handling the immense transportation problem in Brooklyn and threw much light on the plans which the company has under consideration to ameliorate the present congested traffic conditions. One hundred new elevated motor cars, costing \$14,000 each, and 100 new surface cars, costing \$5,000 each, are now under contract for the company to be delivered this year. Mr. Winter said that during the five years since he has been at the head of the company \$30,000,000 has been expended in improvements, and that the Brooklyn Rapid Transit Company has never paid a dividend. The dividends declared by subsidiary companies being turned into the treasury of the holding company and expended for improvements, except what is required to pay interest on bonds and underlying liens.

The witness was questioned regarding the crush at the Manhattan end of the Brooklyn bridge. He thought that the best solution of the problem would be an extended loop, going as far as West street, perhaps, and as far south as Liberty. There would perhaps be half a dozen stations in this loop and no "dead ends." Mr. Winter also said that considerable relief might come from a line connecting the Manhattan terminals of the several bridges. He said the company was already preparing to connect its elevated tracks with the tracks on the Williamsburg bridge and would be ready to operate over the bridge as soon as the stations at the Manhattan end were ready. He said that the traffic on the Brooklyn bridge would be relieved by the extension now being built by the bridge department at the Manhattan end to allow the running of six-car trains, and that the greatest relief that could be expected would result from the completion of the Manhattan bridge.

Mr. Winter was also sounded as to his idea of giving transfers between the cars of the Manhattan and Brooklyn systems, but he gave it as his opinion that such an arrangement could not be carried out. Mr. Ivins suggested also that it might be a good plan to run the Brooklyn cars over the Williamsburg bridge, down Delancey street and through the Bowery to the city hall, but Mr. Winter insisted that this idea was out of the question also because it would impede trolley traffic on the bridge and would lead to slow service on both sides of the bridge.

Transit Development Company.

After the hearing Brooklyn Rapid Transit officials expressed regret that Mr. Ivins had not continued his questioning as to the relations between the Brooklyn Rapid Transit Company and the Transit Development Company, which were touched upon at Wednesday's hearing. Mr. Winter gave out

a statement of the history of the company, in part, as follows:

The Transit Development Company was incorporated on April 24, 1902, with a capital stock of \$25,000. The object of the company was to hold real estate free from the lien of railroad mortgages and buy from the railroad companies of the system such real estate as was no longer used for railroad purposes. Since its incorporation the company has also been used to take title to large amounts of new real estate purchased. It is also the owner of considerable car and electrical equipment. The title to such car equipment is sometimes temporarily taken by the Transit Development Company, and when the delivery of the cars is complete they are conveyed at cost to the companies for whose use they are found to be best adapted.

Every share of the capital stock of the Transit Development Company is owned by the Brooklyn Rapid Transit Company. Not a single individual has ever made a dollar by the incorporation of the company, by the carrying on of its business or by reason of his connection with it. Not a dollar of salary is paid to any of the officers or employees of that company. The Brooklyn Rapid Transit Company is the sole beneficiary of all its stock and property.

All the new power houses, land, buildings and equipment are owned by the Transit Development Company solely. The title to the Brooklyn City Railroad Company's power house is distinct from that of the Transit Development Company.

The Transit Development Company last spring increased its capital stock from \$25,000 to \$500,000, which additional capital stock was purchased at par by the Brooklyn Rapid Transit Company. It has now substantial assets, the actual cost of which is upward of \$18,000,000.

One of these assets is the stock of the American Railway Traffic Company, which operates the contract with the city for the disposition of ashes, the Transit Development Company having purchased over 98 per cent of the stock of the traffic company for \$50,000, and the assumption of some of the traffic company's obligations. So far as the city contract is concerned, it has not yielded any profit to the company commensurate with investments required to carry on the contract.

The Belmont Tunnel.

On Tuesday, August 20, the commission resumed its investigation of the Interborough-Metropolitan Company. E. P. Bryan, president of the Interborough Rapid Transit Company, was called upon to testify further as to the acquisition of the old Steinway tunnel franchise by the company. Incidentally it was brought out that, as president of the Interborough, Mr. Bryan receives a salary of \$35,000 per year.

Mr. Bryan stated that the old Steinway franchise had been purchased from John Pierce, representing the stockholders of the New York & Long Island Railroad, for \$402,035, that the railroad had no corporate existence, being represented merely by a board of trustees, and its stock being held by the Interborough. He showed that the Interborough had expended about \$7,000,000 on the construction of the tunnel and the acquisition of real estate, but that no securities of any kind have been issued against this amount.

Mr. Bryan was preceded by Henry C. Wright, secretary of the City Club, who described the work of the club in studying transportation conditions of the city. He said the club's investigation of the bridge crush had showed that between 5 and 5:30 in the afternoon, 3,971 persons were unable to get seats in cars going to Brooklyn; that between 5:30 and 6, 6,696 persons had to stand, and during the following half hour there were 4,364 without seats.

The Interborough Accounts.

Mr. Bryan's examination was continued on Wednesday and Thursday. He was asked a number of questions in regard to the financial relations between the Interborough Rapid Transit Company and August Belmont & Co., and the items entering into the subway construction account. These questions elicited the information that directors' fees, the cost of the negotiations leading to the acquisition of the Manhattan elevated road, the cost of a souvenir book issued on the occasion of the opening of the subway, and the discount on bonds underwritten by Belmont & Co. had been charged to the construction account of the subway. These statements caused a tilt between the Interborough-Metropolitan attorneys and Mr. Ivins in regard to whether such items should be charged to the construction account, but Paul D. Cravath, general counsel for the company, explained that the account under discussion was not the account with the city for the construction of the subway.

At the hearing on Thursday Mr. Ivins stated that he had been unable to obtain the books showing the financial history of the surface roads leased to the New York City Railway.

PIPING AND POWER STATION SYSTEMS—L.

BY W. L. MORRIS, M. E.

Fire Service to Low-Pressure Service—Class M-6.

If a fire pump were connected to the fire mains only, it would require special attention to keep it in working order, so that it might be used at any moment. Should the plant and its surrounding buildings require water at low pressure and the plant have its own water supply, it will be a good plan to use the fire pump for this service. By using the fire pump for the low-pressure service it is kept in constant use and its condition is thus known at all times.

The low-pressure service should be connected to the fire mains or pump discharge in such a manner that it can be shut off quickly in case of fire, the means for shutting off the pump being so arranged that the pump can be turned off outside of the building which is to be protected. Ordinarily, the best arrangement would be to start the low-pressure piping system at the fire pump discharge, a valve being inserted in the line so that the latter could be cut off. By taking all the general service connections from this main, only one main would have to be shut off in case of fire.

This one valve would shut off the water service from all plumbing fixtures, wash water for the car barns, and the water service to the journals, etc., and in many cases also the water to the open heaters. In most instances no serious result or inconvenience would be experienced if such services were shut off during a fire, but if it is absolutely essential to maintain some portion of the low-pressure water service it would be advisable to run a separate main from the fire pump discharge, the latter line then being fitted with a reducing valve. The main line, however, should be arranged so that it can be shut off, since there will be many minor connections taken from it which might be broken in case of fire, and thus cause a loss of pressure and a waste of water.

If three pumps, a feed pump, fire pump and reserve pump, are employed, the reserve pump can be used to supply the low-pressure service. The principal point to consider is how to reduce to a minimum the amount of water used for purposes other than fire. The use of a reducing valve in a branch from the fire line is liable to cause trouble if the low-pressure pipe is damaged and considerable water would then be lost, even though the pressure were reduced.

A positive and safe method is to shut off all the lines to the low-pressure service by gate valves, as previously mentioned, and if necessary, permit the feed pump to supply the boilers with cold water in times of fire. If an overhead tank is installed it can be used to supply water for the engine journals or as much of the low-pressure system as is unlikely to be injured by fire.

Fire Service to Oil Room—Class M-7.

All oils, grease, benzine, etc., kept in barrels should be stored in a separate room for two reasons, one being to avoid breakage due to the prevailing heat of the power station and the other to confine this material so that it will be less exposed to fire, and thus not liable to endanger other parts of the building in case a fire should start from the point where such inflammable material is stored. The oil room should have a double metal-faced door, one inside of the room and the other outside of the room or wall. The room should be located at an outside wall, with sufficient windows opening away from the building to act as a vent in case of an explosion of vapor inside of the oil room and also to allow the fire to be suppressed from the outside. The ceiling should be of masonry, designed to withstand intense heat. The door which opens into the oil room should have a masonry sill at eight inches or more above the floor, so that if oil should escape it would not run under the door and spread the fire to the rest of the building. A sewer and catch basin should be connected to the oil room floor to carry off any water delivered to the room.

otherwise both water and oil would spread to other parts of the building by leaking through the crack under the door.

If compressed air is at all times available in the power plant, a very efficient system of fire protection can be provided for the oil room by using one of the many "kill fire" powders. Such powder can be stored outside of the oil room and can be thrown on the fire by means of compressed air. The use of water in an oil room tends to spread fire, but the chemical powders merely produce a non-combustible gas, which smothers. It must be borne in mind, however, that fire extinguishers which produce non-combustible gases are only successful in a closed space. The necessity for keeping the doors closed when these powders are used will therefore be evident. A closed room such as has been suggested for the storage of oil is ideally suited for the use of chemical fire extinguishers, since the air is confined in the room and the non-combustible gas is easily retained and accomplishes results with a small amount of chemical.

Instead of using dry powder it might be better to use bottles of the chemical in liquid form, supported by fuse wire or strings, so that in case of fire the bottles would drop to the floor, break and extinguish the blaze.

If compressed air is not available in the plant two or three pipe sleeves can be built in the oil room wall and if chemical extinguishers are available their contents can be discharged into the oil room through the sleeves.

Engine and cylinder oil contained in metal tanks would be but a slight fire risk if kept between the masonry foundations if there is masonry floor in the engine room basement.

Where a return-drip oil system is used it is quite objectionable to place any part of this system in the oil room. It is seldom a difficult problem to place the various parts of the return-drip system so that they are protected from the fire. If the engine room floor is made of wooden joists and wooden boards there will be little additional risk if oil in metal tanks is placed below it. The fire would have to be far beyond control before there would be any additional danger from the oil tanks.

Floors and Roofs.

In many respects the oiled wooden floor surface is superior to any other material that can be used for an engine room floor and is much preferred by operators, as it is the least

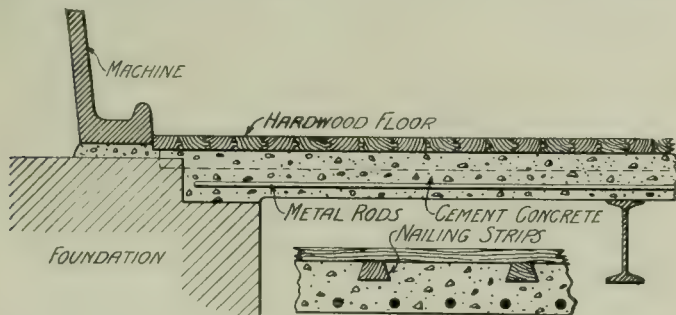


Figure 309 (M 7-1).

tiresome material for the feet. If a wrench or heavy part falls on the wooden floor it causes a dent, but not continual disintegration at that point. Cement, tile and metal floors are tiresome to work on, and with the exception of the metal floor, are easily damaged by falling parts. Cement floors have two additional objections: oil will cause sand and cement to disintegrate and even when oil has not reached the floor a fine dust is constantly being made by the movement over its surface.

The cast-iron checker plate floor serves the different requirements better than any other material, but it has the disadvantage that it is very tiresome to work on and if the engine room is hot, it will blister the feet. The greatest advantage of the cast-iron plate floor is that any section can be removed easily without any appreciable cost or inconvenience.

One of the most satisfactory forms of floor construction is that shown in Figure 309 (M 1-7). In this construction the structure which carries the floor surface is fireproof and no appreciable risk is added by the use of the oiled wood floor top if constructed as shown. The I-beams may be left exposed as the plan followed throughout should be the use of non-combustible material, and therefore it is unnecessary to attempt to construct the parts so that they will be able to withstand an intense heat. The machinery and apparatus will not withstand so much heat as the I-beams and other exposed metal parts.

A power plant should, so far as possible, be constructed of the non-combustible material and no attempt should be made to make it stand proof against damage should a fire occur. That is to say, steel trusses are the most suitable, as they are non-combustible. To make a roof fireproof it would

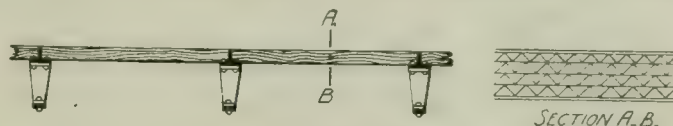


Figure 310 (M 7-2).

be necessary to support the roof on concrete steel trusses, with a tile or other fireproof roofing, which would necessitate an expense that would never be returned by the saving in the event of a fire.

If a plant is situated where there are dangerous fire risks near by, it may then be fireproofed outside, so that fire cannot be carried into the power station. This may necessitate the use of a fireproof roof covering and possibly rolling metal shutters, metal doors, etc.

A very suitable roof for this purpose is shown in Figure 310 (M 7-2), it being made of asbestos paper, with an earthenware glaze termed "vitrified." This material, when vitrified, is quite strong, is light, and the airtight cells shown in section A-B are very poor conductors of heat and prevent condensation on the under surface. The roofing felts cemented on top of these slabs are about 3 by 5 feet and are carried on trussed metal purlins. This material is made up of sheets, with a coating which serves as a binder, holding all the parts rigidly in place. The thickness should vary from 1½ to 2 inches, depending upon the length of the span. A fireproof roof might be constructed by making the slabs of concrete, reinforced with wire mesh, but this construction would have objections in that it is heavy and would drip considerably.

Fire Service to Lawn Sprinkler—Class M-8.

This is a service that is of a secondary nature in itself, but must be installed in such a manner that it does not become a risk in case of fire and interfere with the full use of the fire system. If it is at all possible to take the different hose connections from the low-pressure system, it should be done. If, however, it is necessary to use a higher pressure for the sprinkling service than can be carried on the low-pressure system, it would then be necessary to take the water for sprinkling from the fire main.

In purchasing material for the hose connections which are taken from the fire mains, special attention should be paid to the strength and reliability of the parts, since they will be subjected to a pressure of 150 pounds per square inch, or possibly even higher in case of fire. In no case should the fittings for sprinkler connections attached to the fire main be less reliable than the regular fire main fittings and materials.

(To be continued.)

Brown, Boveri & Co. of Baden, Switzerland, have on order a 15,000-kilowatt steam turbine for the Krupp works, in Germany. The overload capacity of this machine will be 18,000 kilowatts, involving the capacity to develop continuously 24,000 horsepower.

Accurate statistics show that Union Pacific motor cars are being operated at a cost of \$3.36 per 100 miles for fuel. This figure covers a period of operation of more than two years.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Duty to Passengers Not Knowing Car Has Not Stopped.

Blue Grass Traction Company v. Skillman, 102 Southwest-ern Reporter, 809.—The court of appeals of Kentucky holds that a conductor was bound to know, when people followed him to the door, after he had announced a station and opened the door for them, that they were coming out of the car for the purpose of alighting, and it was incumbent upon him to warn them of the danger; for he knew the car had not stopped, and he could not but know, from their actions, that they were coming out to get off. It was incumbent upon him under the circumstances to pay attention, as it was dark and the car was moving so smoothly that a person would not perceive the danger.

Railroad Condemnation Requirement Not Applicable.

Stafford Springs Street Railway Company v. Middle River Manufacturing Company, 66 Atlantic Reporter, 775.—The supreme court of errors of Connecticut says that the charter of the street railway company authorized it to take land "in the same manner as provided for taking land for steam railroad purposes." Under the title of "location and construction of steam railroads," the statutes provide that "every such company, before applying to the commissioners for the location of its road, shall deposit with the state treasurer a sum equal to \$11 for each mile of its proposed road," etc. But the court does not think that applicable to this street railway company, the statute having been first enacted in 1882, when street railways were operated by the use of horses, and seldom, if ever, laid except on the highway, while the words "every such company" manifestly referred to the words "every railroad company may lay out its road not exceeding six rods wide." A street railway is a kind of railroad company, but it does not follow that it is affected by every statute concerning railroad companies. That is a question to be determined in each case by a study of the whole body of legislation bearing upon the question.

City Cannot Construct Street Railways.

Bird, Attorney-General, v. Common Council of City of Detroit, 111 Northwestern Reporter, 860.—The supreme court of Michigan holds that, under the provision of the constitution of that state that "the state shall not be a party to or interested in any work of internal improvement; nor engage in carrying on any such work, except in the improvement of or aiding in the improvement of wagon roads, and in the expenditure of grants to the state of land or other property," the city of Detroit is without authority to construct street railway tracks in its streets.

Chief Justice Carpenter says in the case, among other things, that, in determining the constitutional proposition, the court decides just one question which has not already been decided by the harmonious adjudications of this court. That question was this: Has the city of Detroit authority to construct street railways under the provision of the constitution which, by necessary implication, authorizes municipalities to construct and maintain highways for public travel?

In construing the legislative grant to the city, the court decides that the city of Detroit has not authority to construct a street railway under its grant of power to "establish, open, widen, extend, straighten, alter * * * and to grade, pave, repair and otherwise improve its highways, streets and avenues" (Section 169 of Detroit charter), and to keep those highways, streets and avenues "reasonably safe and convenient for public travel." Section 3443, Compiled Laws of 1897.

With respect to the constitutional provision preventing municipalities from constructing street railway tracks in their

streets, three propositions are stated: First—A street railway is a work of internal improvement within the meaning of said section. Second—The prohibition of said section, unless otherwise provided in the constitution, applies to municipalities which are subdivisions of the state as well as to the state at large. Third—No other provision of the constitution authorizes a municipality to construct or to operate a street railway.

Carriers of Passengers—Care Required.

Schloemer v. St. Louis Transit Company, 102 Southwest-ern Reporter, 565.—The supreme court of Missouri, division No. 2, says that the rule of law is firmly established in that state that street car companies are carriers of passengers, and are held to the same degree of care and vigilance in preventing injuries to their passengers as is required of other railroads carrying passengers for hire; that is to say, the highest care and skill which prudent men would use and exercise in a like business, and under like circumstances.

Construction of Obligation to Pay Percentage of Net Income from Passenger Traffic.

City of New York v. Manhattan Railway Company, 104 New York Supplement, 609.—The supreme court, of New York, appellate division, first department, holds that, the company being required to pay to the city 5 per cent of the net income of an elevated railway from passenger traffic, there was no error in a refusal to deduct from the gross income taxes paid by the company, "rental damage" to abutting owners for the trespass upon their interest in the streets, and interest on mortgage bonds or other money borrowed for the construction of the road.

The court says that the question was not as to the net income of the corporation upon which it was entitled to base the amount of money distributable to its stockholders, or in determining whether or not its operations as a whole had been successful. In other words, it was not the net income of the corporation resulting from all its business, but the net income received by the railway from passenger traffic. It would be clearly improper to include in this, a charge against the corporation, any income that it should receive from sources other than the payment by passengers for passage upon its railroad. A corporation may receive income for advertising privileges, for rentals of its real estate, and other sources to which it would be entitled, and upon such income no charge could be based. On the other hand, its disbursements in relation to its general business, the salaries of its officers, the taxes it is required to pay, and legal and other incidental expenses are general charges against the corporation as the owner of property, or as enjoying a franchise or right to exist as a corporation. Neither are to be included in ascertaining what its net income for its passenger traffic is.

An entirely different question would be presented if the court were required to ascertain a percentage of the net income of the corporation, the net income of the property owned by the corporation; but, where the obligation is to pay a percentage of the net income received by the railway from passenger traffic, it seems to the court that must be ascertained by taking the gross income from passenger traffic and deducting from that the cost to the road of conducting the passenger traffic, as distinct from the cost to the company in its general operations. The court thinks it can hardly be said that the cost to the road of the salary of its general officers, the legal expenses in defending suits against it, and general expenses of that kind should be deducted from the gross receipts from passenger traffic; and yet it can see no reason why such general administrative expenses of the corporation are not upon the same basis as the taxes that the corporation pays because it owns property or exercises a franchise.

News of the Week

Minneapolis Low-Fare Case Argued.

The case of the Minneapolis Street Railway, now controlled by the Twin City Rapid Transit Company, against the city of Minneapolis, Minn., with regard to the enforcement of the ordinance passed on February 9, requiring the company to give six fares for a quarter, was argued in the federal court in St. Paul before Judge Lochren on August 20. The company opposed the ordinance and immediately secured a temporary injunction restraining the city from enforcing it. The case now before the court is to determine whether the temporary injunction shall be dissolved or whether the ordinance shall be declared invalid. The case hinges on the validity of the charter granted to the company by the city in 1875, which fixed the rate of fare at five cents. The company's petition for an injunction was published in part in the Electric Railway Review of February 23, 1907, page 256.

Suggested Changes in Chicago Elevated Loop.

Continued congestion of traffic on the Chicago elevated loop brings forth frequent schemes for relief. Among the later suggestions is that of Leroy L. Hunter, who proposes a subsidiary loop, to be formed by the continuation of the present spur of the Oak Park line in Market street south from Madison street to the Metropolitan line, between Jackson boulevard and Van Buren street, and to route some of the Metropolitan, Oak Park and Northwestern trains around this auxiliary loop.

G. W. Scott proposes a rearrangement of the present loop into four smaller loops by building cross lines on Clark and Monroe streets, thus forming a separate loop for each company. The advantages claimed for this system are: Each road complete with its own loop. No conflict relative to station approach. No crossings. A tieup affects the individual road, and does not necessarily extend to others. A union or transfer station at the inner angle of all four loops. An approximate reduction of one-half in loop length to be traversed. The possibility of rounding the individual loops in time not appreciably longer than for the same distance on main-line service.

Fined for Failure to Provide Fenders.

J. McMillan, traffic manager and acting superintendent of transportation of the Los Angeles Interurban Railway, was fined \$300 on August 21 for operating a car without a fender. The motorman and conductor of the car were fined \$100 each. The city council recently passed an ordinance prescribing a certain type of fender and the two carmen and Mr. McMillan were arrested on July 15 for failure to comply with the ordinance. The hearing before Judge Frederickson began on August 13. The attorneys for the company denied that the Interurban is a street railway and claimed that the city has no authority to prescribe a fender for it. Mr. McMillan was put on the stand and stated a number of reasons why the ordinance was unreasonable: that if the example of Los Angeles were followed every town through which the line passes might prescribe a different type of fender; that the pilots now in use are much more useful and safer, as a fender is too fragile to be of any benefit at the high speeds at which the interurban cars run outside of towns; and that on some of the city curves the fenders would extend 7½ feet beyond the outside rail.

Following the adverse decision of the court the city police immediately began arresting conductors and motormen. Eight men were arrested and the district attorney announced that he would continue to have arrests made daily. The company has appealed the case.

Appeal Granted in Chicago Decree.

An appeal from the order decreeing that the Chicago Union Traction properties be leased to the Chicago Railways Company has been granted by Judge Grosscup of the United States circuit court. The appeal will be heard on September 5 by Judges Seaman and Baker of the United States circuit court and Associate Justice Brewer of the United States supreme court, sitting as a judge of the circuit court of appeals. It is expected that these judges will give a decision before September 14, the date on which the Chicago Railways Company must accept the new ordinance unless a further extension should be granted by the Chicago city council. If the decision is affirmed the lease will be perfected immediately, but if the decision should be reversed the ordinance cannot be accepted. Justice Brewer takes the place in the court of appeals of Judge Grosscup, who cannot pass in the higher court on his own action as a judge of the circuit court. Judge

Grosscup granted the petitions on August 18 of five different interests for appeals. Representatives of two other interests which had been granted appeals by Judge Baker asked that their appeals be considered at the same time with those granted by Judge Grosscup. Those who have appealed are as follows:

Nelson Thomasson, Jr., A. F. Werge, James Bolton and Jacob Baur, stockholders in the West Chicago Street Railroad Company and members of the stockholders' protective committee.

Central Trust Company of New York.

Merchants' Loan & Trust Company, Chicago.

Guaranty Trust Company of New York.

Equitable Trust Company of New York.

Fidelity Insurance Trust & Safe Company, Philadelphia.

Illinois Trust & Savings Bank, Chicago.

Truce in Cleveland Low-Fare Controversy.

The attorneys for the Cleveland Electric Railway, the Low Fare Railway, the Forest City Railway and the Municipal Traction Company of Cleveland, O., met on August 19 and agreed upon a truce for a week, during which the low-fare companies will make no attempt to carry out the provisions of the so-called curative ordinance, which went into effect on August 15, and which permits the Forest City Railway to operate over several streets now occupied by the Cleveland Electric Railway. It was further agreed that after the expiration of the truce no tracklaying should be started by the low-fare companies, except during court hours and after three hours' notice had been given to the attorneys of the Cleveland Electric Railway.

Charles S. Thrasher, a stockholder of the Forest City Railway, presented himself at the company's offices on August 17 and asked to be allowed to examine the company's books and records, in accordance with the oft-repeated statements of the officials and of Mayor Johnson that the company's records were at all times open to public inspection. However, he was informed by the attorneys that the company's records were in a bank vault and could not be seen and that the company had no operating accounts, as the road was operated by the Municipal Traction Company. He was not allowed to inspect the latter company's books, as he is not a stockholder of that company. On August 21 the Audit Company of Cleveland was allowed to make an examination of the Forest City books in behalf of Mr. Thrasher. This investigation disclosed that an unknown person had advanced large sums to the company, which had been credited to capital account. The books were also indefinite in many other respects.

On the same day Peter Witt, city clerk, appeared at the Cleveland Electric offices with an accountant and was given every facility for making an examination of the company's books. The results of Mr. Witt's examination have not yet been announced.

Recent Accidents.

Six persons were seriously injured and several others slightly injured in a rear-end collision at Philadelphia on August 17, between a Fairmount Park car and two Glenside cars of the Philadelphia Rapid Transit Company. The first of the Glenside cars was disabled and the second was pushing it, and the motorman of the first car was unable to stop both cars with the brake.

As the result of a collision on August 15 between a dirt train of the Long Island Railroad and a Coney Island electric car at Coney Island avenue and the Manhattan Beach Railroad crossing, which at this point is at grade, one man was killed, two fatally injured and several other passengers severely bruised. The accident occurred at a point on the line where a lumber yard obscures the approach of oncoming trains from the view of a motorman. The dirt train was standing with its rear car just clear of the crossing and, although a flagman was stationed at the crossing, the train backed up just as the electric car was crossing the track. The car was turned over on its side and a number of the passengers were injured by being pinned underneath the car. The statements of witnesses vary as to whether the conductor signaled to the motorman to go ahead or whether he gave the warning not to cross too late. The motorman and the flagman were charged in the Flatbush court with homicide, but after a brief hearing the magistrate adjourned the case until August 30.

By the burning out of a motor fuse on a Centre avenue car of the Chicago City Railway at Twenty-second street and Archer avenue on August 16 six passengers were injured, two of them seriously, and the motorman slightly burned.—On Sunday evening, August 18, when a State street car eastbound on Sixty-third street was approaching the entrance to the White City, the motor fuse burned out, setting fire to the woodwork in the front end. The car ran two blocks before the motorman succeeded in stopping it and in the confusion sev-

eral of the passengers were slightly injured by jumping from the moving car.

At a collision between two cars of the line of the York & Dallastown Electric Railway, about six miles from York, Pa., on August 18, nine persons were injured. The collision occurred on a sharp curve, which prevented the motorman from seeing the other car and is said to have been due to a misunderstanding of signals. Most of the passengers were injured in jumping from the car when they saw that an accident was inevitable.

A car of the New York City Railway, which was being repaired on the fourth floor of the car house of the Fourteenth street line on August 22 accidentally became connected with the power and ran off the end of the track, through two brick walls and partly into an adjacent flat building.

Eleven-Hour Workday in Des Moines.—The Des Moines City Railway on August 7 put into effect an 11-hour schedule for its trainmen, except on two runs, which cannot be made in less than 11 hours and 20 minutes. The employees recently demanded a reduction in the length of the runs, claiming their health was being impaired by long hours of labor.

University Cannot Grant Right of Way.—Attorney-General Stead of Illinois has rendered an opinion that the recent resolution of the legislature conferring upon the University of Illinois the power to grant a 25-foot right of way across the university campus to the Urbana & Champaign Railway is inoperative.

Street Railway Goes Out of Business.—After 14 years of operation the Independence & Rush Park Street Railway of Independence, Ia., has surrendered its franchise and the tracks and poles are now being removed. The road was built in 1892 by C. W. Williams and extended from the center of the city to the Rush Park race track. It has never proved a financial success and after several successive changes of owners the business is now being given up by the syndicate which purchased the property about four years ago.

Petition for Joint Rate in Oregon.—The Sunnyside Fuel Company of Portland has petitioned the Oregon railroad commission to establish a through route or joint rate on cordwood shipments in carload lots over the lines of the Northwest Log & Lumber Company and the Portland Railway Light & Power Company.

Express Service Started on the Pittsburg & Butler Line.—The Pittsburg & Butler Street Railway has started an express service on its line from Pittsburg to Butler, Pa., reducing the time from 1 hour and 41 minutes to 1 hour and 11 minutes. Twelve express trains have been put into service, in addition to the 38 local trains.

Philadelphia Subway Inspected.—A party of officials of the Philadelphia Rapid Transit Company and several city officials inspected the eastern section of the Market street subway on August 19 as the guests of the Millard Construction Company, contractors. The officials expressed their satisfaction with the work and with the progress being made.

Picnic for Employees at Milwaukee.—The Milwaukee Electric Railway & Light Company on August 22 gave the annual picnic to its employees and their families at Waukesha beach. A sufficient number of special cars were provided to convey the employees and their families to the beach and back, and a large number of entertainments and contests were arranged at the expense of the company.

Speed Limit Ordinance in Toledo.—The new speed limit ordinance recently passed by the city council of Toledo, O., went into effect on August 12. The ordinance limits the speed of all street and interurban cars to 12 miles an hour and 6 miles an hour on curves. It also requires a car going in one direction to stop and remain stationary while a car on the opposite track is unloading passengers.

Ordinance to Regulate Street Cars in Portland, Ore.—An ordinance introduced in the city council of Portland, Ore., on August 14 prohibits the operation within the city limits of street cars not equipped with modern air brakes, reduces the speed limit of cars within the fire limits from 8 to 6 miles an hour, and requires cars to come to a full stop when approaching another car that is discharging or receiving passengers.

Information in Regard to Atlantic City.—The Atlantic City bureau of information and publicity, composed of the board of trade, Hotel Men's Association and the Business League of Atlantic City, has issued an attractive pamphlet of 40 pages, describing the advantages of Atlantic City as a summer resort and a convention city. The pamphlet contains a large number of halftone illustrations of the most attractive points of interest of the resort, such as the hotels, scenes on the Boardwalk and the beach, etc., and is filled with information in regard to the city which will prove especially useful and

of interest to those who expect to attend the conventions of the American Street and Interurban Railway Association and its allied associations in October. Inclosed is a folder containing a directory of the hotels, with rates, and a list of members of the bureau of information and publicity.

Western Ohio Excursions.—Charles F. Price, general passenger agent of the Western Ohio Railway, Lima, O., has issued two posters advertising excursions from points on the Western Ohio to Detroit, Mackinac, Put-in-Bay, Cleveland, Buffalo and other lake resorts via the Detroit & Cleveland Navigation Company boats; also a round trip excursion from points on the Western Ohio to Niagara Falls, via the Detroit & Cleveland and Cleveland & Buffalo boat lines, at a rate of \$5.00.

To Investigate New York Central Suburban Service.—An investigation of the suburban business of the New York Central & Hudson River will be made by the public service commission of the first district, New York. The decision to consider this subject was made on account of a complaint from the Civic League of The Bronx that the company was not operating enough trains to accommodate its suburban traffic. The complaint also charges that the rates of fare are unequal and oppressive.

Suit Directed Against Milwaukee Franchise.—Attorney-General Gilbert of Wisconsin has filed suit in the circuit court of Milwaukee county to annul the franchise granted to the Milwaukee Electric Railway & Light Company in 1900. The suit is directed against the Milwaukee company, the North American Company and some of its directors, the city of Milwaukee, 20 members of the common council of 1900, and David S. Rose, formerly mayor. Mr. Rose declares that the suit is a political move.

San Francisco Strike to be Declared Off.—It is reported from San Francisco that the ways and means committee of the car men's union, including the employees of the United Railroads, who went on a strike on May 5, has arranged with representatives of the company to declare the strike at an end, and that the men will return to work at once as individuals. The strike has been practically at an end for some time and the company has been operating its cars without hindrance, but all members of the labor unions have been forbidden to ride on the cars.

Another Express Alliance.—A. B. Shepard, president of the Toledo & Chicago Interurban Railway, has announced that his company has entered into a contract with the United States Express Company and is now handling its business on all parts of the road, particularly from Ft. Wayne to Garrett, Ind., where the express is transferred to the Baltimore & Ohio Railroad for points on its system. Special cars making two trips each way per day are devoted to the express service, which is increasing so rapidly that it is probable that a third car will be needed in the near future.

Hearing on 5-Cent Fare.—The West End Improvement Club of Council Bluffs, Ia., which in March of this year filed a complaint with the interstate commerce commission against the Omaha & Council Bluffs Railway & Bridge Company asking the commission to compel the company to carry passengers between Omaha and Council Bluffs for a 5-cent fare, has received a communication from E. A. Moseley, secretary of the commission, stating that the hearing of the case would take place shortly after September 1. The answer of the railway company to the complaint was published in the Electric Railway Review of March 30, 1907, page 434.

Impose Conditions on Geary Street Road.—The San Francisco board of supervisors on August 15 decided to grant a temporary permit to the Geary Street Park & Ocean Railroad to operate its cars provided it would sign an agreement admitting that it has no franchise and transferring to the city for the consideration of one dollar all its fixed property in the streets. The company's franchise expired on November 19, 1903, and up to the beginning of the car men's strike, on May 5, 1907, it operated under sufferance, paying to the city 5 per cent of its gross receipts. President H. E. Platt recently asked permission to resume operation on the old basis.

Short-Lived Strike of Camden Gloucester & Woodbury Railway.—Forty motormen and conductors employed by the Camden Gloucester & Woodbury Railway of Gloucester, N. J., went on a strike at midnight on Saturday, August 17, but returned to work at 9 o'clock the next morning, when it was agreed to hold a conference to consider the men's grievances. The men appeared to have been dissatisfied because of new regulations which had been put in force, including one requiring them to keep away from saloons, and because several of the men had recently been discharged for violations of the rules. The men also claimed that they were often obliged to work an excessive number of hours per day.

New York Subway Improvement Approved.—The New York public service commission of the first district on August 16 formally approved the plans for three additional tracks in the Broadway subway, between Ninety-sixth and One Hundred and Third streets, and adopted a resolution calling upon the board of estimate to pass the appropriation needed to carry out the improvement. At the One Hundred and Third street junction the double tracks of the Broadway and Lenox avenue divisions of the subway meet and the switches and grade crossings made necessary by this arrangement cause many delays, particularly as the express trains of the section below Ninety-sixth street are obliged to use the local tracks above that point. President Shonts of the Interborough-Metropolitan Company recently testified before the commission that the additional tracks would permit of an increase in the local service of the subway of 33½ per cent.

Jurisdiction of Minnesota Commission to be Tested.—The disputed question of supervision of the interurban street railways of Minnesota, so far as the railway and warehouse commission is concerned, is to be submitted to a test. Papers, it is said, are being prepared for presentation to the commission which will bring the controversy to a focus. The matter will come up probably in the form of a petition for adjudication regarding a railroad crossing where the Minneapolis & St. Paul Suburban Railway crosses the tracks of the Minneapolis & St. Louis steam road. Under a law passed by the last legislature the commission was given supervision of all crossings and interlocking plants. In a decision given by the state supreme court street railways were designated as common carriers, but the question of supervision by the commission was left undecided. It is believed that under that decision the commission has supervision and will try to exercise it.

Los Angeles Franchise Case Decided.—Judge Bordwell of the superior court in Los Angeles, Cal., on August 14 decided the case of the city against the Los Angeles-Pacific Company in the so-called "third-rail" case. The court holds that the company has no right to lay a third rail for the use of broad-gauge tracks on Hill street, from Fourth to Eighth street, and on Sixteenth street, from Georgia street to Burlington avenue. These lines are used jointly by the Los Angeles-Pacific Company and by the Los Angeles Interurban Railway, each company holding franchises for part of the route. The law passed by the last legislature allowing companies to use each other's tracks is interpreted by the court as applying only when each company holds a franchise for the entire route. The court holds that a street railway company holding a franchise cannot grant to another company not having a franchise the right to use its tracks jointly, and consequently decides that the Los Angeles-Pacific cannot lay an additional rail to facilitate the operation of both companies.

To Establish Electric Freight Service.—Negotiations are in progress between the West Chester Street Railway and the Philadelphia & West Chester Traction Company for the establishment of a freight service from Coatesville and Kennett Square and intermediate points to Sixty-third and Market streets, Philadelphia. Terms for the interchange of freight are now being arranged, and some official announcement will, it is expected, be made shortly. These terms, it is understood, can only be completed after a schedule of carrying charges has been decided upon. The West Chester Street Railway extends from Coatesville and Kennett Square to West Chester, where connection is made with the Philadelphia & West Chester Traction Company, whose lines extend from West Chester to Sixty-third and Market streets. If the deal is consummated, and there is said to be every chance that it will go through, a warehouse may be erected at Sixty-third and Market streets. Later, it is believed, an effort will be made to reach the business center of Philadelphia over the Market street elevated and subway road.

Illinois Tunnel Company Contracts.—Samuel McRoberts, president of the Illinois Tunnel Company, has announced the completion of contracts for connection with the subway and the transfer of freight with nearly all of the railways owning freight terminals in Chicago. Contracts have been closed with the following companies: Atchison Topeka & Santa Fe, Baltimore & Ohio, Chicago Burlington & Quincy, Chicago Great Western, Chicago Indianapolis & Louisville, Chicago Milwaukee & St. Paul, Chicago Rock Island & Pacific, Chicago & Alton, Chicago & Eastern Illinois, Chicago & Northwestern, Erie, Illinois Central, Lake Shore & Michigan Southern, Michigan Central, New York Chicago & St. Louis, Pennsylvania Company, Pittsburg Cincinnati Chicago & St. Louis, Wabash, Wisconsin Central. Connections have already been made with some of these roads and the construction of subways to the freight houses of the other roads is progressing rapidly. Mr. McRoberts expects that this work will be completed about November 1, and that the subway company will be handling a large amount of freight by January 1, 1908.

Construction News

FRANCHISES.

Anniston, Ala.—The city council of Anniston has granted a perpetual franchise to the Anniston Electric & Gas Company in return for an agreement on the part of the company to reduce fares between Anniston and Oxford to five cents.

Battle Creek, Mich.—The Michigan United Railways has submitted to the city officials of Battle Creek a draft of a new franchise.

Cambridge, Md.—J. H. Buergeess, Jr., and W. H. Medford of Baltimore have been granted a 30-year franchise for an electric railway line in Cambridge.

Chisholm, Minn.—The Mesaba Traction Company has been granted a franchise for the operation of its interurban line through Chisholm.

East Moline, Ill.—The East Moline & Campbell's Island Railway has been granted a 50-year franchise. The company proposes to build from East Moline to Campbell's Island, Ill.

Hillsdale, Mich.—The city council has granted a 30-year franchise to the Southern Michigan Railway.

La Junta, Colo.—The Arkansas Valley Traction Company, incorporated recently to build an electric line between Rocky Ford and La Junta, has applied for a franchise to operate its lines in the four principal streets of La Junta.

Lincoln, Neb.—The Citizens' Railway has been granted a franchise to build a line on North Sixteenth street, from T to W.

New York, N. Y.—Supreme Court Justice Dayton has granted the application of Robert E. Robinson to have continued, until his suit is tried, a temporary injunction obtained by Robinson some days ago restraining the board of estimate from granting the application of the New York & Port Chester Railroad for the changing of its route so that it will coincide with part of the route laid down in the franchise granted in 1904 to the New York Westchester & Boston Railway. The injunction also restrains the officers of the road from proceeding with the proposed change of route. Robinson says that the proposed change is illegal and that the board of estimate has no power to grant it.

Parsons, Kan.—The city council has granted a franchise to C. L. Brinser for an electric railway in Parsons. This will form part of an interurban system, one line of which will extend north to Chanute and Pittsburg and the other south to Altamont by way of Edna to Coffeyville, Kan. Three different companies had made application for the franchise. The successful company has deposited \$25,000 and will start work within 60 days. The system is to be completed within one year.

Pasadena, Cal.—The Pacific Electric Company, Los Angeles, Cal., which recently applied for a franchise for an additional track on Colorado street and Fair Oak avenue, must pay \$5,000 for the privilege, according to a decision recently reached by the city council. The proposed new tracks will enter the heart of the business section and this amount was decided upon as being reasonable compensation for the grant, which will now be sold to the highest bidder.

Pittsfield, Mass.—The board of aldermen has granted a franchise to the Berkshire Street Railway for the extension of its tracks from East street to a point beyond Pleasure park. The work must be done within one year.

Rocky Ford, Colo.—The Arkansas Valley Traction Company has applied for a franchise. It is stated that the company has secured the right of way for its line from Rocky Ford to La Junta and is prepared to begin construction as soon as the franchises in the terminal cities are secured.

St. Louis, Mo.—A franchise has been granted by the St. Louis county court to the St. Louis Lakewood & Grant Park Railway for a single or double track electric line over a private right of way from the terminus of the Cherokee line to the Grant farm, the road to be in operation within one year.

Salem, Ore.—A. Welch, Portland, Ore., has petitioned for a franchise for an electric railway from the northern to the southern limits of the city, with an outlet upon the Willamette river. The line will extend southward to Albany, with a contemplated extension to Portland on the north and Eugene on the south, with a feeder from the main line at Turner to Mehama. The franchise covers two separate lines, both of which have their starting point at the Fair Grounds

store on the Portland-Salem road, at its junction with the original L. B. French right of way. Work must be begun within six months of the granting of the franchise and completed to Albany within two years. It is stated that this line will be the initial portion of a continuous system of inter-urban lines in Oregon, from Portland to the southern boundary of the state, with feeders tapping the most fertile sections of the valley, at present without railway facilities to the principal markets. Surveys are to be started at once. It is said that eastern capital is back of the project.

Salt Lake City, Utah.—The committees on municipal laws and streets of the city council have practically decided in favor of granting the franchise to the Utah Light & Railway Company for 19 extensions of the city lines in Salt Lake City. The question of compensation to the city has not yet been decided.

Sayre, N. Y.—The Waverly Sayre & Athens Traction Company has secured franchises in this city, thus enabling this line to connect South Waverly with Sayre. This portion of the road has recently been relaid with new rails.

South Amboy, N. J.—The Jersey Central Traction Company, Keyport, N. J., has applied for a franchise to lay its tracks for a distance of 700 feet on Bordentown avenue. In securing its former franchise from the county to cross the Amboy bridge, this strip of land was omitted in the description.

South Bend, Ind.—A franchise has been granted to the Chicago South Bend & Northern Indiana Railway for an extension of its line in Notre Dame avenue to the college grounds.

Springfield, O.—The city council has granted the Indiana Columbus & Eastern Traction Company a 12-year extension of its franchise. The ordinance provides that the company shall erect a new passenger station, shall furnish an hourly local service and shall permit joint use of its tracks by other companies which are not direct competitors. The use of the T-rail is permitted.

Tiffin, O.—The Cleveland & Indianapolis Electric Railway Company, which is building an interurban line from Bluffton to Norwalk, O., has secured a franchise for its operation in Tiffin.

Traverse City, Mich.—The citizens of the city have voted to grant a 60-year franchise to the Carter Construction Company of Chicago, for an electric railway.

Waterloo, Ia.—Two applications for electric railway franchises are now before the city council, as follows; E. P. Caldwell, W. M. Law, L. E. Evans, J. W. Richards and others, to build an electric line in Waterloo, the motive power to be either gasoline, kerosene or other similar fuel; M. B. Locke, representing a syndicate of local west side business men, which also desires to build an electric line in this city. No action will be taken by the council until the ordinance committee and the city attorney have passed upon them for revision.

Wilkesbarre, Pa.—A franchise has been granted to the Wilkesbarre & Wyoming Valley Traction Company for the extension of its line from the Empire to Laurel Run and work will be started on its construction within the near future. Thomas A. Wright, general superintendent, Wilkesbarre.

RECENT INCORPORATIONS.

Massillon Wooster & Mansfield Traction Company, Cleveland, O.—Incorporated in Ohio by G. A. Bartholomew and others to build an electric railway. Capital stock, \$1,000.

Princeton Power Company, Princeton, W. Va.—Incorporated in West Virginia to build an electric railroad and to maintain power stations. Capital stock, \$30,000. Incorporators: L. H. Perkins, W. B. Honaker, E. W. Hale, S. V. Straley, Princeton, W. Va.; and S. J. Evans of Keystone.

TRACK AND ROADWAY.

Alaska Home Railway, Valdez, Alaska.—This company has been formed to construct an electric railway from Valdez to the interior of the Copper river district. The company is formed entirely of residents of Alaska who have subscribed \$105,000 toward the cost of the line. Power for operation will be generated from a recently installed water power plant. A portion of the land for the terminals and wharves will be donated and it is said that a franchise will be granted by the city. H. D. Reynolds of the Reynolds-Alaska Development Company, which owns valuable mining lands in this section, is the manager of the new company.

Albion, N. Y.—It is reported that a company has been organized to build an electric line from Batavia through Barre

and Albion to Oak Orchard Harbor. Charles E. Hart of Albion is president.

Aurora Elgin & Chicago Electric Railway, Chicago, Ill.—It is reported that this company contemplates building a branch to Naperville, Ill., next year. As now planned the line will extend in a straight line west to Wheaton, where it will connect with the third-rail road near Wheaton, a short distance south of the golf grounds. It is announced that Naperville local business interests have offered to help finance the project.

Baton Rouge (La.) Electric & Gas Company.—General Manager C. H. Kretz states that the work of renewing the track, etc., will be completed by the end of the current month and then the matter of remodeling the car barns will be taken up. By the first of October the entire system will have been almost completely rebuilt.

Belton & Temple Traction Company, Temple, Tex.—This company is preparing to build an extension on Central avenue, Temple, west through Freeman Heights to Lake Polk driving park, and thence south to connect with the main line at Bell-view addition.

Boise & Interurban Railway, Boise, Idaho.—This company has recently completed its line between Boise and Caldwell, Idaho, and plans are now being formulated for a number of important extensions radiating from Boise. It is said to be the intention of the company to extend its line to Emmett, New Plymouth, Ontario, Weiser, Nampa, Roswell and other towns. Work has already been started on several extensions within the city of Boise. The company is also planning to build a park of 120 acres about four miles west of Boise. One hundred thousand dollars has been set aside for that purpose and a fine lake resort is to be created. W. E. Pierce is president and F. H. Knox, chief engineer.

Buffalo Lockport & Rochester Railway, Buffalo, N. Y.—The grading on this company's interurban line has been completed from Rochester to within two miles of Lockport. The road will connect at East avenue with the East avenue line of the International Railway Company, with which the Buffalo Lockport & Rochester has a traffic agreement for the entrance of its cars to Buffalo. Track has been laid from Medina to a point a short distance west of Middleport and it is announced that at the present rate of progress the line will be in operation this fall. Edmund Wragge, Toronto, Ont., is chief engineer.

Canyon City & Royal Gorge Railroad, Canyon City, Colo.—F. D. Heath, president, writes that this line from Canyon City, Colo., to the top of the Royal Gorge, 30 miles, will be operated by both steam and electricity. It is also proposed to build an electric line in Canyon City. Surveys have been completed and 10 miles have been graded from Canyon City. Contracts have been let and one substation is under construction. The overhead work is in progress. The W. C. Ross Company of Chicago has the contract. C. L. Mitten is chief engineer.

Central Kentucky Traction Company.—This company has issued \$300,000 bonds and executed a mortgage for \$250,000 to secure funds to finish the construction of its lines from Lexington, Ky., to Winchester, 20 miles, and Nicholasville, 15 miles.

Chicago & Milwaukee Electric Railroad.—Representatives of this company at Kenosha are reported to have announced that the cars of this company would be running into the loop district in Chicago by November 1. Entrance to Chicago from Evanston will be had over the line of the Evanston division of the Chicago Milwaukee & St. Paul Railroad, which will soon be equipped for electrical operation. This will make it possible to connect at Wilson avenue with the Northwestern Elevated, over whose lines the cars will operate into the city. It is stated that a 2-hour schedule will be maintained between Chicago and Milwaukee, and that sleeping cars later may be added.

Columbia & Walla Walla Traction Company, Walla Walla, Wash.—Miles C. Moore, president, states that this company proposes to build an electric railway from Pasco via Wallula and Walla Walla to Dayton, Wash., and to Lewiston, Idaho, 150 miles.

Corn Belt Traction Company, Champaign, Ill.—H. C. Billingsley, vice-president, states that construction work will begin shortly on this line, which is proposed to connect Champaign and Bloomington, Ill. A franchise has been secured at Champaign and much of the right of way has been secured between there and Bloomington. It is stated that the first section of nine miles between Champaign and Mahomet will be constructed this fall. It is expected to purchase power from the Illinois Traction Company.

Cowlitz Valley Railway & Power Company, Castlerock, Wash.—C. C. Brown, president, writes that this company proposes to build an electric line from Portland to central eastern Washington, a distance of 120 miles. The line will cross the Columbia river and follow the Cowlitz river for the entire distance. Preliminary surveys have been completed from Tilton Coalfield to Columbia, 70 miles, and the balance of the route is under survey. Grading will begin as soon as the right of way is secured. Power will be furnished from power houses now under construction at Spirit Lake by the St. Helen's Ore Mill & Power Company, which has contracted to furnish the power. The object of this road is to tap the mineral regions of the St. Helen's mining district and the Tilton coal fields. It is also expected to handle a heavy timber and lumber traffic. The grades will be easy and few bridges will be required. C. W. Riddell, chief engineer, Portland, Ore.

Danville & Eastern Illinois Railway.—This company, a part of the Illinois Traction System, has increased its capital stock from \$5,000 to \$500,000.

Denton (Tex.) Interurban Railway & Power Plant Company.—It is stated that this company's street railway line for Denton, Tex., will be in operation in about 30 days. Over a mile of track has been laid and grading is completed for considerable more track. The work in the power house is nearly completed. H. M. Griffin is president.

Denver & South Platte Railroad.—A party of Pittsburg capitalists interested in this company recently made an inspection trip over the line, which is being constructed from Englewood to Littleton, Colo. It is planned to extend the road to Roxbury Park, 25 miles from Denver, and eventually to Colorado Springs. It is said that the owners plan to build a large resort at Roxbury Park. W. E. Hughes, president.

Des Moines (Ia.) City Railway.—It is reported that plans are under consideration by this company for an extension of its line across the new Sixth avenue bridge over the Des Moines river to Highland Park. Frank S. Cummins, chief engineer, Des Moines.

Elmira Corning & Chemung Railway.—This new line was formally opened for business on August 4, when 4,300 passengers were carried over its route.

Fayetteville (N. C.) Street Railway & Power Company.—This company is in the market for two miles of 30 to 40 pound rails, with plates, spikes, bolts and three crossings.

Fremont (O.) Street Railway.—This line is to be improved and a new belt line to be built around the city. Rails for the belt line are now being received. J. W. Hunt is general manager.

Ft. Worth, Tex.—Two plans are being promoted to build an electric railway from Ft. Worth to Mineral Wells, Tex. One of these is being promoted by Maj. J. D. Beardsley of Mineral Wells, formerly of Gibsland, La., and the other is promoted by Gideon R. Turner of New Orleans. Subscriptions have been secured in favor of each of these enterprises, and at present it appears that both of them will begin work. The Beardsley road, it appears, will run via North Ft. Worth and Springtown, while the Turner line is to go via Weatherford. Committees are soliciting subscriptions, and representatives of the American Engineering Company of Indianapolis, Ind., have agreed to build the Beardsley road.

Hot Springs, Ark.—Hays Brothers Immigration Improvement & Real Estate Company is in the market for 2½ miles of 56-pound rails and the same amount of trolley wire, also fishplates, spikes and bonds. W. E. Mitchell, manager.

Illinois Traction Company, Champaign, Ill.—The Central Illinois Construction Company, a subsidiary of the Illinois Traction System, has awarded the contract for the superstructure of a bridge across the Mississippi river at St. Louis to the Missouri Valley Bridge & Iron Company of Leavenworth, Kan. The plans for the superstructure will be ready in about three months. The bridge will be about 2,200 feet long and will cost in the neighborhood of \$2,500,000. Ralph Modjeski of Chicago is preparing the plans. Besides a double track for cars there will be double roadways for wagon traffic and sidewalks for pedestrians. W. B. McKinley, president, announced last week that cars would be running on the Lincoln-Mackinaw line by December 1. Forty per cent of the grading is now completed. The company has secured permission from the Illinois railroad and warehouse commission to cross the tracks of the Chicago & Alton, Cleveland Cincinnati Chicago & St. Louis and the Vandalia railroads, either overhead or underneath, to be determined by a conference of the officials.

Indiana County Railways.—Governor Stuart of Pennsylvania has approved the articles for the consolidation under the above name of the Indiana Clymer & Creekside Railway

and the Indiana Punxsutawney & Sagamore Street Railway, with a capital stock of \$457,000. The officers are: President, D. H. Clar., of Punxsutawney; vice-president, T. L. Eyre of West Chester; secretary and treasurer, J. A. Klingensmith of Indiana.

Indianapolis Columbus & Southern Traction Company, Columbus, Ind.—Tracklaying on the extension from Columbus to Seymour has been completed and ballasting has been completed as far as Sand Creek. The work of stringing the trolley wire is nearly finished.

Indianapolis Newcastle & Toledo Electric Railway, Newcastle, Ind.—Twenty-three carloads of rails for this line from Indianapolis to Newcastle have been delivered and will be laid at once.

Inter-Urban Railway, Des Moines, Ia.—This company is negotiating for right of way through the Crawford farm south of the city for its proposed Carlisle and Knoxville extension. Most of the right of way has been secured with a view to the construction of the line next year.

Las Vegas, N. M.—Announcement is made of plans for the construction of an interurban electric railway from Las Vegas to Mora, N. M. Local capitalists, headed by Felix Martinez of El Paso, Tex., have subscribed \$40,000 for the undertaking and it is believed that the necessary additional funds can be raised within a short time. The line will serve a section hitherto without rail communication. President W. A. Buddecke of the Las Vegas Railway & Power Company, is among those interested.

Los Angeles-Pacific Company, Los Angeles.—Announcement is made that this company proposes soon to build a standard-gauge third-rail interurban line, with Sherman as its terminus. T. R. Gabel, general manager, Los Angeles.

Marengo Harvard & Lake Geneva Electric Railway, Walworth, Wis.—Right of way is being secured by the promoters of this line and capital for its construction is now assured. The road will be built along the Harvard and Marengo highway, making connection at Marengo with the Elgin & Belvidere Electric Railway and affording railway facilities to Woodstock, Beloit, Janesville, Geneva lake and Delavan lake. Hamilton Browne, 181 La Salle street, Chicago; E. D. Patrick, J. H. Patterson and A. A. Crissey, Marengo, Ill., are interested.

Mt. Hood Railway & Power Company, Portland, Ore.—The Mason Construction Company has established a camp at Fairview, Ore., preparatory to beginning the grading for this line from Portland to Bull Run, Ore., 25 miles. F. C. Finkle, consulting engineer.

Muskingum Valley Traction Company, Marietta, O.—This company, recently organized under the laws of Ohio, is at work on the construction of an electric line up the Muskingum river, from Marietta toward Zanesville. Grading is now in progress and it is announced that tracklaying will be started by the first of September. It is planned to have the line completed to Beverley by next spring and eventually it will connect with the line from Zanesville, thus establishing direct traction communication with Columbus and the larger cities of Ohio.

New York City Interborough Railway.—The Tremont avenue and One Hundred and Eighty-first street line of this company, now under construction, probably will be completed about November 1 next. This line, which will run from the One Hundred and Eighty-first street station of the Broadway subway line, through One Hundred and Eighty-first street and Tremont avenue to West Farms, will ultimately be extended to Locust Point on Long Island sound. The Kingsbridge road, which will connect with the subway at Two Hundred and Twenty-fifth street and intersect the One Hundred and Eightieth street line at Southern boulevard, also will be finished at about the same time. The Ogden avenue line, which will extend north in Ogden avenue, from the One Hundred and Fifty-fifth street station of the Sixth avenue elevated road, is expected to be in operation by September 1. A. E. Kilbach, 13 Park Row, manager and engineer.

Northern Traction Company, Hibbing, Minn.—It is announced that tracklaying on this company's proposed interurban line to Chisholm and Buhl was started this week from the terminus in Hibbing, at Third avenue and Cedar street. Practically all of the right of way has been secured and the greater portion of the grading is completed. It is expected that the line between Hibbing and Chisholm will be in operation some time this fall.

Pottsville, Pa.—A new 38½-mile electric line from Pottsville to Glen Carbon and Millersburg, to cost about \$1,500,000, is one of the recent electric railway projects in Pennsylvania.

W. E. Harrington, president of the Eastern Railways Company, Pottsville, Pa., is interested.

Quitman Valdosta & Thomasville Electric Railway & Power Company, Quitman, Ga.—An official report from H. L. Young states that this company, recently incorporated, proposes to build an electric railway from Quitman to Valdosta and Thomasville, Ga., a distance of 45 miles, by way of Blue Springs, Valdosta, Quitman, Dixie, Pidcock, Boston and Thomasville. Surveys have been completed between Quitman and Blue Springs, seven miles, and two miles east of Quitman has been graded. Grading is now in progress west of Blue Springs. No work of any consequence will probably be done on the road until the first of January.

Russellville & Ozark Mountain Traction Light & Power Company, Russellville, Ark.—Plans and specifications for a concrete dam, to be constructed over the Illinois bayou by this company, are now on file at the office of Edwin Cook, engineer, 401½ Main street, Pine Bluff, Ark., and at Brooks & Hays' office in Russellville. Bids will be received until 4 p. m., August 24.

San Antonio (Tex.) Traction Company.—A force of men is now at work on this company's extension of its tracks on Dwyer avenue. This extension, when completed, will enable the cars to pass through Main Plaza from Garden street by way of Nueva street and Dwyer avenue and will facilitate handling the crowds at the coming international fair.

Sangamon Valley Railway, Springfield, Ill.—It is announced that the right of way has been secured for the line from Springfield to Hillsboro, Ill., and that work will be started at once. J. E. Melick is president.

South Shore Traction Company.—It is stated that this company now has all the franchises necessary from Patchogue, L. I., to New York City.

Southern Cambria Railway.—It is reported that this company has awarded a contract for a large number of ties to be used on its line from Johnstown to South Fork, Pa.

Southern Electric Railroad, Paducah, Ky.—This company, recently incorporated to build an electric railway from Paducah to Mayfield, Ky., has increased its capital stock from \$50,000 to \$1,000,000 and elected the following officers: President, W. A. Martin; secretary and general manager, H. H. Loving; treasurer, W. B. Scott.

Springfield Belt Line Railway.—This company, a part of the Illinois Traction System, has increased its capital stock from \$5,000 to \$500,000.

Texas Traction Company, Dallas, Tex.—Satisfactory progress on the construction of this line is reported. About 70 per cent of the grading is finished and the roadbed will be completed by September 1 next. The bridges north of McKinney are in place. Fred A. Jones, in charge of the construction work, is reported as saying that if present weather conditions continue the line will be completed within the time planned.

Washington Railway & Power Company, Vancouver, B. C.—The greater portion of the tracklaying for the electric line in Vancouver is completed and work on the unfinished portion in the business section is being pushed. It is said that the line will be in operation within 30 days.

Winfield, Kan.—Robert W. Watson of Harrisburg, Kan., is promoting an interurban line from Arkansas City to Winfield, Kan.

Yakima (Wash.) Transportation Company.—A. J. Splawn, president, announces that construction work on the electric line in Yakima and vicinity will begin at once. Ties and rails for construction of three miles of track have been delivered. This company has taken over the property and franchises of the Yakima Intervalley Traction Company.

POWER HOUSES AND SUBSTATIONS.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—The work of laying the concrete foundation of the new plant at Electric park has been started.

Sydney & Glace Bay Railway, Sydney, N. S.—This company, which has heretofore purchased power from the Cape Breton Electric Company, has decided to erect a central power station at Glace Bay, N. S.

Utah Light & Railway Company, Salt Lake City, Utah.—This company is having plans prepared for an emergency power plant, which will cost \$1,000,000, to be erected on the site of the present plant. The new plant will have a capacity of 40,000 horsepower, and it is expected it will be a year and a half before it is completed.

Personal Mention

Mr. Charles F. McClellan has been appointed acting superintendent of the Troy & New England Railway of Troy, N. Y.

Mr. J. W. Anderson, since April 1 last superintendent of the Worcester & Southbridge Street Railway, has resigned his position, effective at once.

It is reported that Mr. Bion J. Arnold of Chicago will be retained by the New York public service commission to make a valuation of the New York City transportation systems.

Mr. L. R. Richards has resigned his position as electrical engineer of the Steubenville & East Liverpool Railway & Light Company, Steubenville, O., to engage in other business. Mr. Richards has been connected with the company for the past seven years.

Mr. John Hanf, formerly master mechanic of the International Railway Company of Buffalo, N. Y., has been appointed master mechanic of the southern division, Public Service Corporation of New Jersey, with headquarters at Camden, N. J.

Mr. Clifford B. Powers has been appointed purchasing agent of the Lake Shore Electric Railway, with headquarters at Norwalk, O., relieving Mr. F. W. Coen, secretary-treasurer of the company, who heretofore has had charge of this department at Cleveland. Mr. Powers will report to Mr. F. J. Stout, general manager.

Mr. Mark Lowd has been appointed to take charge of the construction work on the lines of the Stone & Webster Engineering Corporation in Oklahoma, Texas and Louisiana. He was formerly chief engineer of the Seattle (Wash.) Electric Company and will be succeeded in this position by Mr. George P. James, field engineer of the company.

Mr. R. A. Dyer, assistant manager of the Rochester Syracuse & Eastern Railway, Syracuse, N. Y., will, in addition to his present duties, assume those of superintendent of the Auburn & Syracuse Electric Railroad, succeeding Mr. R. P. Stevens, recently elected president of the Lehigh Valley Transit Company, as announced in the Electric Railway Review for July 13, 1907.

Mr. E. A. Sturgis, for the past two years superintendent of equipment of the Boston & Northern and Old Colony Street Railway companies, Boston, Mass., has resigned to become master mechanic of the Rio de Janeiro Tramway & Power Company. Mr. E. W. Holst, heretofore superintendent of car repairs of the Old Colony Street Railway, has been appointed to succeed Mr. Sturgis.

Mr. James K. Gray has been appointed superintendent of the Western Ohio Railway, with headquarters at Wapakoneta, O., effective on August 15. Mr. Gray started with the Western Ohio as extra motorman five years ago, when the road was first put into operation and was subsequently promoted to night dispatcher and chief dispatcher. On February 8, 1907, he was appointed trainmaster.

Mr. L. C. Shipperd, formerly treasurer of the Evansville (Ind.) Electric Railway, has been elected superintendent of the Evansville Princeton & Vincennes Interurban Railway, controlled by the Evansville & Southern Indiana Traction Company, succeeding Mr. W. P. Larcey, resigned. Mr. Larcey has been connected with the road since a few months after its completion, and was general manager when it was absorbed by the Evansville & Southern Indiana.

Obituary.

Walter A. Murphy, superintendent of the Carbaras-Boone Traction Company, Boone, Ia., was instantly killed last week by an electric shock, due to an attempt to clip a hanging wire outside of a car window while grasping the handle of the controller.

Charles Francis Marlow, secretary and treasurer of the Chicago Consolidated Traction Company, died at his home in Evanston, Ill., on August 20. Mr. Marlow was born in Philadelphia on January 15, 1864, and after graduating from high school entered the service of the Pennsylvania Railroad in the freight department, where he remained until 1893. He was employed for a year by William Wharton, Jr., & Co. of Philadelphia and in 1896 came to Chicago as assistant treasurer of the Siemens & Halske Electric Company. In 1898 he was appointed auditor of the Yerkes street railways in Chicago and upon the organization of the Chicago Consolidated Traction Company in 1899 he was elected secretary and treasurer.

Financial News

Barre & Montpelier Traction & Power Company, Barre, Vt.—Gross revenue in the year ended June 30, 1907, was \$45,745.95. Operating expenses were \$33,261.19, leaving net earnings of \$12,484.76. Taxes, insurance and equipment expenditures amounted to \$7,220.33 and notes payable to \$2,200, a total of \$9,420.33, leaving a surplus of \$3,064.43.

Brooklyn Rapid Transit Company.—In his testimony before the New York public service commission, first district, President Winter of the Brooklyn Rapid Transit Company stated that the gross revenue for the fiscal year ended June 30, 1907, was as follows:

Passenger	\$18,443,983
Freight	256,968
United States government mail	34,695
From American Express Company	57,876
Advertising	148,424
American Railway Traffic Company	439,641

Total\$19,381,587

The income account, with a comparison with the previous fiscal year, is as follows:

	1907.	1906.
Gross earnings	\$19,381,587	\$18,473,328
Expenses	11,465,705	10,441,377
Net earnings	\$ 7,915,882	\$ 8,031,951
Other income	555,166	323,936
Total income	\$ 8,471,048	\$ 8,355,887
Charges	6,026,386	5,612,934
Surplus	\$ 2,444,662	\$ 2,742,953
Special appropriations	442,064	580,343
Surplus	\$ 2,002,598	\$ 2,162,610

Fitchburg & Leominster Street Railway, Fitchburg, Mass.—In connection with the application of this company to the Massachusetts railroad commission for approval of an issue of \$250,000 stock the company presented an appraisal of the physical property made by C. M. Tompson of Boston. With a total of 40.9 miles of single track the properties were valued as follows:

Track	\$ 323,890.92
Grading, masonry, bridging, etc.	374,626.14
Overhead construction	174,135.25
Rolling stock	173,830.00
Buildings	100,600.00
Land	100,100.00
Steam and hydraulic power equipment.	81,300.00
Whalom park properties	21,950.70
Furniture	2,976.00
Shop, road department, power house, tools, machinery	6,233.05
Horses, wagons, sleighs, etc.	3,560.00
Engineering, legal and general expenses.	39,044.47
Interest during construction	8,000.00

Total\$1,383,246.53

Robert N. Wallis, treasurer of the company, writes that in reporting the hearing before the railroad commissioners the daily press created "a wrong impression by using the total of the inventory and the total of the liability side of the balance sheet. This made it appear that our outstanding liabilities were more than the property was appraised for. This is not so, as the appraisal by the disinterested expert showed more value in the property than is shown upon the books."

Knoxville (Tenn.) Railway & Light Company.—In offering for sale a block of the consolidated mortgage 5 per cent bonds of this company Isidore Newman & Son of New York report the following earnings:

	Year ended June 30, 1907.	First 6 months, 1907.	First 6 months, 1906.
Gross earnings	\$559,699	\$282,929	\$228,581
Operating expenses and taxes.	298,360	154,523	142,725
Net earnings	\$261,339	\$128,406	\$ 85,856
Interest charges	119,034	62,192	49,126
Surplus over interest	\$142,295	\$ 66,214	\$ 36,730
Reserve and depreciation	30,000	15,000	*15,000
Balance, surplus	\$112,295	\$ 51,214	\$ 21,730

*Deduction for reserve and depreciation was not made

monthly in 1906, but a single deduction of \$30,000 was made in December, 1906, half of which is considered as applying to the first half of 1906. The circular also gives considerable additional information regarding the company, which owns at present 39 miles of track (including 7 miles of double track), all of which is either new or has been reconstructed within the past 2½ years with rails weighing 70 pounds per yard or more. The power house has also been reconstructed and new car houses and cars have been added and the lines of track have been reconstructed and extended.

New York Auburn & Lansing Railroad, Auburn, N. Y.—The public service commission of the second district, New York, after hearing arguments on behalf of this company for approval of an issue of \$2,000,000 bonds, has permitted the withdrawal of the application, with leave to counsel to submit it again after a decision has been given by the courts regarding litigation involving the right of way of the road. The application was opposed by B. N. Leonard of Auburn.

Public Service Street Railway Company, New Jersey.—This company has been formed on behalf of the Public Service Corporation of New Jersey to acquire and operate the electric railways owned by that company. Stockholders of the Public Service Corporation approved on August 20 the terms of the transaction. The new company will acquire the properties of the North Jersey Street Railway Company, the Jersey City Hoboken & Paterson Street Railway Company and the United Street Railway Company of Central New Jersey. The capital stock of these three companies is, respectively, \$15,000,000, \$20,000,000 and \$4,000,000, a total of \$39,000,000. Owners of stock of the North Jersey and the Jersey City Hoboken & Paterson companies will receive for each share of their holdings a share in the new company. For each four shares of stock of the United Street Railway Company of Central New Jersey three shares of the new stock will be issued. The capital stock of the new company is \$38,000,000. Ninety-five per cent of the stocks of the three companies is owned by the Public Service Corporation. The directors of the Public Service Railway Company are as follows: Thomas O. Barr, Orange, N. J.; John J. Burleigh, Merchantville, N. J.; Albert B. Carlton, Elizabeth, N. J.; Walton Clark, Philadelphia, Pa.; Mark T. Cox, East Orange, N. J.; Anthony R. Kuser, Bernardsville, N. J.; Lewis Lillie, Haverford, Pa.; Randal Morgan, Philadelphia, Pa.; Thomas N. McCarter, Rumson, N. J.; Uzal H. McCarter, Rumson, N. J.; Charles A. Sterling, East Orange, N. J. The officers are: President, Thomas N. McCarter, Rumson, N. J.; vice-presidents, Charles A. Sterling, East Orange, N. J.; Albert B. Carlton, Elizabeth, N. J.; John J. Burleigh, Merchantville, N. J.; secretary, Frederick Evans, New York; assistant secretary, Harry C. Stevenson, Newark, N. J.; treasurer, James P. Dusenberry, Newark, N. J.; assistant treasurer, Robert D. Miller, Jersey City, N. J.

Quebec Railway Light & Power Company.—It is reported in Quebec that the controlling stockholders of this company have given an option on their holdings to Hanson Brothers of Montreal, representing the Mackenzie & Mann interests.

Seattle Renton & Southern Railway, Seattle, Wash.—Negotiations are reported to be under way for the purchase of control of this road by the Seattle Electric Company.

ELECTRIC RAILWAY EARNINGS.

Aurora Elgin & Chicago Railroad.

	July— 1907.	1906.
Gross receipts	\$152,252.05	\$135,797.63
Operating expenses	74,908.51	64,971.49
Net earnings	77,343.54	70,826.14
Fixed charges	27,508.26	24,939.13
Surplus	49,835.28	45,887.01

Brockton & Plymouth Street Railway, Plymouth, Mass.

	1907.	1906.	Increase.
June gross	\$12,359	\$10,808	\$1,551
June net	3,903	4,331	*428
June surplus over charges.	2,103	2,498	*395
Twelve months gross	116,419	104,039	12,380
Twelve months net	41,386	33,156	8,230
Twelve months surplus over charges	19,746	11,616	8,130

Galveston (Tex.) Electric Company.

	1907.	1906.	Increase.
June gross	\$36,520	\$ 32,165	\$ 4,355
June net	17,019	15,754	1,265
June surplus over charges.	12,853	11,587	1,266
Twelve months gross	345,979	256,612	89,367
Twelve months net	139,930	107,017	32,913
Twelve months surplus over charges	89,930	57,017	32,913

Houghton County Street Railway, Hancock, Mich.

	1907.	1906.	Increase.
June gross	\$ 22,437	\$ 20,151	\$ 2,286
June net	10,375	8,400	1,975
June surplus over charges.	6,429	4,482	1,947
Twelve months gross.....	243,320	211,196	32,124
Twelve months net.....	92,199	66,572	25,627
Twelve months surplus over charges	45,031	20,626	24,405

Houston (Tex.) Electric Company.

	1907.	1906.	Increase.
June gross	\$ 59,076	\$ 51,158	\$ 7,918
June net	19,909	21,020	*1,111
June surplus over charges.	8,883	10,955	*2,072
Twelve months gross.....	634,521	558,301	76,220
Twelve months net.....	221,290	211,655	9,635
Twelve months surplus over charges	94,310	82,906	11,404

Jacksonville (Fla.) Electric Company.

	1907.	1906.	Increase.
June gross	\$ 34,161	\$ 26,846	\$ 7,315
June net	13,068	10,248	2,820
June surplus over charges.	9,213	6,823	2,390
Twelve months gross.....	366,765	296,125	70,640
Twelve months net.....	134,713	110,810	23,903
Twelve months surplus over charges	92,622	70,890	21,732

Montreal Street Railway Company.

	1907.	1906.	Increase.
July—			
Earnings	\$339,756.45	\$300,884.57	\$38,871.88
Operating expenses ..	175,946.86	161,160.75	14,786.11
Net earnings	163,809.59	139,723.82	24,085.77
Charges	67,732.86	55,801.90	11,930.96
Surplus	96,076.73	83,921.92	12,154.81
October 1 to July 31—			
Earnings	\$2,834,644.35	\$2,494,669.54	\$339,974.81
Operating expenses ..	1,761,545.18	1,528,353.81	233,191.37
Net earnings	1,073,099.17	966,315.73	106,783.44
Charges	457,347.08	374,810.26	82,536.82
Surplus	615,752.09	591,505.47	24,246.62

Puget Sound Electric Railway, Tacoma, Wash.

	1907.	1906.	Increase.
June gross	\$ 147,199	\$ 116,794	\$ 30,405
June net	58,936	38,165	20,771
June surplus over charges.	26,958	13,401	13,557
Twelve months gross.....	1,520,908	1,216,672	304,236
Twelve months net.....	529,654	400,736	128,918
Twelve months surplus over charges	184,092	131,307	52,785

United Traction Company, Albany, N. Y.

	1907.	1906.	1905.
Quarter ended June 30—			
Gross	\$512,511	\$467,887	\$441,316
Operating expenses	294,383	268,282	329,806
Net	218,128	199,605	111,510
Other income	35,890	2,622	3,780
Total income	254,018	202,227	115,290
Charges	87,482	86,881	86,505
Surplus	166,536	115,346	28,785

Whatcom County Railway & Light Company.

	1907.	1906.	Increase.
June gross	\$ 27,362	\$ 20,310	\$ 7,052
June net	10,588	6,345	4,243
June surplus over charges.	3,931	2,586	1,345
Twelve months gross.....	318,131	237,462	80,669
Twelve months net.....	123,201	71,221	51,980
Twelve months surplus over charges	59,617	32,201	27,416

*Decrease.

Dividends Declared.

American Railways Company, Philadelphia, quarterly, 1½ per cent.
 Columbus (O.) Railway Company, common, quarterly, 1¼ per cent.
 Georgia Railway & Electric Company, Atlanta, Ga., common, quarterly, 1½ per cent.
 Kansas City Railway & Light Company, preferred, quarterly, 1¼ per cent.
 Terre Haute (Ind.) Traction & Light Company, preferred, semi-annual, 3 per cent.
 Whatcom County Railway & Light Company, Bellingham, Wash., preferred, semi-annual, 3 per cent.

Manufactures and Supplies

ROLLING STOCK.

Northern Electric Railway, Chico, Cal., is in the market for three large cars.

Kansas City Railway & Light Company, Kansas City, Mo., is reported to be in the market for 100 cars.

New York City Railway, it is reported, has ordered 100 "pay-as-you-enter" cars from The J. G. Brill Company.

Utah Light & Railway Company, Salt Lake City, Utah, has awarded the contract for the 50 cars, previously mentioned in the Electric Railway Review, to the St. Louis Car Company.

Georgia Railway & Electric Company, Atlanta, Ga., which was reported to have purchased 40 cars, officially advises us that this is incorrect. The company is building 40 cars in its own shops.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has ordered, it is reported, six double-truck 34-foot semi-convertible cars from the G. C. Kuhlman Car Company.

Philadelphia Rapid Transit Company, Philadelphia, Pa., has ordered 40 all-steel cars from the Pressed Steel Car Company. This company was previously reported to have ordered 60 cars, but this report is officially branded as incorrect.

Joplin & Pittsburg Railway, Pittsburg, Kan., which was reported to have bought 12 cars from the Jewett Car Company in the Electric Railway Review of July 27, officially advises that the order is for six interurbans and six closed cars for city service.

Hays Brothers Company, Hot Springs, Ark., which was reported to be in the market for cars, in the Electric Railway Review of June 29, officially advises us that it will buy two large double-truck cars and two single-truck cars. W. E. Mitchell, vice-president and general manager, Arkansas National Bank building, Hot Springs.

SHOPS AND BUILDINGS.

Illinois Traction System, Champaign, Ill.—Work on the construction of this company's shop building at Decatur, Ill., previously mentioned in the Electric Railway Review, is progressing rapidly and should be completed in about a month. The storehouse is already finished.

Joliet & Southern Traction Company, Joliet, Ill.—We are officially advised that the site for a station at Joliet, mentioned in the Electric Railway Review of August 17, has been purchased, although plans for the building are not yet completed.

Old Colony Street Railway, Boston, Mass.—The 1-story express and freight car house, mentioned in the Electric Railway Review of August 17, which this company is building at Taunton, Mass., is to be 40 by 115 feet; side walls and foundation built of reinforced cement; roof to be mill construction, covered with 5-ply gravel roofing. A spur track has been laid on one side on which four express cars can be loaded and unloaded at the same time. At one end of the building will be the main office, private office, toilet and store rooms. The new building takes the place of the one adjoining it, which is 30 by 50 feet, and which the Old Colony Street Railway has outgrown in 12 months.

Rhode Island Company, Providence, R. I.—It is reported that plans have been completed for a brick and concrete car house, 280 by 142 feet, to be built at Mt. Pleasant. The cost will be \$80,000.

Redlands (Cal.) Central Railway.—Ground has been broken for this company's car house, on the south side of Brookside avenue, west of Angelica street. The building will be mission style, with arched doors and windows and cement front.

Southwestern Traction Company, London, Ont.—The car house at London, Ont., with five cars and 20 motors, was destroyed by fire recently. General Manager S. W. Mower states that the building will be rebuilt as soon as possible.

Sydney & Glace Bay Railway.—This road has decided to build its car houses at Glace Bay, N. S.

TRADE NOTES.

Northern Engineering Works, Detroit, Mich., has furnished the Pennsylvania Railroad Company with one 5-ton 3-motor

electric traveling crane, with a 55-foot span. It is installed in the Altoona shops.

Bethlehem Steel Company, South Bethlehem, Pa., began production in its new Saucon plant on August 14.

H. W. Johns-Manville Company has removed its Minneapolis office from 26 Washington avenue to 251 Third avenue, South.

Invincible Rail Joint Company, Spokane, Wash., has filed amended articles to change its name to the Washington Steel & Bolt Company.

Stone & Webster Engineering Corporation, 84 State street, Boston, Mass., took possession of its own building at 147 Milk street on August 19.

Dayton Pneumatic Tool Company, Dayton, O., has appointed Root, Neal & Co., 178 Main street, Buffalo, N. Y., as its agents in that territory.

Kauffman Engineering Company, Salt Lick, Ky., builder and operator of steam and electric roads, is in the market to lease 10 miles of 40, 45 or 50 pound rails.

Pittsburg Automatic Vise & Tool Company, Pittsburg, Pa., has recently supplied several of the larger plants of the United States Steel Corporation with entire vise equipments.

Electric Storage Battery Company, Philadelphia, Pa., has removed its temporary San Francisco offices from 11 Hawthorne street to permanent quarters in the Crocker building.

Blue Island Car & Equipment Company, Pierre, S. D., has been incorporated in the state of South Dakota with a capital stock of \$150,000 and at Calumet, in the state of Illinois, with a capital stock of the same amount.

Canadian General Electric Company is building a 5-story fireproof office building, 60 by 186 feet, at King and Simcoe streets, Toronto, Can. It will be constructed of skeleton steel and dark gray brick, with stone and terra cotta trimmings.

Bluffton Anchor Company, Bluffton, O., has been incorporated with a capital stock of \$2,000 to manufacture a recently patented device to anchor telegraph and telephone poles. F. H. Downing, Lima, O., is interested in the company.

Atlas Anchor Company, Cleveland, O., has been organized with a capital stock of \$20,000, to manufacture anchors for telephone and trolley poles. The incorporators are: C. E. Frost, R. W. Deering, T. J. Frost, K. F. Leet and S. E. Maggi.

Standard Truck Company, Cleveland, O., has been incorporated with a capital stock of \$100,000, to manufacture steel trucks for street cars. The incorporators are attorneys representing the men back of the company, whose names are not yet known.

Ferrofix Brazing Company, Charlotte, N. C., has been organized with a capital stock of \$25,000 to manufacture and repair by process of brazing, and to handle all kinds of machinery and supplies. Incorporators: F. H. Bradley, L. E. Anderson and J. A. McRae.

Yale & Towne Manufacturing Company, Stamford, Conn., has filed a certificate increasing its capital stock from \$1,000,000 to \$1,500,000. The recent legislature authorized the company to increase its capital to \$5,000,000, and further issues of new stock will probably be made.

Ohio Brass Company, Mansfield, O., manufacturer of electric railway supplies, reports that the week ending August 17 was the banner week in the history of the company. More orders for materials and supplies were received during that week than during any other like period since its organization.

Industrial Works, Bay City, Mich., manufacturer of wrecking and station cranes and other construction and shop equipment, is preparing plans for the erection of a new gray iron and steel foundry. It will be 160 by 300 feet, and will help materially in handling the company's rapidly increasing business.

D. E. Bonner, for the past three years Chicago representative of the Pantasote Company, 11 Broadway, New York, will become connected with the company's main office there. G. N. Boyd, heretofore of the New York office, succeeds Mr. Bonner in Chicago. The offices of the Pantasote Company are in the Fisher building.

Porter Tool & Supply Company, 100 William street, New York City, advises that in order to conduct its growing business to better advantage it has been incorporated under the laws of the state of New York, and has succeeded the firm of Charles E. Porter. The company handles a complete line of electric railway supplies and is able to make prompt deliveries

of gears and pinions, coils, gear cases, commutators, controllers and motor parts, trolley poles and wheels, track scrapers, car replacers, pinion pullers, car signs, car fittings, etc. The new company is in better position than ever to handle the requirements of its customers. C. E. Porter is president and E. S. Porter secretary of the company.

Central Inspection Bureau, New York, has recently completed the inspection of a large number of interurban cars for the American Railways Company at the works of the Jewett Car Company, and of a number of interurban cars for the Eastern Pennsylvania Railway Company at the works of the Cincinnati Car Company.

Buss Machinery Company, Muskegon, Mich., manufacturer of woodworking machinery, has purchased the land and buildings partially occupied by it and formerly used as the plant of the Davies Foundry Company. The site is 132 by 140 feet and includes a 4-story wooden building, besides a brick machine shop and other buildings.

St. Louis Car Company, St. Louis, Mo., has increased its capital stock from \$3,000,000 to \$6,000,000. The company has sold some of its stock in France and \$1,000,000 will be deposited to its credit in the Bank of France upon notification that an equal par value amount of stock has been deposited in the National Bank of Commerce in St. Louis.

Carnegie Library, technology department, Pittsburg, Pa., is making a comprehensive collection of trade catalogues and will be grateful to receive and file the literature of manufacturers. They will be carefully listed under both firm name and subject and will be accessible to the public. Address H. W. Craven, technology department, Carnegie Institute, Pittsburg, Pa.

Ventilated Cushion & Spring Company, Jackson, Mich., has incorporated with a capital stock of \$75,000 to manufacture and sell its patented springs and buttons, used in equipping cars. Incorporators: H. W. Hart, Chicago; S. F. Randolph, New York; W. B. Miller, Akron, O.; B. M. De Lamater, H. S. Reynolds, H. E. Edwards, R. W. Smith and Charles Ruston, Jackson, Mich.

Heath & Milligan Manufacturing Company, Chicago, has had plans prepared for a warehouse and oil house, at 90 to 106 Seward street. The buildings will be three and one story, 98 by 200 feet and 25 by 98 feet, respectively, and will cost \$225,000. Although a building permit has been taken out, the superstructure will not be built until next year. The contractors are B. H. Lichter & Co., 115 Dearborn street and the architect Myron H. Church, Marquette building.

Chicago Pneumatic Tool Company, Chicago, has issued its statement of profits for the first half of 1907, ending June 30. The profits for this period were \$50,000 more than for the corresponding period in 1906. After writing off \$108,633.58 for depreciation, development of new tools and deducting the reserves for interest and sinking fund there remained a balance of \$316,394.54 available for dividends. This figures about 9.8 per cent on the company's capital stock for the full year. Following is the statement for the first half of 1907:

Profits for the half year.....	\$507,528.12
Depreciation of buildings, including repairs and renewals of buildings and plant	\$97,833.58
Written off for developing and perfecting new tools	10,800.00
	<hr/> 108,633.58
Net profit	\$398,894.54
Reserve for bond interest.....	\$57,500.00
Sinking fund reserve	25,000.00
	<hr/> 82,500.00
Profit available for dividend.....	\$316,394.54
Quarterly dividend No. 17.....	\$61,087.83
Quarterly dividend No. 18.....	64,487.83
	<hr/> 125,575.66
Balance carried to surplus.....	\$190,818.88
Previous surplus	878,409.44
	<hr/>
Surplus carried forward	\$1,069,228.32

McGuire-Cummings Manufacturing Company, Chicago, has recently received the following sweeper orders: From the Spokane & Inland Railway Company of Spokane, Wash., for two standard single-truck steel underframe sweepers; from the New York & Long Island Traction Company of Long Island City, N. Y., for three of the same type; from the Rapid Transit Subway Construction Company, New York City, for two of the same type; from the North Electric Street Railway Company, Scranton, Pa., for a standard single-truck snow

sweeper; and from the Connecticut Company, New Haven, Conn., for a single-truck wood underframe rotary sweeper. The company has also received an order for seven double-truck derrick cars from the Consolidated Railway Company of Connecticut.

ADVERTISING LITERATURE.

Cooper Heater Company, Dayton, O.—A 4-page leaflet illustrates this new heater for street car use and contains a list of 19 reasons why it should be generally adopted.

Heany Fireproof Wire Company, York, Pa.—A small leaflet describes the use of the Heany fireproof insulated magnet wire in street railway work.

Jewell Electrical Instrument Company, Chicago.—A recently issued catalogue illustrates and describes the Jewell standard electrical measuring instruments, consisting of direct and alternating current meters for portable, laboratory and switchboard use.

Price Publishing Company, Lima, O.—The latest addition to this company's line of electric railway maps is a large one of Ohio, Indiana and Michigan. These maps are evidently filling a want never before satisfied and many roads are supplying them to their ticket and freight agents.

McGuire-Cummings Manufacturing Company, Chicago.—A folder contains a lengthy list of the cities in the United States and foreign countries in which the McGuire-Cummings combination rotary snow and track sweepers are in use, together with a number of testimonial letters from various traction companies.

Watson-Stillman Company, New York.—Catalogue No. 70, just issued, is said to be the most extensive yet published, covering only one feature of hydraulic machine shop tools, namely, forcing presses. Nearly one-half of the matter has never been shown by the company previously and many sizes of tools have been added.

Under-Feed Stoker Company, Chicago.—The August issue of the *Publicity Magazine*, which is devoted to the interests of the Jones stoker, manufactured by this company, contains a reproduction of an article which appeared in the *Nebraska State Journal* regarding the better street car service rendered by the Lincoln Traction Company of Lincoln, Neb., due to the successful use of the 12 Jones automatic stokers installed at its plant.

Chicago Pneumatic Tool Company, Chicago.—Catalogue No. 23 has more than 100 pages and is devoted exclusively to Franklin air compressors. The descriptive matter is illustrated with a number of halftone engravings of the machines and parts. The company's widely known line of pneumatic tools and appliances, including "Boyer" and "Keller" hammers, "Little Giant" drills, sand hammers and hoists, is illustrated in a new catalogue designated No. 24.

The J. G. Brill Company, Philadelphia, Pa.—The August number of *Brill's Magazine* is interesting as usual. Among the recent car orders illustrated are those for the Anderson Traction Company of Anderson, S. C.; the Connecticut Company of New Haven; the Washington Water Power Company of Spokane; the Aurora De Kalb & Rockford Railway Company of Aurora, Ill.; the Seattle Renton & Southern Railway of Seattle; and the Richmond Light & Power Company of Staten Island, N. Y.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis.—This company, which is manufacturer of electric controlling devices, has just issued a booklet—pigeon-hole size—descriptive of its line of electric crane controllers. In addition to full descriptions and illustrations of five types of crane and hoist controllers, the booklet contains connection and dimension diagrams, repair part charts, prices, net weight and shipping weight of apparatus, etc. An improved form of contactor for handling heavy currents is also described.

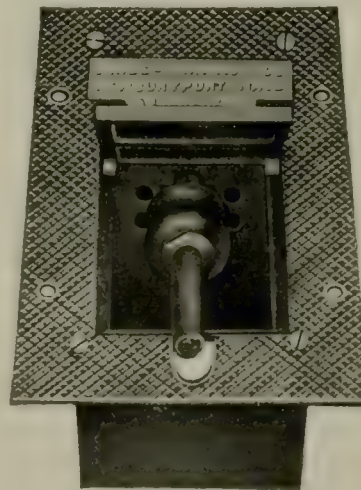
Belden Manufacturing Company, 194 Michigan Street, Chicago.—This company's catalogue No. 3 contains concise descriptions, with profuse illustrations, covering its large line of electrical wire and cordage products. Net prices and useful tables are included. The catalogue, which is 7½ by 5¼ inches in size and contains 48 pages, is of special value to customers for the reason that every holder of its catalogue is advised of changes in price of materials from time to time as they occur. A copy of the catalogue will be sent upon application.

Lagonda Manufacturing Company, Springfield, O.—Just what can happen when a steam main bursts or a fitting on the line breaks or one boiler of a battery gives way, is vividly told in a newly issued pamphlet describing the Lagonda auto-

matic boiler cut-off valve. The pamphlet also explains the dangers from ammonia explosions and the way in which the cut-off valve may be used to stop the flow before enough of the ammonia gets out to do any harm. A number of interesting tests are given to show the certainty with which this type of automatic valve does the work in case of accident. The valve is illustrated in detail and its action explained.

Power Specialty Company, 111 Broadway, New York.—The fourth edition of its pamphlet on "Superheated Steam" has just been issued after revision by the author, Mr. E. H. Foster, inventor of the Foster superheater. This edition contains profuse illustrations of superheaters manufactured by the company as applied to the various types of boilers and also of the direct fired type, ranging from large installations of 3,000 horsepower units to small portable superheaters which may be used for experimental purposes. The pamphlet also contains reproductions of photographs of various parts showing the construction of the Foster superheater in detail. A few pages are devoted to superheated steam specialties, such as piston rod packing, Harter flexible joints, corrugated bronze gaskets and the Willits double-acting non-return valve. At the back of the book are steam tables running to high pressures and temperatures; also tables of velocities of steam in various sizes of pipe at different degrees of superheat, and curves for readily selecting the proper size of steam pipe for any set of conditions, which will be found most useful to the designing engineer.

Trussed Concrete Steel Company, Detroit, Mich.—The engineering department of this company has just issued a limited edition on Kahn System Standards, being a handbook of practical calculation and application of reinforced concrete. The rapid growth of reinforced concrete construction makes necessary a handbook on design, similar to those in use for the ordinary classes of building material. The only data which have heretofore been available to the engineer or architect have been the scientific textbook, in which the information presented is so involved as to be of little practical value to the busy designer. Otherwise he has had to resort to a series of empirical formulæ, or tables, which may only be justified by a few isolated tests. The object of this handbook is to present to the designer tables and information in such form as to be immediately available for use in actual designs, and at the same time to have these tables founded on scientific formulæ approved by this company's very best engineering practice. The work as presented deals mainly with the Kahn trussed bar. The Kahn system of reinforced concrete, however, includes in its application two other types of reinforcement, namely, the Kahn-rib metal, consisting of a series of straight bars connected laterally by light cross members rigidly attached to the ribs and the Cup-bar, being a specially rolled section with cross ribs scientifically designed, so that the bar cannot slip in the concrete. The publication is 7¼ by 4¼ inches, contains 106 pages, is profusely illustrated and well printed on heavy enameled paper, and is neatly bound in green flexible linen covers.



A New Stage Pocket.

AN IMPROVED STAGE POCKET.

The Chase-Shawmut Company, Newburyport, Mass., has recently placed on the market a new stage pocket, designed to comply with the new rules made by the board of fire underwriters, which require such pockets to be fused at the switchboard. In designing this device its manufacturer has taken into careful consideration the rough usage received by articles of this nature in street railway park theaters, etc. It is thought that this simple, safe and durable pocket will fulfill all requirements.

Compulsory Block Signals in Indiana.

The state railroad commission of Indiana has ordered all railroads whose earnings are in excess of \$7,500 a mile to proceed to equip their lines with block signals and to have them completed by July, 1909. The commission's expert will confer with the general managers as to the kind of systems that must be put in.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 9

CHICAGO, AUGUST 31, 1907

WHOLE No. 227

TABLE OF CONTENTS.

Editorial:		Armature Spider for Direct-Current Generator, Boston Elevated Railway (Illustrated)	258
—For Knowledge of Car Movements.....	241	Piping and Power Station Systems—LI. By W. L. Morris, M. E. (Illustrated)	250
—Sand Tracks on Steep Hills.....	241	Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	260
—Train Starting Signals.....	241	News of the Week:	
—Rochester Conductors Plead Guilty.....	242	—Chicago Officials Investigate New York Electrification....	262
—Minneapolis Low-Fare Decision	242	—Cannot Tax Subway Franchise.....	262
—Deficit of the Surface Lines of the Interborough-Metropolitan Company	242	—Minneapolis Council Cannot Regulate Fares.....	262
—Taking Motormen from the Shops.....	243	—The Cleveland Traction Situation	262
—Are Fenders a Protection?.....	243	Construction News:	
Communications:		—Franchises	263
—The Accident Problem. By Frederic W. Bacon.....	244	—Recent Incorporations	263
—Taking Motormen from Shops. By A. S. MacAndrew.....	244	—Track and Roadway	264
Track and Roadway of the Pacific Electric and the Los Angeles Interurban Railways (Illustrated).....	245	—Power Houses and Substations	266
Reorganization of the Chicago Union Traction Company Properties	249	Personal Mention	266
New York Public Service Investigation.....	250	Financial News	267
Reconstruction of the South Side Elevated Railroad, Chicago (Illustrated)	251	Manufactures and Supplies:	
Question Box of the Engineering Association.....	256	—Rolling Stock	268
Arrangement of Exhibits at Atlantic City (Illustrated).....	257	—Shops and Buildings	268
Auditing Conductors' Collections on Interurban Railways. By William H. Forse, Jr.....	258	—Trade Notes	268
		—Advertising Literature	269
		A New Reinforcement for Concrete Roofs (Illustrated).....	270

The general manager of a single-track interurban system about 100 miles in length requested advice recently from a signal company as to the practicability of devising an electric contact system by means of which he could be advised of car movements on an automatically operated board in his private office. The manager

desired to have the progress of cars shown by means of indicators revealing the movement of cars to sidings. If such a system could be devised it would give a correct idea as to the maintenance of the schedule, and would furnish reliable information as a basis for correcting the service. Chronic or unusual delays, or the tendency on the part of motormen to run ahead of their schedule, could be made the basis of prompt, specific investigation. A system of this kind would also be of advantage in indicating the movement of special cars where the schedule of regular cars was approximately definite. The crews of work trains might be required to prevent electrical contact and registration of their movement, if advisable. Such a system would probably be an expensive luxury, but would certainly be a source of satisfaction to the general manager, and might prove to be an added precaution against wrecks due to errors of train movement.

An ingenious device for insuring the safety of passengers and equipment on heavy grades is that recently adopted by the New Jersey & Hudson River Railway & Ferry Company, which is described by Frederic W. Bacon, general manager of the company, in a communication on another page of this issue of the Electric Railway Review. The company's line at one place goes over the Palisades of the Hudson river and descends immediately to lowland over a steep hill. If, for any reason, the motorman lost control of the car, the chances were exceptionally favorable for a serious accident. To avoid this possibility this progressive company has adopted the original plan of installing a "sand track" near the foot of the hill. This device consists of an ordinary side track running parallel with the main

line with the rails covered with sand and with the switch point normally set so that the car, unless brought to a stop and the switch turned by hand, will take the siding. The sand track of itself has sufficient resistance to stop a 20-ton car rolling free at a rate of about 15 miles per hour. It is thus necessary for the car to come to a stop and for the conductor to throw the switch before the car may continue on the main line. In order to stop before reaching the switch it is necessary for the motorman to have his car under perfect control while descending the hill, but if anything goes wrong the car will simply be brought to a standstill in the sand. Although most roads are not required to operate over such a steep grade as the one mentioned, there are many cases of heavy grades preceding curves where the installation of a spring switch leading to a sand track might be the means of avoiding a catastrophe.

Large numbers of long trains and frequent stops during rush hours make the train movement very slow on elevated railroads. All sorts of schemes have been advanced for accelerating traffic under such conditions; longer trains and side-door cars have been advocated; but, as adjacent property owners usually object to any increase

in the length of platforms, longer trains can seldom be handled. The use of side doors or some other method for decreasing the time required at platforms seems to be about the only solution of this problem under present conditions. A method of signaling quickly and thereby decreasing the length of stops for long trains as used on the Boston Elevated might, if applicable, be found to be of considerable help. Instead of the usual passing of signals by bell from car to car an electric buzzer circuit is used. This consists in placing a switch at each end of all cars, these switches being connected between cars by a piece of flexible cable in such a way that the cable is part of the circuit. A wire running the length of the car connects the end switches. At each end of the train the circuit is grounded. Current is supplied from a dry battery. A buzzer located in the motorman's cab completes the

**Sand
Tracks on
Steep Hills.**

**Train
Starting
Signals.**

equipment. One end of the cable, which extends from one car platform to the one ahead, in the same location as the bell rope, can be readily detached when the train is uncoupled. The method of operation is as follows: Each guard, after having closed the gates, pulls down on the cable between cars. This closes the two switches at his platforms. The instant all the switches are closed the buzzer gives the starting signal. If the rear guard is the last one to close his gates the signal will be given the instant he pulls down on the cable. In this way the time ordinarily spent in signaling the whole length of the train is saved and with trains making frequent stops a similar method should materially assist in decreasing the length of train stops at stations.

The two conductors of the Rochester (N. Y.) Railway Company who were arrested recently on the charge of obtaining employment by false representations pleaded guilty on August 21 and were sentenced to 30 days in the penitentiary and, in addition, a fine of \$25, or, in lieu of payment, 25 days in the penitentiary. In passing sentence, Judge Chadsey referred to the influence of the men upon other employes, and to the effect upon the railway company. The men, Harry Stuckey and Harry Hill, had an attorney who contended that their prosecution showed an effort to maintain a blacklist. Representatives of the company denied this statement. The interest of the company in the case was shown by the fact that W. C. Callaghan, superintendent of transportation, made the personal investigation which disclosed that the men had been employed in street railways of other cities, although they had claimed that they had never before been connected with railways. S. S. Crane, general manager of the Altoona & Logan Valley Electric Railway, Altoona, Pa., was in court to recognize the men during the hearing of the case at Rochester. It is one of the most important duties of the superintendents of transportation, particularly on systems in large cities, to examine with care the record of every employe who handles cash. The difficulty of securing men should not prevent a thorough investigation, which can be carried on by correspondence with former employers.

Judge Lochren of the federal court has decided that the city council of Minneapolis has no right to compel the Minneapolis Street Railway, controlled and operated by the Twin City Rapid Transit Company, to reduce its rate of fare within the city to six tickets for 25 cents. Although the case hinged entirely upon the chartered rights of the company, and although the court's decision in no manner touches the abstract question of low fares, it would appear that complete justice, outside of the legal questions involved, has been achieved in thus preventing the city from reducing the company's revenue. In 1875 the Minneapolis Street Railway Company was granted a franchise by the city, with the legal right to collect a 5-cent fare. At that time the city was small and the system was operated by animal power. In 1890 the city passed an ordinance requiring the company, within two years, to change its system to electricity and also to build numerous additional lines and operate them by electricity. This was done and the company operated for seven years under the new system. In the meantime the development in electrical equipment changed to such an extent that the system was found to be so inadequate and out of date that it was necessary to reconstruct it. Without request from the council this was done, new power houses were built and the entire system was provided with the most modern equipment. In making these improvements vast sums of money have been expended at a time when the cost of labor and materials has been steadily advancing. In view of these circumstances it

would seem that the citizens of Minneapolis should not feel particularly aggrieved at the court's decision, but should be satisfied with the good service given them for a 5-cent fare

DEFICIT OF THE SURFACE LINES OF THE INTERBOROUGH-METROPOLITAN COMPANY.

Facts disclosed during the investigation of the Interborough-Metropolitan Company by the New York public service commission have brought definitely to public notice the position of the corporation with respect to the subsidiary surface roads. The continued failure of the surface line properties to earn their expected dividends imposes increasing burdens upon the profits of the other lines in the colossal Interborough-Metropolitan Company. The open discussion of rumors that the surface line properties will be dissociated from the subway and elevated roads, the steps taken by minority New York and Philadelphia shareholders of the Metropolitan Street Railway to protect their 7 per cent guaranteed dividends, and the decline of Metropolitan Street Railway stock to 39 on August 21, a loss of 230 points from the high price touched eight years ago—all these developments point to speedy action of some character.

The next quarterly dividend of 1¼ per cent on Metropolitan Railway stock would be due on October 16. Between \$42,000,000 and \$43,000,000 of this stock is held by the Interborough-Metropolitan Company and the rest is held by outside owners. The low market price reached by the stock last week is due in part to the relatively small part in the hands of the public and therefore available directly for investment or speculation, and partly to the present oppressed market for securities of every character, but the loss in principal which is shown is so startling as to call for comment, even were there no rumors of developments impending to affect the relations of the company to the holding corporations with which it is identified.

The connection of the Interborough-Metropolitan Company with the controlled subway, surface and elevated roads which constitute the operating corporations of the system is of recent completion. This company, having outstanding \$45,000,000 of 5 per cent preferred stock and \$92,000,000 of common stock, and \$67,000,000 of 4½ per cent bonds, was incorporated on January 24, 1906, representing a merger of the properties of the operating Interborough Rapid Transit Company and the New York City Railway Company. It is in marked degree a typical holding company. Except in the event of failure to pay preferred dividends, or unless the directors request that the preferred stock have voting power, no such power may be exercised. The common stock is held in a voting trust, lasting, unless terminated by the trustees in their discretion, until March 6, 1911. In pursuance of the object of its formation the Interborough-Metropolitan Company acquired in October of last year the following securities: A total of \$33,902,800 of the \$35,000,000 stock of the Interborough Rapid Transit Company; \$42,380,300 of the \$52,000,000 stock of the Metropolitan Street Railway Company, and \$29,257,700 of the \$30,000,000 stock of the Metropolitan Securities Company. The principal properties in which control or an interest was acquired through these companies may be indicated as follows:

Interborough Rapid Transit Company.—Operates subway system. Holds 999-year lease of Manhattan (Elevated) Railway. Has agreement with New York City Interborough Street Railway, which operates outlying feeder roads. Owns stock of New York & Queens County Railway. With the Long Island Consolidated Electrical Companies (the stock of which is owned by the Long Island Railroad) owns jointly control of the New York & Long Island Traction Company and the Long Island Electric Railway.

Metropolitan System.—The Metropolitan Securities Company owns the entire outstanding stock of the New York City

Railway, which holds a 999-year lease of the Metropolitan Street Railway.

The present difficulties hinge directly upon the failure of the surface properties to meet the charges which were assumed on their behalf when the combination was formed. In the fiscal year ended March 31, 1907, the combined operations of the Interborough Rapid Transit Company and the New York City Railway, after payment of the dividend on the outstanding Metropolitan stock and of a 5 per cent dividend on Interborough-Metropolitan preferred stock, showed a deficit of \$1,347,489. The deficit of the New York City Railway has been growing since 1904. The profit and loss deficit on March 31, 1907, was \$9,094,375, having increased to that figure from \$854,276 on the corresponding date in 1904. During the same three years the loans and bills payable increased from \$773,958 to \$10,865,000, indicating that money was borrowed to offset the growing deficit from operations.

TAKING MOTORMEN FROM THE SHOPS.

A communication on another page of this issue of the Electric Railway Review deals with the problem of selecting interurban motormen from the shop forces. This is a subject that has been before the electric railway managers since the days of the horse car. On some systems the prospective motorman must serve several days in the repair shop; on some other systems the apparatus is explained to him by the shop foreman; in still other cases the applicant is made familiar with the equipment details by being required to study a dummy car. But few of the larger city systems make any attempt to have the motorman do any shop work on the equipment while learning. Most of his instruction is given in a schoolroom and on the car platform in charge of an instructor motorman. By this process a very efficient motorman can be made of any man of fair judgment who may have no knowledge beyond the manipulation of the levers and handles on the front platform.

The average manager of a large city road prefers to have the motorman refrain from making repairs to the cars on the road, feeling that time will be saved by having the car following push home the disabled car. It often happens that by this method two disabled cars will be brought home instead of one, the assisting car itself often being disabled by the double load it must handle. The short layovers on a city line make it almost impossible for the car crew to perform any work on the cars between trips in the nature of inspection and greasing. On the interurban roads the conditions are quite different. The cars run at comparatively long intervals, the distances traveled per trip are long, the speeds high and the layovers at the ends of the runs are sometimes quite long, and it frequently happens that one crew will handle the same car all day without going near a repair shop. Under these conditions it is often possible to arrange for the car crew to do the regular inspecting and greasing and make the slight adjustments often necessary on the controller fingers and the brakeshoes. If this inspection and greasing has been preceded by some shop experience the motorman will be able to thoroughly inspect the car entrusted to his care, make all the slight adjustments, and, what is of more importance, be able to operate the car efficiently and complete the run even if some slight accident should happen to the mechanical or electrical equipment. A motorman who thus takes care of the car he runs is sure to have less trouble on the road than a man who merely knows how to handle the operating handles.

When good men for the repair shop are needed it is probable that a suitable man can be found among the interurban motormen. By taking men from the cars to the shops for car maintenance work, the repairs are made by men who know the operating conditions and can readily see

when slight changes in operating or repair methods could be advantageously made. Another advantage of this method is that it opens up another line of opportunities to the ambitious motorman, who sees a chance for advancement through the repair shop. Taking the motormen from the repair shop and taking the more expensive repair shop men from the cars brings closer together two departments that are too often at variance.

ARE FENDERS A PROTECTION?

The city council of Los Angeles recently passed an ordinance requiring the use of a certain type of fender on the interurban cars entering the city. The passage of the ordinance was followed by the arrest of the officials of the Los Angeles Interurban Railway and the Los Angeles-Pacific Company. Car crews in several instances were also arrested and the cars left standing on the street, resulting in blockades of an hour or more. Finally an appeal to the courts resulted in the issuance of an injunction restraining the city officials from making further arrests until the injunction case is decided.

With the cars used in Los Angeles the fenders would project 7½ feet beyond the outside rail in rounding curves. That there is a wide range of opinion on the subject of fenders is shown by the fact that almost every large system uses a fender of a different type. Moreover, no matter what kind of a fender is used the accidents continue to happen with a marked degree of regularity.

On the average city street it is impossible to operate a fender less than six inches above the top of the rail. Even then on rounding curves the fender will often strike the ground. In case the fender is to pick up prostrate bodies from the track it must be closer to the roadway than six inches; this means that the fender must be dropped either automatically or by the motorman. If these automatic devices are in perfect working order they are continually being tripped by slight obstructions on the track. This causes considerable annoyance and some expense. If they are adjusted so that they are not liable to be accidentally tripped they are unlikely to trip in an emergency. Depending on the motorman to trip the fender is simply adding to the things that an already busy man in an emergency must attend to. If a fender has the necessary cushioning effect to prevent serious injury to persons accidentally struck, it must necessarily add about five feet to the length of the car. As this increased length is close to the ground it is seldom taken into consideration in making the mental estimate of the distance to the approaching car. This difference in the estimated distance to the car often results in tripping a person who would otherwise escape. In crowded city streets this extra five feet will necessarily often be a factor in increasing the number of accidents even if they are not fatal.

It would seem that some type of fender that does not materially add to the length of the car would be most satisfactory for city use. As to whether this should be merely a wheel guard or some type of short fender attached to the platform is not easily apparent from present practice.

The practice of using fenders of the basket type on interurban cars can hardly be of any benefit except to comply with the demands of town and city governments who pass ordinances for the regulation of street railway matters without any particular knowledge of the operating conditions. At the usual speeds at which interurban roads operate the basket type of fender can be of but little use. At these high speeds the possibility of saving the life of a person, accidentally on the track, is very slight, and the necessity of protecting the passengers and equipment makes the use of a device that will positively remove obstructions from the track imperative. This can only be done by discarding the fender and substituting a substantial pilot.

Communications

TAKING MOTORMEN FROM SHOPS.

To the Editors:

From a shopman's point of view, interurban motormen are generally taken from the outside rather than from the ranks. I know it will be said that we cannot possibly get enough men from the shops and barns to keep the road fully manned. But have we ever systematically employed men in our shops for prospective motormen? Haven't we rather discouraged the aspirant for the road because we thought it easier to make a road man than a shop man?

Now my idea is that motormen are responsible to the mechanical department for their general knowledge of the equipment, and to the operating department for their deportment and obedience to general service rules. This being the case, it would be possible for a master mechanic to employ practically all applicants for road work, allowing only those who made good in the work to qualify for road positions.

This would do more than provide men for the road with a greater practical knowledge of the equipment. It would give us men in our shops who more thoroughly understood the wants of the road and be instrumental in bringing two departments into a good working unit.

I say this because I believe contention between these departments is almost universal in the ranks and if you destroy that you remove a great many of the evils attributed to both departments.

A. S. MacANDREW,

Shop Foreman Indianapolis & Cincinnati Traction Company.

Rushville, Ind., August 15, 1907.

THE ACCIDENT PROBLEM.

To the Editors:

Methods for preventing accidents were discussed recently in your columns. We have been pursuing this matter with considerable diligence and, having added to our system some original features, supplementing these with others in more common use among our associates, a statement regarding their application as a partial solution of the problem, may be of interest at the present time.

We have had a course of instruction for our car men. This course is conducted by paid instructors who report in detail, on our elaborate form provided for this purpose, their opinion as to the ability of the applicant. After being passed by three inspectors the applicant is turned over to the dispatcher for examination on rules and general operation, and, if passed, is assigned to duty.

After a man has thus been assigned, we systematically check his speed operations at various points on the system and also make signal and switch light tests in order to ascertain his diligence in observing carefully all such safety devices. These tests are made at various points of the system and the results posted on the "bulletin" board.

To assist the car men we have placed spacing signals on all curves where the view of the motorman from the car ahead is obstructed, thus prohibiting the presence of two cars in the section at the same time. At other points, where the cars approach sharp curves at moderately high speed, we have installed distance signals, using a green light at night and a yellow and black board hanging from the span wire by day. These signals are placed at various distances from the curves, depending upon the average speed at which the cars are approaching such curves, and are located at the braking point where a motorman by most efficient operation should commence the braking of his car. The board signal we have used to some extent at various points of less importance on the system.

For operation down steep hills we take the extraordinary precaution of requiring the conductor to ride on the front platform with the motorman in order that he may take charge of the car in case the motorman should be disabled in any manner. On one hill, where our line goes over the Palisades and drops immediately to tidewater, we have installed "sand tracks." This device is set so that a car coming down the hill, unless it is brought to a stop, will run in on the sand track, which in itself has sufficient resistance to stop a 20-ton car rolling free without brakes at the rate of about 15 miles per hour, when entering the sand track. It is necessary for the car to come to a full stop in order to throw the switch so that it may continue on the main line. The device is built as a siding running immediately parallel with the main line.

From the mechanical end we maintain a careful car inspection, which is operated on a mileage basis with very satisfactory results.

If any disability takes place on the car while en route that has any bearing upon its safe operation, such as trouble with the headlight, etc., our motormen are instructed that the car is not to be operated at greater than half speed during the balance of the trip.

I think the above covers our general field of action with regard to this important question.

FREDERIC W. BACON,

General Manager New Jersey & Hudson River Railway & Ferry Company.

Edgewater, N. J., August 23, 1907.

QUESTIONS ASKED REGARDING MUNICIPAL OWNERSHIP.

The committee on municipal ownership of the American Street and Interurban Railway Association has issued a circular stating that the committee, which presented a report on this subject at the convention at Columbus last year, has been continued for another year and the officers of the association have asked that another report on the subject be made at the Atlantic City meeting in October. The circular adds:

It has been deemed unnecessary in the making of this report to discuss to any great extent the question from an academic point of view. The literature on this subject has been so multiplied during the past year by the publication of the results of investigators of social economics, and by the reports of various committees which have made investigation of it, that the members of the association are undoubtedly quite familiar with the arguments for and against municipal socialism in any form, and especially as it would affect the interests of our particular industry. It does, however, seem desirable that the report should cover any progress made, either for or against the movement in our respective fields, as well as some statement with regard to general conditions here and abroad, and to this end we are inclosing you a sheet covering a few questions designed to ascertain the condition of affairs with respect to municipal ownership in your immediate vicinity. The committee would be greatly pleased to receive your answers to these questions, and any statement which you may choose to make touching your individual opinion as to this municipal ownership proposition.

The questions asked are as follows:

1. Does the company do any lighting business?
2. If so, state general character.
3. What municipally owned utilities are now in operation in your company's field?
4. What, if any, agitation or movement has arisen or has progressed during the past year for the extension of municipal public utilities?
5. Has there been any movement looking toward the municipalization of your company's business or any part thereof?
6. If any such agitation has arisen please state its cause or causes.
7. What seems to be the present status of public opinion in your vicinity touching municipal ownership of public utilities, such as street railroads and lighting companies?

The committee is composed of the following: Charles D. Wyman, chairman; John A. Beeler, H. M. Sloan, John J. Stanley.

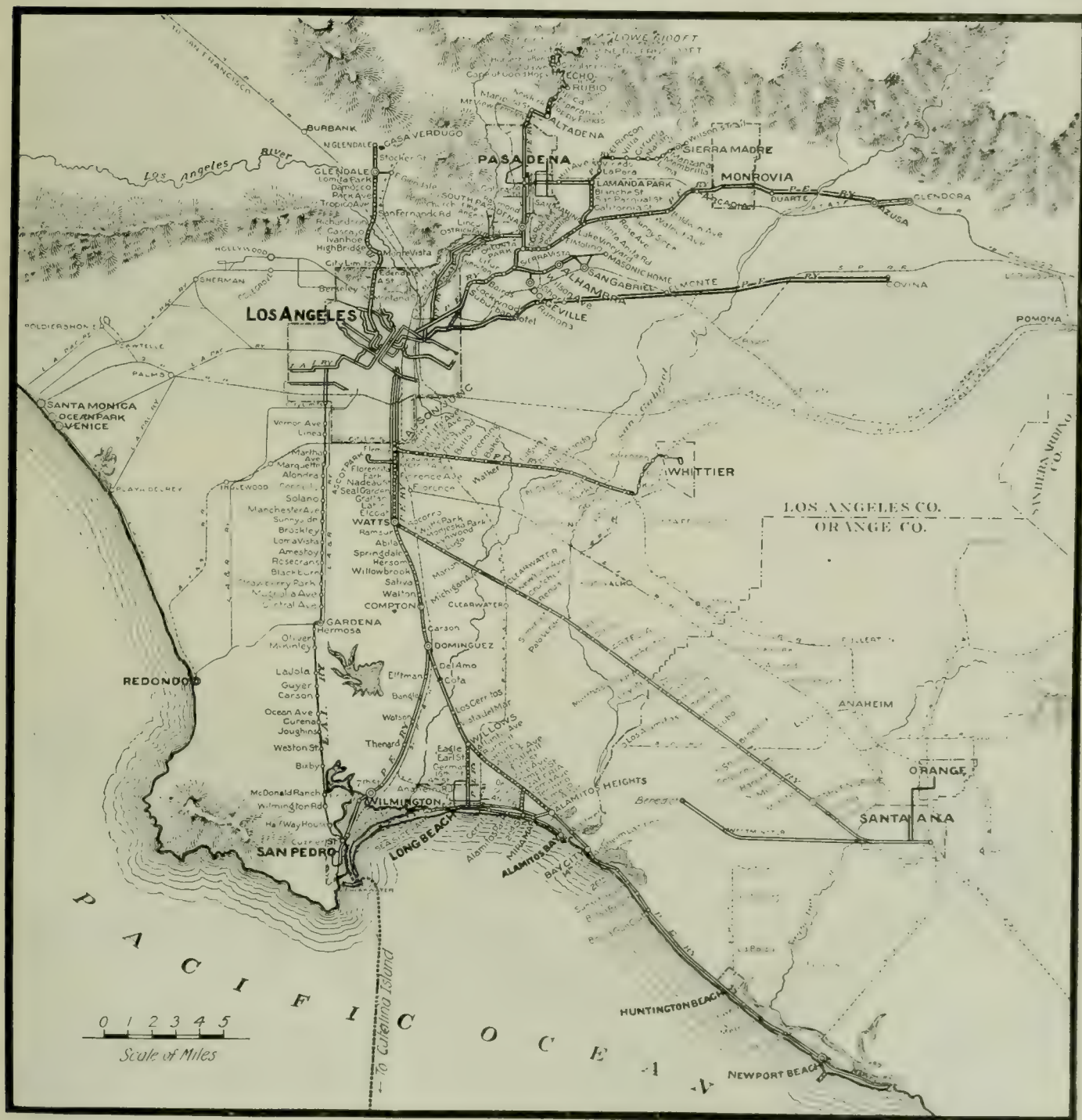
TRACK AND ROADWAY OF THE PACIFIC ELECTRIC AND LOS ANGELES INTERURBAN RAILWAYS.

In several recent issues of the Electric Railway Review there have been described some of the general features, and particularly the rolling stock, of the Pacific Electric Railway and the Los Angeles Interurban Railway. These two lines are operated as a single system by one organization.

Accompanying this description is a map which will serve

per year for side track. The present side-track mileage is 25, which amount was not included in the 550 miles of single track.

Some of the more recent extensions include a double-track line from Los Angeles to Covina, 22 miles; a double-track extension of the Monrovia line, to Glendora, 9 miles; a double-track high-speed cut-off two miles long on the Los Angeles-Pasadena line; an extension of the San Pedro line to the ocean shore, 1½ miles; a double-track extension of the



Pacific Electric Railway—Map Showing Electric Lines in the Vicinity of Los Angeles.

to show the scope of territory tributary to Los Angeles, served by the many radiating lines of these companies. There are now in operation about 550 miles of single track, the branches, however, being almost without exception built as double track lines. It is stated that the trackage is growing at a rate of about 100 miles per year for main line and 12 miles

Long Beach line from Willows to Newport Beach, about 23 miles, and Santa Ana to Benedict, 8 miles. These distances as stated are measured as route miles, but each route is double-tracked.

An important part of the recent track work is the construction of a 14-mile four-track entrance to the city of Los

Angeles. These tracks are built upon a private right of way reaching to within a very short distance of the terminal station. This four-track section of the route affords a high-speed terminal entrance for the four double-track divisions extending southward from Los Angeles. An accompanying illustration will serve to show the high character of the con-

struction of this line. The middle tracks are used for through cars and are laid with 70-pound rail, while the outer tracks, used for freight and local cars, are laid with 60-pound rail.

The track on the new Covina line is laid with a maximum grade of 1.4 per cent and a maximum rate of curvature of 4 degrees. On this division there are a number of especially interesting reinforced concrete bridge structures which will be



Pacific Electric Railway—Four-Track Entrance to Los Angeles.

struction of this line. The middle tracks are used for through cars and are laid with 70-pound rail, while the outer tracks, used for freight and local cars, are laid with 60-pound rail.

Roadway.

As the mileage of this already extensive system has in-

described in a later issue. There are also two double-track pile trestles having a total length of 2,160 feet. Other than the trestle there are seven concrete arches of from 5 to 12 feet span, each containing from 60 to 600 cubic yards of concrete and a number of concrete undercrossings for driveways. The track is laid with 70-pound rail on ties spaced $20\frac{1}{4}$ inches



Pacific Electric Railway—Junction of Three Double-Track Lines at Oneonta.

created, the standards of construction have been raised, the new Covina line exhibiting, probably, construction of the highest type.

This later extension, as stated, will offer a double-track route from the terminal station in Los Angeles to Covina, 22 miles east on the way to Pomona. The right of way varies

center to center. Crossovers are installed at intervals of three miles.

An accompanying engraving exhibits the dimensions of this company's standard two-track roadway. The track rails are electrically connected by Brown bonds, having an amalgam contact with a conductivity equal to No. 00000 copper. The

rails of each track are cross-bonded at intervals of 500 feet and the two tracks are cross-bonded every 1,000 feet. Accompanying halftone engravings show the character of the track on various divisions of the system.

Pole-Line Construction.

The trolley wires on the Covina line will be fed from two

amount of from 7 to 10 gallons per hole. The oil is well mixed with the dirt as it is tamped about the pole and this mixture serves to preserve the wood by keeping away moisture and insects. The oil used costs about 75 cents per barrel. Poles which were protected by this method and have been in service more than five years exhibit no signs of decay.

On the Covina line the two No. 0000 Figure 8 trolleys



Pacific Electric Railway—Glendale Station and Office.

substations located 7 and 18 miles, respectively, from the power station in Los Angeles. An accompanying engraving reproduced from a line drawing shows the detail construction of the pole tops supporting the three-phase high-tension transmission line and the trolley brackets. The transmission pressure is 15,000 volts, and No. 000 hard-drawn copper wires are used, mounted on Lima porcelain insulators 7 inches

are tapped at intervals of five poles to a 600,000-circular mil feeder cable connecting the substations. The telephone wires which are carried on the same pole are mounted not on the ordinary glass insulators, but on standard No. 1 Provo high-tension insulators which were available on account of a change in the transmission line on one of the older divisions.

It will be noted by reference to the illustration of the



Pacific Electric Railway—Improved Roadbed Along Boulevard.

in diameter with cast-iron bases. The poles, which are round northern cedar, 40 feet long, are sunk 6 feet in the ground and spaced 110 feet apart.

An interesting method is used for preserving the butts of the poles. This comprises the use of crude petroleum to the

four-track line that the overhead construction on this section differs in character from that customarily used. There are two span wires, one above the other, each of which comprises $\frac{3}{8}$ -inch stranded steel cable. The arrangement with hangers placed over the two middle trolley wires and not over the

[illegible]

electrically divided by a porcelain break strain and the ends of the span wires are similarly insulated. The break-strain insulators in the vertical hangers afford an assurance that, in case of a damaged trolley hanger below, the repairs to the other parts of the span can be made with facility. The hangers used in this construction are of a one-piece type, manu-

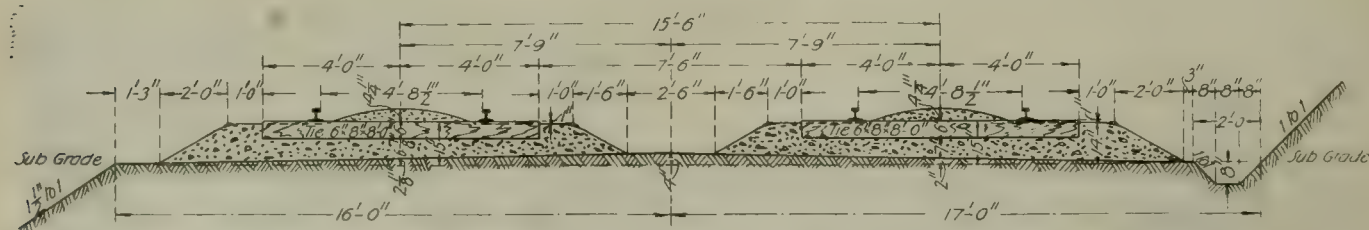
Ballasted 11 miles of double-track main line, 7 miles of street track, with necessary paving; laid 3 miles of 6-inch 72-pound high T-rail in city streets; constructed 4 miles of four-track line and relaid another 4 miles with 70-pound steel; built three of the Type A stations, as shown in one of the accompanying engravings, at a cost of about \$4,000 each and 12 smaller stations ranging in cost from \$700 to \$1,000 each; completed the preparatory work for five interlocking towers at steam railroad crossings, one of which will include about 52 working levers; and also constructed a storage yard for 60 cars and rebuilt the floor in a number of the shops. Accommodations for the section men have been furnished by this department in the way of 25 section houses, each accommodating four families.

When the Columbus Railway & Light Company placed the foundation of a saving account in the banks for each of its employes last Christmas there was much speculation as to what percentage of the men would continue the accounts and add to them. The accounts were started more than seven months ago and the results of the movement on the part of the company can be told. The money was deposited in two of the savings banks of the city, as a substitute for the usual turkey given the men on Christmas evening.

While a few of the men drew out the dollar and spent it, a canvass of the banks shows that almost 91 per cent have continued the accounts and have deposited small amounts from week to week. The accounts were the first that many



Pacific Electric Railway—Standard Type A Freight and Passenger Station.



Pacific Electric Railway—Cross Section Showing Dimensions of Double-Track Roadbed.

Maintenance of Way and Structures.

The maintenance of way organization includes an engineer in charge and three supervisors with assistants, these supervisors having charge of the northern, southern and city divisions, respectively. Each supervisor has under him a number of section foremen, to each of which is assigned a territory including about eight miles of double track. The section gangs include from 8 to 16 men each, depending upon the nature of the soil underlying the tracks which they have in charge. The engineering staff of the maintenance of way de-

of the men ever started, and it is doubtful if many of the men would have started accounts had not the concern placed the money to their credit at the banks.

It is estimated that a good many thousands of dollars are now the results of the savings accounts which were begun last Christmas. The habit of saving has been instilled in the minds of many of the 700 employees of the company.

In addition to the savings accounts, General Manager E. K. Stewart purchased 100 shares of the stock of the Columbus Railway & Light Company and offered it to the men in two-share lots. The men were to pay a small amount down and \$5 a month until the total amount was paid. Without any hesitation 50 of the men took two shares each and in most instances they have paid the full amount on their stock and are now financially interested in the company which gives them employment.—Finance.

REORGANIZATION OF THE CHICAGO UNION TRACTION COMPANY PROPERTIES.

To carry out the plan of reorganization of the Chicago Union Traction Company and its underlying roads Judge Grosscup and Professor Gray, the arbitrators, have named the three members of the reorganization committee who are to act with L. C. Krauthoff and George W. Wickersham. The men named are John C. Hately, Seymour Morris and W. T. Fenton. The Harris Trust and Savings Bank of Chicago was named as depository for the bonds, and the Farmers' Loan and Trust Company of New York as subdepository.

Deposits of bonds were invited beginning on August 28. The committee has addressed a statement to holders of bonds of these companies: North Chicago City Railway, the Chicago West Division Railway Company, the North Chicago Street Railroad Company, the West Chicago Street Railroad Company, the Chicago Passenger Railway Company and the West Chicago Street Railroad Tunnel Company.

In its statement the committee calls attention to the expired rights of some of the lines and to the limited franchise privileges of others. The committee says:

By force of the decision of the United States supreme court in the so-called "Ninety-nine year case," we are advised that with respect to lines of railway of the various companies (embracing 306.04 miles) in the systems operated by the receivers of the Chicago Union Traction Company, all rights to operate 136.44 miles absolutely expired on or before July 1, 1907, rights of operation over 70.35 miles are subject to termination by the city on six months' notice and upon payment of the appraised value of the physical properties, and the rights on 99.25 miles expire from time to time, beginning in the early part of 1908. The right to operate by electrical power in the principal business section of Chicago is subject to termination on 60 days' notice at the will of the city. A sale of the various properties, thus deprived of operating rights, in the enforcement of the several mortgage liens, could hardly be expected to realize enough to discharge more than a fraction of the mortgage debts.

Unless the ordinance is accepted by the Chicago Railways Company on or before September 14, 1907, it becomes null and void. If not accepted, the city of Chicago will undoubtedly exercise the right to terminate the operating rights which are subject to such action, and no extension of the unexpired rights can be reasonably expected. The undersigned, therefore, urge all security-holders to deposit their securities under the plan on or before September 9, 1907, the date fixed for that purpose, to the end that a sufficient number may thus evidence their assent to the plan and so justify the committee in declaring it to be operative and in procuring the acceptance of the ordinance by the Chicago Railways Company.

Plan of Reorganization.

The plan of reorganization and adjustment as adopted is subject only to the decision of the United States circuit court of appeals, which is to hear the appeal from Judge Grosscup's order on September 5. The plan proposes the issue of new securities as follows:

1. First mortgage, 20-year, 5 per cent bonds to whatever amount is necessary to rehabilitate the North and West Side lines. These bonds are not limited in amount in the plan. They probably will amount to about \$24,000,000 when the rehabilitation work has been completed. These bonds will be allowed 5 per cent interest out of the gross receipts of the company, by the terms of the traction settlement ordinance; the other bonds to be issued will be payable only out of the company's 45 per cent share of net profits.

2. Consolidated, or second mortgage bonds, amounting to \$32,800,000 and being for 20 years. Of the total \$32,800,000, there are to be issued \$15,900,000 in "Series A" and \$16,900,000 in "Series B." Interest on all the \$32,800,000 of bonds, except \$6,767,200 of "Series A" is to be 4 per cent the first five years and 4½ per cent the remaining 15 years. The \$6,767,200 of "Series A" bonds will bear 5 per cent interest and will be used as collateral security for notes sold to the organization syndicate. Bonds of "Series A" will have precedence, in all respects, over bonds of "Series B." The uses of these two series of bonds are shown elsewhere.

3. Sinking fund debenture bonds payable in 20 years, at 4 per cent, under an agreement for a sinking fund, if earned, designed to redeem and discharge at or before maturity such of the debentures as may be issued. These bonds will amount to \$5,000,000, and will be used as collateral security to the extent of \$4,801,200, the remaining \$198,800 being exchanged for West Chicago Street Railroad certificates of indebtedness.

The exchange of the foregoing securities will be as follows:

	Consolidated mortgage bonds, 5 per cent. Series A.	Consolidated mortgage bonds, 4 per cent for five years, 4½ per cent thereafter. Series A.	Sinking fund debentures, 4 per cent. Series B.	
For \$500,000 of outstanding North Chicago City Railway Company 4 per cent first mortgage bonds (100 per cent of par value of bonds).....		\$ 500,000		
For \$2,500,000 outstanding 4½ per cent North Chicago City Railway Company second mortgage bonds (100 per cent of par value).....		2,500,000		
For \$4,012,000 outstanding first mortgage 4½ per cent bonds of Chicago West Division Railway Company (100 per cent of par value).....		4,012,000		
For \$3,171,000 outstanding North Chicago Street Railroad Company 5 per cent first mortgage bonds (20 per cent of par value Series A, 80 per cent Series B).....		634,200	\$ 2,536,800	
For \$1,614,000 outstanding 4½ per cent North Chicago Street Railroad Company refunding mortgage bonds (100 per cent of par value).....			1,614,000	
For \$3,683,000 forty-year 5 per cent first mortgage bonds of West Chicago Street Railroad Company (20 per cent of par value in Series A, 80 per cent in Series B).....		736,600	2,946,400	
For \$6,317,000 forty-year 5 per cent consolidated mortgage bonds of West Chicago Street Railroad Company (100 per cent of par value).....			6,317,000	
For \$497,000 outstanding certificates of indebtedness of West Chicago Street Railroad Company (60 per cent of par value in Series B, 40 per cent in debentures).....			298,200	\$ 198,800
Exchanged for \$1,306,000 Chicago Passenger Railway Company consolidated 5 per cent mortgage bonds (100 per cent of par value).....			1,306,000	
For \$1,500,000 outstanding West Chicago Street Railroad Tunnel Company 20-year first mortgage bonds (50 per cent of par value Series A, 50 per cent Series B).....		750,000	750,000	
For the outstanding 4,499 shares of stock of North Chicago City Railway Company (180 per cent of par value).....			449,820	
For the outstanding 6,246 shares of stock of the Chicago West Division Railway Company (80 per cent of par value).....			499,680	
For the outstanding 6,103 shares of stock of the Chicago Passenger Railway Company (25 per cent of par value).....			152,575	
To be deposited as "senior collateral" security, to secure the Chicago Railways Company's notes.....	\$5,867,200			
To be issued as additional collateral for Chicago Railways Company notes if the cash requirements exceed \$4,000,000 or cannot be provided by sale of notes secured by the \$5,867,200 consolidated mortgage bonds.....	900,000			
To be deposited as "junior collateral" to secure Chicago Railways Company notes to retire the floating indebtedness of \$4,390,126 of the Chicago Union Traction Company, the North Chicago Street Railroad Company and the West Chicago Street Railroad Company.....			29,525	4,801,200
Total	\$6,767,200	\$9,142,800	\$16,900,000	\$5,000,000

Cash requirements of the situation are to be met by two syndicates. A rehabilitation syndicate is to purchase \$12,000,000 20-year 5 per cent bonds for cash, and the proceeds are to be set apart and used solely for construction, equipment, additions, extensions and other purposes required by the ordinance. An organization syndicate will purchase not to exceed \$5,000,000 of 5-year 6 per cent collateral notes, the proceeds of which will be set aside and used only to pay receivers' certificates and to defray the expenses of organization, legal and other current expenses.

Note Issues.

The 5-year 6 per cent collateral notes are to be redeemable at par within three years or more after the date of issue.

There will be an issue of 10-year 6 per cent collateral notes, redeemable in three years, on which the interest will be payable only if earned after the payment of all prior fixed charges; but the deficiencies of any year will be made up in subsequent years if earned, and the accruing interest on the debentures held as collateral for these notes will be applied toward the payment of interest on the notes. The total of these notes is not to exceed \$5,000,000.

Stock Participation Certificates.

The income participation certificates based on the \$100,000 capital stock of the Chicago Railways Company will comprise 262,500 certificates. These certificates will be issued in exchange for the following stocks:

	Participation certificates			
	Series 1.	Series 2.	Series 3.	Series 4.
North Chicago City Ry. Co. stock at 37 1/2	9,271.29			
Chicago West Division Ry. Co. stock at 33 1/2	21,173.94			
Chicago Passenger Ry. Co. stock at 43	2,624.29			
North Chicago Street R. R. Co. stock at \$1.50	48,248.00	9,649.6		
West Chicago Street R. R. Co. stock at 51	50,943.90	10,288.67		
Chicago Union Traction Co. stock, preferred, at 50			60,000.00	
Chicago Union Traction Co. stock, common, at 25				50,000.00
Junior collateral and reserve purposes	238.58	61.73		
Total	132,500.00	20,000.00	60,000.00	50,000.00

Series 1 certificates will be entitled to priority in distribution of dividends upon the stock to the extent of \$8.00 for each year, and in the distribution of capital to \$100 for each part.

Series 2 certificates, subject to the prior rights of Series 1, are entitled to distribution of dividends of \$8.00 for each part, but without the right to make up deficiencies in any year, and are entitled to distribution of capital at \$100 per share, subject to the prior rights of Series 1.

Series 3 certificates are entitled to similar dividends and capital disbursements, subject to the prior rights of Series 1 and 2.

Series 4 certificates, subject to the prior rights of Series 1, 2 and 3, are entitled to share pro rata in any excess of dividends upon the capital stock remaining after payment of the full amounts upon Series 1, 2 and 3, and in the distribution of capital after the full payment of \$100 for each part of the prior certificates.

The voting power upon the stock shall be held for a period of five years from August 1, 1907, and until the 10-year 6 per cent collateral notes shall have been paid or retired, by a board of voting trustees, as follows: A. C. Bartlett, Charles H. Hulburd, Albert A. Sprague, Chauncey Keep and Charles G. Dawes.

Electrification of Spanish Railroad.

It is reported that a trial of electricity as a motive power is to be made on a section of the main line of a Spanish railroad from Linares to Almeria, about 145 miles in length. The line has a practically uniform grade of 2 1/4 per cent, which made it more and more difficult to handle the increased traffic with steam locomotives. This is particularly true with reference to the comparatively heavy ore trains passing over the line. The three-phase alternating-current system has been adopted. A steam central station will be installed at Santa Fe and the power will be transmitted at a pressure of 5,500 volts through a double overhead contact line, thus entirely eliminating any separate transmission lines and substations. The three-phase alternating-current locomotives will be designed with a normal capacity of 320 horsepower each and for the regular train service two of these units will generally be coupled together with multiple-unit control, while the lighter trains may be hauled by one single unit. The schedule calls for trains weighing from 150 to 300 tons running at a schedule speed of 16 miles per hour, both up and down grade. If the trials result satisfactorily the complete line is to be electrified at once.

NEW YORK PUBLIC SERVICE INVESTIGATION.

At the hearing before the New York public service commission on Thursday, August 22, E. P. Bryan was called upon to testify further in regard to operating conditions in the subway. He said that if changes were made in the tracks at the Forty-second and Ninety-sixth street stations so as to do away with the congestion caused by the transfer of passengers from local to express trains; if the platforms were lengthened so as to run longer trains, and new terminal facilities provided, the capacity of the subway would be increased nearly 100,000,000 passengers yearly, or about 75 per cent. He said these changes would require about two years to complete and would cost \$7,000,000.

The company had carefully considered the Illinois Central and Boston types of car and he was convinced that their adoption would be a mistake. He said such cars would necessitate lengthening the station platforms to 350 or 400 feet and on account of the curved platforms at express stations a sliding platform would be required to bridge the gap between the doors and the edge of the platform, which would be very dangerous in cases of crowding. He said that for the year ended June 30, 1906, 137,919,000 subway tickets had been sold and for the next year 166,363,000 had been sold.

In regard to the elevated road he thought that the traffic in non-rush hours was amply taken care of, but that about 50 per cent of the passengers were carried during three hours out of the 24. He thought that additional tracks on the Second and Third avenue lines would relieve the congestion wonderfully.

At Thursday's hearing it was brought out that Paul D. Cravath, general counsel for the Interborough-Metropolitan Company, had refused to allow the commission's accountants to examine the company's books, on the ground that it is a holding and not an operating company. This gave rise to considerable discussion as to whether the company would not contest the commission's jurisdiction and possibly the constitutionality of the public service law.

It was also stated after the hearing that the old books of the Metropolitan Street Railway, which was leased in 1902 to the New York City Railway, had been destroyed and consequently could not be used to furnish evidence to the commission. This company was a consolidation of practically all of the surface lines in Manhattan and its books were expected to throw some light on the exceptionally high costs of some of the surface roads, as shown in the company's reports to the old railroad commission. These figures were produced by Mr. Ivins as evidence at one of the first hearings of the investigation (Electric Railway Review, August 10, 1907, page 165). It is believed, however, that some of the facts desired may be found in the books of the New York City Railway. The following statement was issued on August 23 by D. C. Moorehead, secretary and treasurer of the Metropolitan Street Railway Company:

There should be no mystery or misunderstanding on this subject. When in February, 1902, the New York City Railway Company became lessee of the Metropolitan system, we opened a new set of books. The old books for the period prior to the lease soon became obsolete and were crowded out of the vaults at our main office by the accumulation of current books and papers. They were then transferred to the storage loft provided for the storage of unused books and papers and were finally turned over with other obsolete books and papers to the person who purchases our accumulation of old papers, large quantities of which are thus disposed of and destroyed each year.

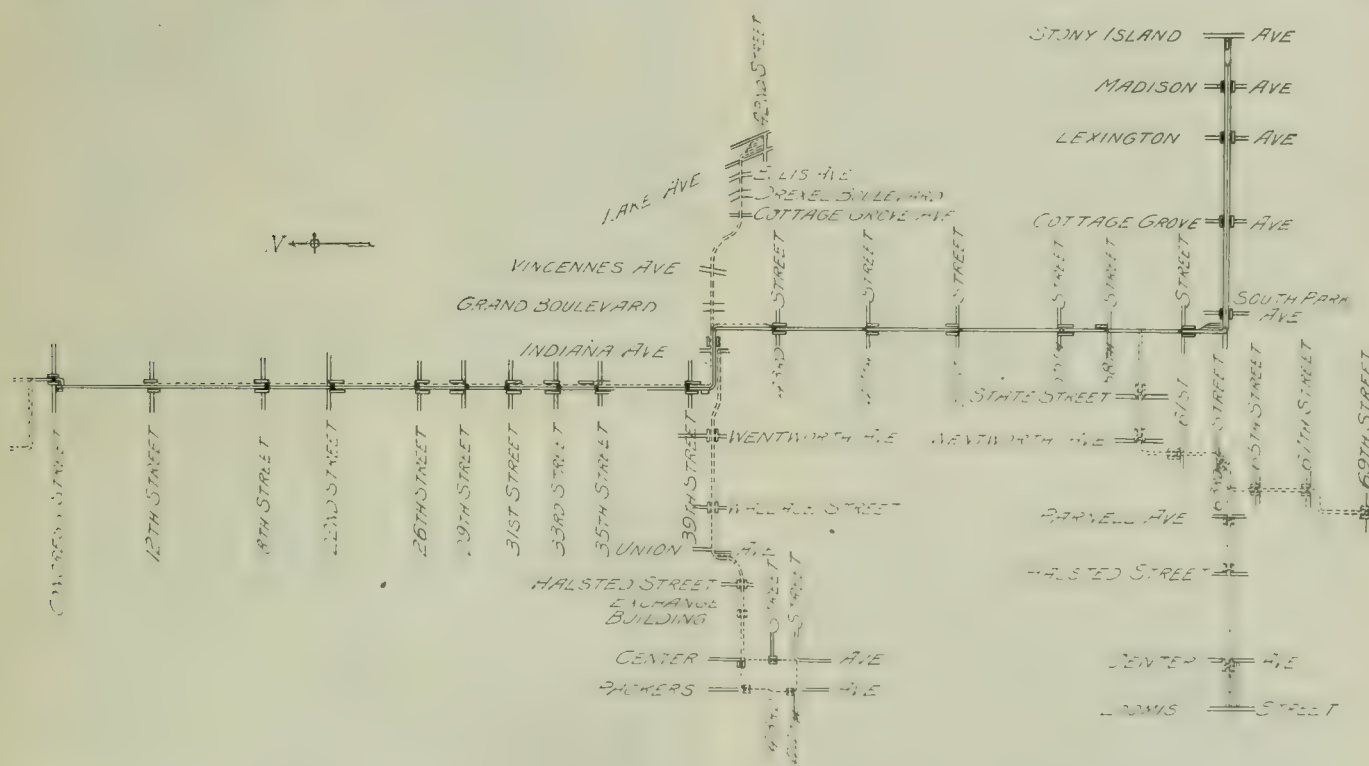
No hearings have been held this week. It was expected to hold a hearing on Wednesday to inquire into the operating conditions of the surface roads, and it was expected to have Oren Root, Jr., general manager of the New York City Railway, on the stand, but on account of the death of Mr. Root's father, Professor Root, on August 26, it was decided to postpone the hearing until next week. The commission on August 29 formally demanded the Interborough-Metropolitan books.

RECONSTRUCTION OF THE SOUTH SIDE ELEVATED RAILROAD, CHICAGO.

The South Side Elevated Railroad is one of four elevated electric roads which serve the various residence districts of Chicago. Its line extends from the Union loop in the business center of the city south through one of the more populous of the better residence sections of the south side to Sixty-third street and thence east to Jackson park. In order to reach other sections of the south side and to provide a more attractive service, certain branch lines were planned and the main line between Twelfth street and Forty-third street was remodeled by the addition of a third track for express trains. The road now has in effect one of the fastest systems of express trains in electric elevated railway service in the United States. These express trains are run only with the currents of greatest travel; i. e., express trains are run northbound or toward the downtown district in the morning when travel is greatest in that direction and southbound or toward the resi-

is from 25 to 30 feet wide. The roadway thus made upon the right of way has been opened to the public for use as a thoroughfare, the title to the land, however, still remaining in the South Side Elevated Railroad Company. To give the desired head room it was necessary to raise the entire structure at stations from three to eight feet.

The ordinance also required the elevation of the tracks of the Union Stock Yards & Transit Company and the Chicago Junction Railway Company, which pass under the South Side Elevated structure on Fortieth street, between State street and Wabash avenue. This made it necessary for the South Side company to raise its tracks at this point so as to give a 17-foot clearance for the steam road beneath. In return the ordinance permitted the company to straighten its tracks at Twelfth street, to relocate its structures on the curves where its line enters and leaves Fortieth street, and to change alignment at several other points. It also permitted the lengthening of platforms to accommodate 6-car trains. The usual right of way difficulties and condemnation suits



South Side Elevated Railroad—Map of Old Main Line and New Branches and Additions.

dence districts in the evening. The center track of the 3-track system serves for express trains for both morning and evening traffic. All express trains are run as locals on their return trips, and by a careful system of dispatching congestion of trains is avoided. Express trains are "cut into" the center track at Forty-third street when northbound and at Twelfth street when southbound and make no stops between Congress and Forty-third streets, a distance of 4.4 miles.

To comply with the terms of the city ordinance under which the company made these improvements an almost complete reconstruction of a large portion of the elevated structure was required. Except along Sixty-third street the stations formerly used were built upon the ground underneath the elevated tracks, with stairways for access to the platforms above. Alongside these stations was a 16-foot alley way, which was the only public thoroughfare left open. The ordinance required the company to elevate these stations so that there would be 14 feet between the ground and the structure and to lay and maintain an asphalt street on both the 16-foot alley mentioned and its own right of way, which

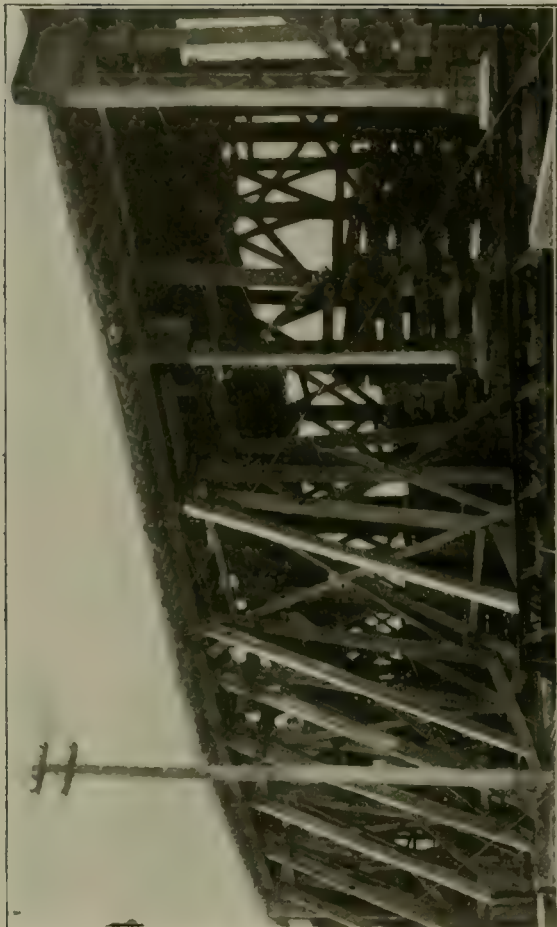
delayed the work for a considerable period, during which complete plans, specifications and contracts were drawn.

In addition to the work done in reconstructing the main line the company planned and has since built a line to Englewood. The Chicago Junction Railway Company is now building an elevated structure extending from the South Side line at Fortieth street to the Union Stock Yards and to the Illinois Central tracks at Forty-second street. Both these branches have been leased to the South Side Elevated Railroad Company, which will operate them.

The location of both main and branch lines is shown on one of the accompanying illustrations, the new work being shown by dotted lines. Of this revision work the methods employed in attaching a third track to the main line between Twelfth street and Forty-third street, without causing delays to regular traffic, present the more interesting engineering features.

General Description.

The original structure consisted of two tracks spaced 12 feet between centers on tangents with supporting columns and foundations located centrally under each track. The



South Side Elevated Railroad—Temporary Wooden Trestle at Fortieth Street Curve.



South Side Elevated Railroad—Overhead Crossing at the Chicago Junction Railway on Fortieth Street.



South Side Elevated Railroad—Overhead Crossing at Michigan Boulevard on Fortieth Street.



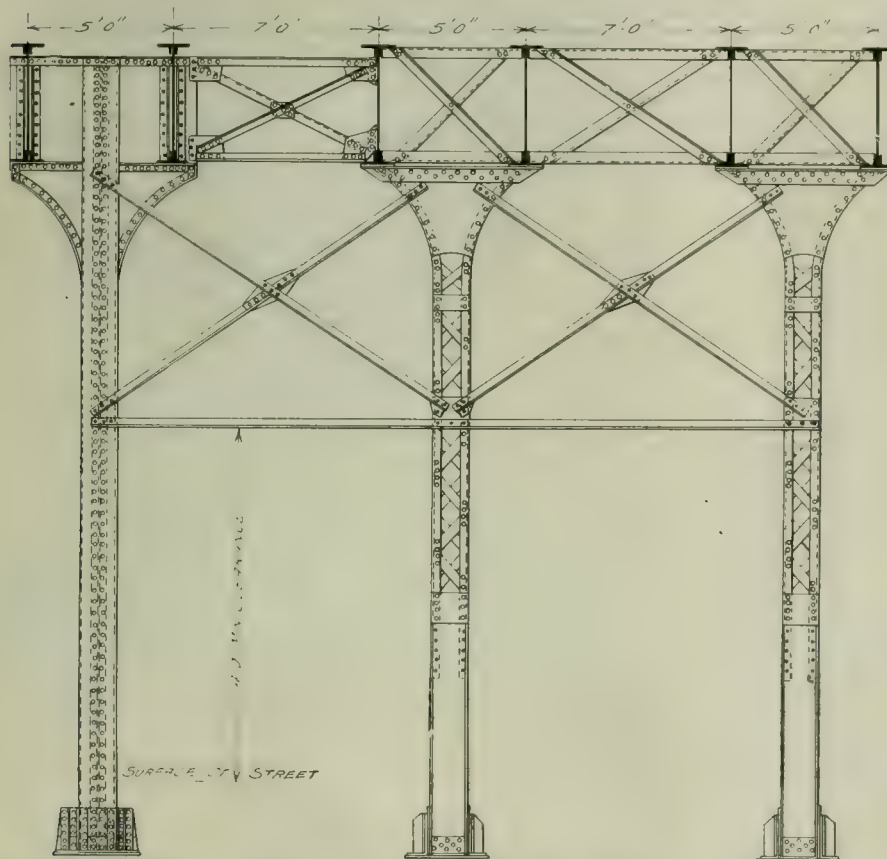
South Side Elevated Railroad—Temporary Structure Supporting Girders at Twentieth Street.

remodeled structure has three tracks similarly supported. The height of the structure being increased, it was necessary to lengthen many of the old columns and to add cross and knee braces as required by the changes in grade and alignment. The work was carefully planned and by co-operation of the working forces of the company and the contractors it was carried on without delay to the regular service, and few patrons of the line realized the magnitude of the changes which were being made. Every precaution was taken for the safety of the public during construction.

The length of structure rebuilt is about 20,000 feet. For the expeditious handling of the work the line was

At Twenty-fifth street, at the two curves on Fortieth street, at Twelfth street and at Forty-third street, the degree of curvature was reduced.

In crossing the St. Charles Air Line north of Sixteenth street, where the structure had previously been raised 13 feet above its original position, with approaches on grades of 2.17 per cent, the grade was reduced to 1 per cent. The maximum increase in height was 6.58 feet. The old column extensions were removed to points farther south and used in the remodeled structure, where conditions would permit, and

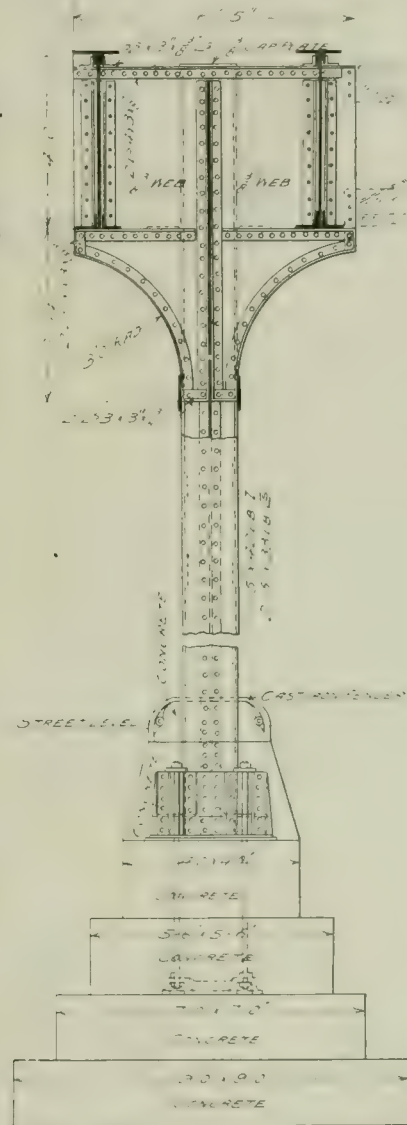


South Side Elevated Railroad—Steel Structure with Column Extensions and New Third Column.

divided into two divisions, the first, comprising five sections, extending from Twelfth street to the north curb line at Thirty-seventh place, and the second, comprising three sections, from that point to Forty-third street.

Changes of Grade and Alignment.

In the reconstruction an improvement was effected in the grades and alignment, except between Twenty-eighth and Thirtieth streets, where, because of property right difficulties, the new structure was built on the west side of the old for a portion of the distance, and on the east side for the remaining portion. The structure, when cut and shifted to its new position, put a light reverse curve in the tracks. The maximum grade of 2.17 per cent in the old structure was reduced to 1.44 per cent in the new, and the former minimum radius of curvature of 100 feet was increased to a minimum of 182 feet, while the greater part of old 100-foot curves were converted into curves of 500 feet radius. The increased height of the structure at stations to allow the required 14 feet of headway placed summits in the track which act as accelerating grades for trains leaving stations and retarding grades for those approaching stations. These summits are not sufficiently marked to be of importance in the design, but whatever effect they have is favorable to the fast local schedules.



South Side Elevated Railroad—Details of New Third Column and Foundation.

new extensions put in. One through plate girder was added to complete the structure.

On tangents where only a change in grade and the addition of the third track comprised the work of reconstruction the old structure was raised by means of jacks and temporary supports to the new established grades and extensions were put on the old columns. These column extensions consisted of channels and plates attached to new column bases and riveted to the old columns. When the new structure for the support of the third track was erected, track was laid upon it and connections made with the old northbound track by means of crossovers at convenient points, and northbound trains were operated over the new track. The old structure was then moved, where necessary, to its new foundations and lateral connections completed.

During the reconstruction of the stations, temporary sta-

tions and stairways were provided and the old stations removed. New bents were substituted for the old bents on either side of the stations, and the old center or half bents were abandoned entirely. The track girders on each side of the bents south of the station were supported on temporary structures while the old columns were being removed. The track girders just north of these bents were cut away 13 inches and when this was done and the old cross girder had been taken down, the new columns and cross girder were erected on new foundations and the old track girders then spliced and connected to the new cross girder. The old bent just north of the station was handled in a like manner. It was then necessary to establish single-track operation through the old northbound or east track until the old southbound track and girders in the former two short spans could be taken down and two through girders and the floor system, which made up the new structure, could be erected and the track relaid in the new span. Single-track service through the station was then transferred to the new southbound track until the third through girder and floor system could be erected and the track be relaid in that span. The east platform of the station was then moved to the new position on the cross girders and the through girders and floor system for the new third track were placed. The new track was then laid and connected with the old northbound track at convenient points and the regular double-track service through

possible in constructing foundations and erecting the steel was done before the old structure was disturbed. The ends of the old track stringers adjacent to the bents at the new point of curve and point of tangent were then supported and cut loose from the old cross girders, the old bents removed and new bents substituted. The old track stringers were then spliced and riveted to the new cross girders as in the case of those at the stations. The new stringers for the northbound track were placed and crossovers put in to establish single-track service on the old northbound track. The

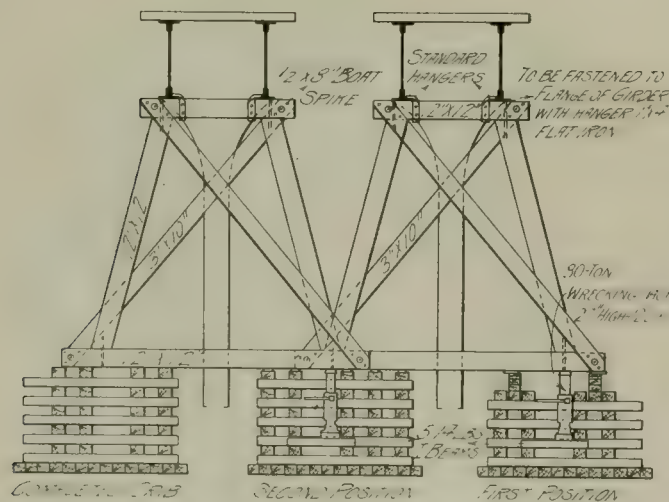
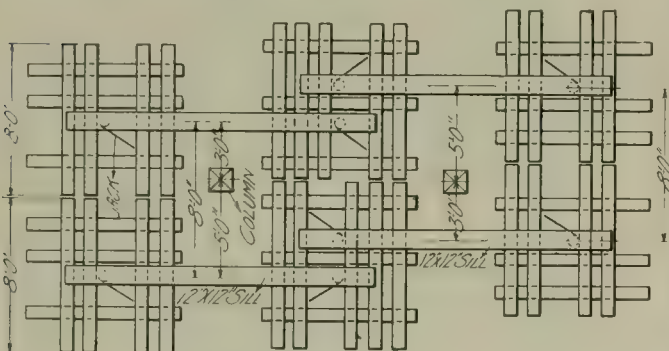


South Side Elevated Railroad—Remodeled Structure Showing Cross and Knee Bracing.

structure under the old southbound track was then removed, except for 180 feet at the central portion of the curve. The stringers in the northbound track on each side of the bent south of the point of curve were supported and the old columns removed. When this was done the new columns and cross girders were placed, and most of the remaining columns and cross girders were erected. It was then necessary to support the track stringers of the northbound track in a like manner north of the point of tangent. All stringers which could be placed without interfering with traffic were then erected and double-track service was resumed on the new southbound track and the old northbound track. Later the new southbound track was used for single-track service while the old structure under the northbound track was removed and the new columns and stringers put in. When the rest of the central track stringers were placed, double-track service was resumed on the new southbound track and the central or old southbound track.

Temporary Structure.

At the curve at Fortieth street, between State street and Wabash avenue, the trains were carried out around the work on temporary wooden blocking until the new structure was ready to receive the track. At this point it was necessary in order to reduce the degree of curve to throw the structure out of its former alignment, and in coming back to the old tangent a reverse curve was put in and the structure moved to its new foundations on rollers. The structure at the Fortieth street crossing of the Chicago Junction Railway consists



South Side Elevated Railroad—Details of Temporary Trestle.

the station was established on the old southbound and the new northbound track. The metal work and the new station building were then completed without interference with train service. To make this change at each station required about 60 days.

Changes of Alignment on Curves.

East of Prairie avenue a new curved structure was built and the old one abandoned. In carrying out this all the work

of four through plate girders, with a floor of 15-inch channels riveted to the girder webs.

The most difficult problem connected with the work was that of designing a temporary structure that would carry the constant train service and would not interfere with the construction of foundations. These temporary supports consisted generally of cribs of 12 by 12 inch timbers usually about 10 feet long, resting on mud-sills 6 by 12 inches. Projections were left beyond the joints of these cribs, under which were

Trains were rarely delayed more than three minutes during the progress of the work. A cause of some difficulty and delay was the 228-day strike of the ironworkers, during which period much of the unfinished structure was carried on the temporary supports.

Design.

The design of the structure involved no unusual engineering problems. Except where special conditions required special treatment, the addition consists of a single track parallel with the tracks of the old structure and generally 12 feet from it. The track is supported by a pair of plate girders riveted into the expanded tops of the columns, which were placed in the central vertical plane of the track. The stringers are braced together effectively, and this bracing is carried to the tops of the columns in order to stiffen the latter so as to enable them to withstand the thrusts from braked trains and the tractive effects of motors.

The new structure is attached to the old by a system of bracing frames at bents, and lateral bracing is used between the two stringers of each track. The old columns were designed for a height of 18 feet and when the clear height of the structure above the roadway is 18 feet or more sway bracing between columns is used to resist bending stresses.

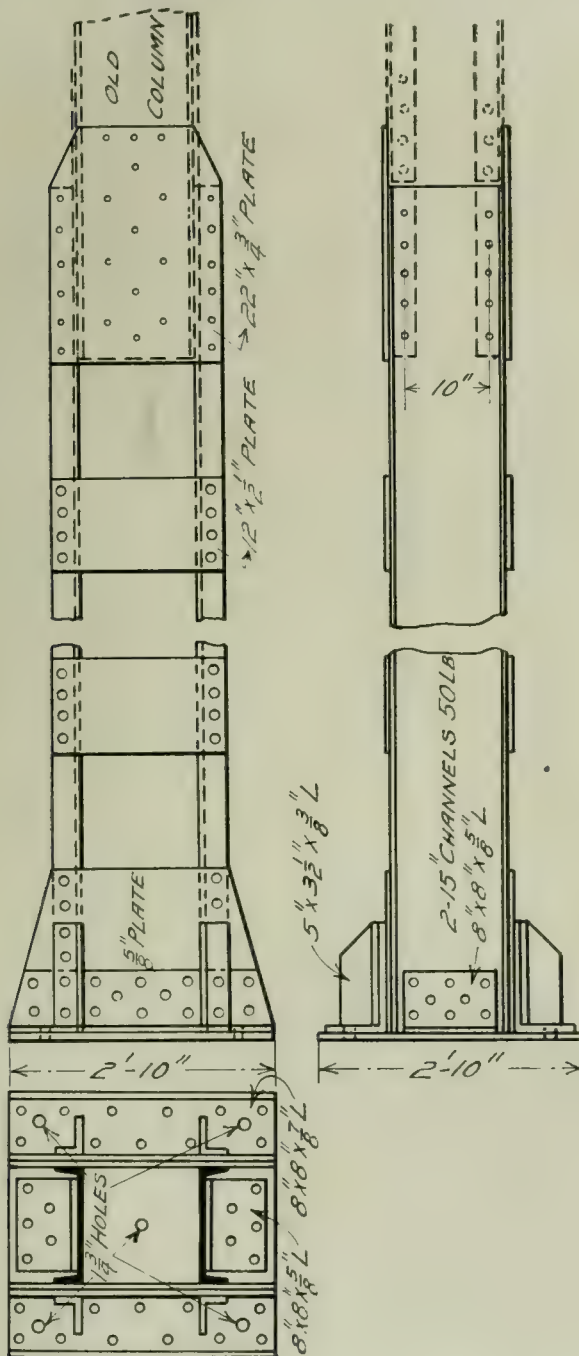
The old columns are made up of two 15-inch channels latticed, and the new columns are built of two 15-inch channels with flanges turned in, riveted to a 15-inch I-beam and stayed occasionally between flanges with plates. All column feet are built with their bases about $2\frac{1}{2}$ feet below the grade of the street. These column bases are encased in concrete and protected by cast-iron fenders. All columns are firmly attached to the concrete pedestals by anchor bolts. Wherever the old structure was raised sufficiently to require extensions to be made to the columns, bases similar to those designed for the new columns were attached to the column extensions and were buried in the concrete in a manner similar to that described for the new columns. These extensions to columns consist of channels and plates attached to the old column by rivets. The upper ends of the old columns were also connected with the track girders by knee braces, which served to fix the tops of the columns and reduce the bending moments in them. At intervals of about 150 feet, or every third bent, expansion pockets were provided with bearings on which the longitudinal girders may slide to compensate for temperature variation or slight variation between field and shop measurements.

The American Bridge Company furnished the iron and steel required for the new structure and the Kelly Atkinson Construction Company of Chicago was subcontractor for the work of erecting. The building of foundations was let to Angus Brothers & Co. The moving, laying and adjusting of tracks for the maintenance of train service during the progress of the work, the construction of temporary ticket booths and the removing of the old brick stations were accomplished by the regular forces of the railroad company.

The design and construction were conducted under the direction of Charles V. Weston, M. Am. Soc. C. E., chief engineer of the South Side Elevated Railroad, with A. N. Wood as assistant designing engineer. J. N. Darling was principal assistant constructing engineer and M. S. Ralls assistant constructing engineer. The work was started in January, 1905, and finished in March, 1907.

Effect on Traffic.

During the month of June, 1905, there were on the average 638 trains daily running at intervals of from 1 to $3\frac{1}{2}$ minutes. The number of passengers carried in June, 1905, was 2,818,220 and in July, 1905, 2,643,427. For the corresponding months of 1907 the numbers of passengers carried were 3,470,576 and 3,469,916, respectively. The old schedule time of $17\frac{1}{2}$ minutes between Forty-third street and Congress street has been reduced to $9\frac{1}{4}$ minutes, which is about 28.6 miles per hour.



South Side Elevated Railroad—Details of Column Extensions.

placed 30-ton hydraulic jacks. The structure was raised two inches at a time and blocks inserted after each lifting, as it was not desired to rely upon the jacks to carry the live load of trains. The temporary structure terminated in a wooden trestle, upon the caps of which the track stringers rested directly. Where new foundations were being placed at the same time crib timbers 9 by 18 inches and 30 feet long were used, working room being left inside for the handling of concrete for the foundations.

In comparing this speed with that of the New York subway trains of the Interborough Rapid Transit Company, it is interesting to note that the speed is greater than that of the subway express trains between the city hall and Forty-second street, where a distance of 3.17 miles is covered in eight minutes, a speed of 23.8 miles per hour.

QUESTION BOX OF THE ENGINEERING ASSOCIATION.

S. W. Mower, secretary of the American Street and Interurban Railway Engineering Association, has issued the list of questions constituting the "Question Box" which will be presented at the Engineering association convention to be held at Atlantic City, N. J., October 14, 15 and 16, 1907. With the list of questions is inclosed a circular letter to the general managers and engineers of member companies, stating that, while a statement of views relative to any and all questions would be greatly appreciated, it is not desired to burden them unduly, but, in order to secure a representative expression of opinion, each company is requested to answer at least five questions. The "Question Box" is to be printed in pamphlet form, together with the replies from the various companies, and distributed in advance of the convention. Replies are to be forwarded to S. W. Mower, general manager Southwestern Traction Company, London, Ont. Non-member companies are also invited to make replies. The list of questions follows:

Power Houses.

1. Is the use of jet condensers on turbine installation advisable?
2. Have you had any trouble with stripping of blades in a turbine of either the Parsons or Curtis type? If so, to what did you lay the cause? What do you suggest as a remedy?
3. Have you had any trouble caused by deposits of foreign matter forming on the blades of the turbine? How do you remedy this?
4. What success have you had with motor generators wound for 6,600 to 16,000 volts on the alternating current side? Is any difficulty experienced due to direct exposure of windings to lightning?
5. What is the smallest size of boiler plant or minimum coal consumption which warrants the use of automatic stokers?
6. Is it advisable to use gaskets for superheated steam headers?
7. In a small or medium size plant what is the best method of increasing boiler capacity during heavy peak loads? Give details and results obtained.
8. What schemes are there for inducing firemen to take greater interest in their work? Please give details and results secured.
9. How can coal pile fires be prevented?

Shop Construction.

10. Allowing for additional cost, is it not advisable to have creosote blocks, or a wood floor, on concrete foundation in the machine, blacksmith and wheel section of a shop, in preference to ordinary concrete floor, which becomes uneven quickly and is hard on workmen walking about?
11. Owing to the breaking of concrete around pit tracks, the inability to secure a safe jacking base and the possibility of shocks to workmen, is not a plank floor preferable to concrete?
12. What is the most desirable construction for an operating car barn, considering cost, maintenance, operating and insurance?
 - (1) Brick walls, mill construction roof.
 - (2) Brick walls, roof iron trusses, 2-inch boards, tar and gravel.
 - (3) Brick walls, reinforced concrete roof.
 - (4) Brick walls, reinforced concrete walls and roof.

Track.

13. What is the life of ties or timber embedded in concrete?
14. Is there a standardized specification for track and roadbed?
15. Which is the best material for ballast on interurban lines—gravel, crushed rock or stone?
16. What is the best method of handling weeds on interurban roadbeds?
17. Has the sprinkling of crude oil on the roadbed been tried to lay the dust and kill weeds, and have the results been satisfactory?

18. Some companies have laid their tracks with joints directly opposite one another, and, as they continue the practice, it must have some advantages. What are they?

Overhead Work.

19. Is there a standard and reliable specification form for overhead trolley construction?
20. What should be the dimensions of a substantial lightning arrester ground plate for the purpose of grounding station arresters?
21. What experience have you had with a fuse arrester, viz., an arrester of the type composed of one or more pieces of 18 to 20 d. c. c. m. w., 16 inches or 18 inches in length, bared at one end and suspended over the positive bus to ground?
22. What is the most efficient method of preventing short circuits by reason of low-tension feeders coming in contact with trees?
23. Can sleet be prevented from forming on the trolley by greasing the wires? Has such an idea ever been tried?

Car Bodies.

24. What is a good form of monitor deck ventilator for suburban cars, one that will change the air in the car sufficiently and yet not allow annoying drafts in winter?

Car Equipment.

25. What is done to prevent brush and brush holder troubles by operators of fast and heavy equipments?
26. Will controller blow-outs be reduced if the fields are connected ahead of the armatures, and why?
27. Which are preferable, solid or split gears, and why?
28. What are the best methods of wiring on open city cars?
29. Which is the most economical, all things considered, hot water or electric heating for cars?
30. What in your opinion should be the requisites and general design for a car coupler for interurban car service?
31. Are the results obtained from the use of a high-grade brass motor bearing so much more satisfactory than a bab-bitted bearing to warrant the additional cost?
32. Is there any motor lid for the railway motor that can be removed and replaced daily without any danger of losing in streets or into motor?
33. Is there any method by which carbon brushes for railway motors can be tested without a running test to determine whether they are of the same grade as before used?
34. Has anyone experienced trouble with loose field coils in the newer types of motors, and what can be done to prevent it?
35. What is the best way to straighten armature shafts that are sprung between pinions and bearings without removing the winding or shaft from the core?
36. Should armatures rewound or repaired be balanced before being put in service?
37. Which is the more economical for finishing armatures, the higher priced, smooth, hard oil-proof varnish at about \$1.50 per gallon, or a grade costing about 75 cents per gallon, and which has not all the qualities mentioned above?
38. What is the average cost of equipping double-truck cars with four motors and air brakes, including the wiring, mounting motors, piping, etc.?
39. Give formula of babbitt used for your own journals.
40. Give formula of material used in trolley wheels.
41. Is it practical to use the same kind of a fender on city and interurban cars?
42. What are the arguments in favor of a pilot for purely interurban service?

Wheels and Axles.

43. Why are chilled iron wheels preferable in interurban service to steel-tired wheels?
44. What causes car axles to crack and break?
45. Is a drop test sufficient to detect flaws in axles, provided it is calculated to be about equal to service conditions plus a proper factor of safety?
46. What is the average life of 4, 4½ and 5 inch cold rolled steel axles under cars having four-motor equipments ranging from 15 to 27 tons?
47. What is the chief factor in determining when a steel wheel should be turned down in the lathe; i. e., is it flange wear, tread wear, diameter or what? About how often is it found necessary to turn them?

Inspection.

48. How often should clearance of motors be taken?
49. In maintaining rolling stock, what is a fair average in cars per man for the maintenance of trucks and electrical equipments at car houses?
50. What is a fair average in motors per man?

Lubrication.

51. What is the most economical depth of oil to use in the oil wells of the armature bearings of the G. E. 80 or 101-B motors? State length of time between oilings for the various depths to be mentioned.

52. Which gives the best results for lubrication of gears, grease or a heavy oil?

53. What is the best simple shop test of lubricating oils and greases, including gear grease?

54. What is the best way of cleaning cars?

55. As the operating department deals with and receives complaints from the public as to the cleanly condition of the cars, why is it not best to have our cleaning come under the operating end, provided the advice of the master mechanic is adhered to regarding the use of proper cleaning compounds which will not prove injurious to the paint?

56. What systematic and periodic method have you for taking up with the general manager or transportation department a record of the cars turned in off the road due to the fault of negligent operation on the part of the trainmen? What is done to prevent a repetition of the faults?

57. On a belt line, cars weighing 23,000 pounds loaded and having two G. E. 67 motors, pass one way around a 50-foot radius spiral curve on an unpaved street, no grade, at a 10-minute headway. A curve having a 60-foot radius would decrease the operating expenses for current, car and motor repairs and wear on curve. What price could be paid for enough of the corner property to construct a curve 60-foot radius, so that interest on the cost of the property at 6 per cent would be offset by the saving in operating expenses, assuming feed wire and return was sufficient and assuming both curves to cost the same?

58. Is a long or short pull register preferable, and why?

59. What is the best method for checking motormen on the operation of controller with reference to care of equipment and saving of power?

60. What is the best manner of instructing student motormen in the mechanical operating of both city and interurban cars?

61. In how great detail should the mileage of parts of equipment be kept?

62. What should be the angle between trolley pole and wire?

BOOK TABLE.

Hendricks' Commercial Register for Buyers and Sellers. New York, 1907. Samuel E. Hendricks Company, 74 Lafayette Street. Cloth, 1,224 pp., 7 by 10 in. Price, \$10.

The sixteenth edition of this valuable reference work has been issued. It contains an index of over 350,000 names and addresses of manufacturers and jobbers in upward of 15,000 different lines of supplies or materials. In many instances the information is supplemented by the special trade name of the goods manufactured. The work is probably the most complete of its kind published and is particularly valuable in the lines of railroad supplies, engineering equipment and classifications allied with the mechanical engineering, contracting, electrical and architectural professions, and iron, steel, mining, mill, quarrying, export and kindred industries. The work has been found especially valuable in the Electric Railway Review office as a directory of manufacturers.

A collision between a furniture van and a car of the Chicago City Railway on August 29 at Wabash avenue and Eighteenth street, almost resulted in a riot. The van was crossing the tracks and, according to the teamsters, the motorman did not sound his gong. The wagon was overturned and the driver thrown to the pavement. After the wagon was removed the car was about to proceed, but the teamster stood on the tracks and refused to budge until given assurance that the company would make good the damage. He appealed to brother teamsters, and drivers to the number of 40 responded. They tried to board the car and two teamsters attacked the motorman. Finally, with the aid of the police the car crew was able to put the assailants off and the teamsters, after smashing a window or two, allowed the car to proceed.

The aggregate capacity of steam turbines of the Parsons type manufactured up to the present is given as 870,000 horsepower.

ARRANGEMENT OF EXHIBITS
AT ATLANTIC CITY.

George Keegan, 2321 Park Row building, New York, secretary of the American Street and Interurban Railway Manufacturers' Association, has issued Circular No. 7, which announces the number of the exhibit space allotted to each exhibitor at the Atlantic City convention in October and also gives complete information in regard to the arrangements which have been made for the accommodation of exhibitors on the Steel Pier. Inclosed with the circular is a diagram of the pier and detailed diagrams of several sections of the pier, showing the location of each exhibit booth. A reproduction of the diagram of the entire pier is presented herewith. Booths numbered up to 198 and from 1000 to 1054 are to be located in the arcade. Numbers 200 to 300 will be found in the ballroom. Booths 300 to 511 will be located in the narrow section of which the aquarium is the center. Numbers 600 to 700 will be set up around the music hall.

Secretary Keegan has received 167 applications for exhibit space to date.

The Quebec bridge across the St. Lawrence river collapsed about 6 p. m. on August 29. The reports state that over 80 of the men at work on the structure lost their lives in the wreck. This bridge, which has been under construction for six years, was to have cost when completed nearly \$7,000,000. The length was 3,300 feet and the distance between the two central supporting piers 1,800 feet. The floor of the bridge was 63 feet wide and was to carry two steam road tracks, two tracks for an electric railway running out of Quebec and a roadway for vehicular traffic. The two cantilever towers were 375 feet high and the clear height above the water 150 feet.

The new 129-pound rail that the Chicago City Railway Company is using on its south side lines is being welded by the Lorain Steel Company with its electric welder. At present the machine is welding four joints per hour, it being expected that about 8,000 more joints will be welded this season. The start was made last week at Grand Crossing on the Cottage Grove line. The new rails have been laid and welded on Root street, between Wallace and State. Wentworth avenue, from Root street to Fifty-fifth street, is practically completed.

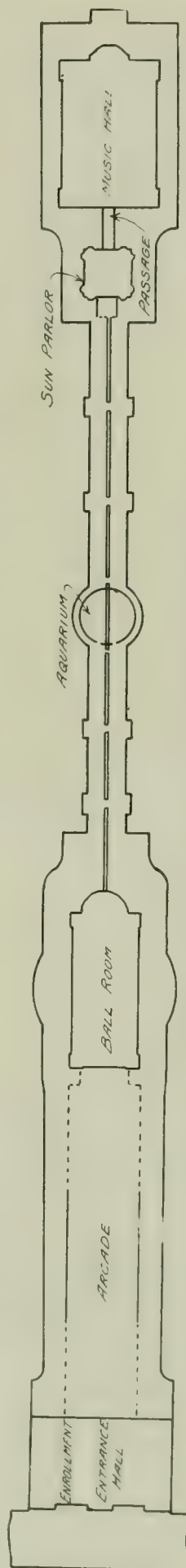


Diagram of Steel Pier at Atlantic City, Showing Arrangement of Exhibit Booths.

AUDITING CONDUCTORS' COLLECTIONS ON INTER-URBAN RAILWAYS.*

BY WILLIAM H. FORSE, JR., SECRETARY AND TREASURER INDIANA UNION TRACTION COMPANY.

Conductors are human, subject to temptation, and as fare registers are frequently watched by curious passengers, the moral effect of the dial and gong is no doubt excellent.

A special type of register is used for interurban service when the 5-cent zone system is outgrown. A register having a "bank" of a dozen dials is sometimes used for the purpose of indicating ten different rates of fares, ticket and pass collections, and the issuance of cash fare receipts.

Cash fare receipts are used when there are more classes of fares than there are dials on the register, and when no registers are used. They are printed in duplicate, and after the two parts are punched simultaneously, they are separated at perforation, one part is given the passenger as his receipt, and one part, called the audit stub, is retained by the conductor, and at the end of the day is sent to the auditor. A receipt having two audit stubs exactly alike is used when a crew operates a car over the tracks of its own and a connecting line. One of the stubs is then sent to the auditor of each of the railways, and is used in support of the statements showing amount of interline cash collections.

In order that conductors may be compelled to punch the two parts of the fare receipts in the same relative places they are perforated and folded over by the printer before being clinched in pads of 50 or 100. The conductor is supposed to punch the two parts exactly alike, with one punching through them both. In practice, however, a man sometimes punches the part given passenger for the full amount paid, say, \$1.30, while the audit stub is punched \$1.05, the difference being pocketed. This manipulation has been overcome to some extent by the use, on short lines, of a small metal container. The container is filled with fare receipts by the office issuing them, and after being locked is delivered to the conductor. It is made to fit the pocket, and its patented feature is intended to prevent the conductor from issuing the passenger a receipt which differs in amount from the audit stub.

Secret inspection has been found a necessary adjunct of mechanical safeguards. The simplest reports of inspectors usually consist of "on and off" records. The inspectors travel the full length of a conductor's trip, and, unknown to him, keep accurate count of the passengers who get on and off at each stopping place. In order that these reports, when honestly prepared, may serve as an accurate check upon conductors, there must be a comprehensive system provided, which will automatically furnish the auditor with the same record of passengers "on and off" from the conductor's standpoint.

Each person who rides should give the conductor something for which he must account to the auditor. This may be cash, a ticket, trip pass or coupon. If the somewhat cumbersome plan of issuing a receipt for each ticket and pass, as well as cash fares, is followed, the conductor's work will sometimes be increased beyond his power to handle it all properly.

Presuming that fare receipts are issued only for cash paid, conductors are instructed to write upon the back of each strip of coupons collected the points between which the passenger traveled. If an employee presents a card pass he should be required to affix his signature to a slip filled in by the conductor, showing the zone through which he traveled, in addition to pass number. The fare receipt will be punched with the amount paid and names of stations for which the fare was paid. The tickets will, in themselves, show the zones covered by passengers using them, and thus the record in this connection is complete.

The tickets, coupons, etc., for each trip are placed in a separate envelope by the conductor, and are received in the office of the auditor. If he is informed that an inspector has covered certain trips, the conductor's collections for those trips are tabulated, showing the number of passengers accounted for as having boarded and left the car at each station. These reports are compared with the inspector's reports, and if inspector and conductor are equally careful and honest, there should not be the slightest difference in the figures.

Interurban railway conductors using fare registers are subject to check in another manner. The auditor checks against each other the collections actually turned in by the conductor, and the conductor's record of collections. The conductor's record consists of the paper taken from the locked fare register at the end of each day or trip, by a man employed at terminal points for this purpose. It follows that if the conductor has carefully "rung up" each fare collected, on the proper dial, the actual collections and the register reading should be the same, if the register is in proper working order.

Experience has proved that the differences are quite frequent, but usually nominal in amount. The auditor makes up a statement, daily, of these differences, termed "overs and shorts," and for comparative purposes they serve as an index to the efficiency of conductors. Some railways use a merit system in this connection, posting the standing of conductors on bulletins at car barns and other places where employees congregate, thus creating friendly rivalry for efficiency percentages.

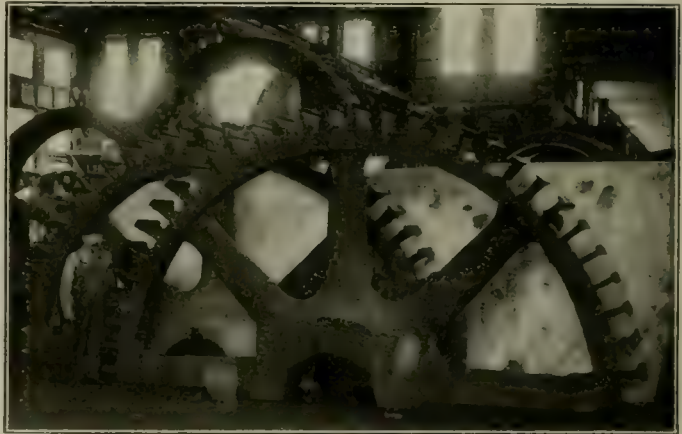
ARMATURE SPIDER FOR DIRECT-CURRENT GENERATOR, BOSTON ELEVATED RAILWAY.

The illustration here reproduced shows the armature spider for one of the two 2,700-kilowatt Allis-Chalmers direct-current railway generators for the extension of the Lincoln wharf power station of the Boston Elevated Railway Company.

The new machines, which equal in size and capacity any of similar type in the country, will furnish a portion of the power used for operating the elevated railway division and the cars through the East Boston tunnel.

These units are of the multipolar type, compound wound for 575 volts, at a speed of 75 revolutions per minute. They will be driven by vertical cross-compound engines, on whose shafts the armatures, 21½ feet in diameter, because of their size, will have to be built up on the ground.

The armature core is formed of punched steel laminations, mounted on a cast spider. The rings are made up of seg-



Armature Spider for 2,700-Kilowatt Direct-Current Generator for Boston Elevated Railway.

ments, which are built up on the spider in such a way as to obtain great strength. An open construction and ample air passages throughout the core insure thorough ventilation.

Thus the heat in the armature is dissipated as fast as generated, permitting heavy overloads to be carried without dangerous heating. The armature coils are held in place by wooden wedges, a method which does away with the necessity of band wires. An Allis-Chalmers brush oscillating device will be provided, by means of which the brushes travel back and forth on the commutator in a direction parallel with the engine shaft, keeping the commutator in perfect condition and avoiding the usual wearing of grooves.

These machines are designed to endure sudden changes in load of any amount from zero to the extreme limit of capacity without shifting the brushes. The armature spiders, as indicated in the picture, are made in halves so that the armatures may be mounted on shafts after the shafts have been put in place.

The alleged refusal on the part of a Baltimore street car conductor to accept a Columbian half dollar in payment of fare was the cause of a suit for \$5,000 damages instituted in the Baltimore city court on August 21 against the United Railways & Electric Company by William E. Maginnis. It is alleged in the declaration that on August 19 Mr. Maginnis offered the coin to a conductor in payment of his fare, but the conductor declared it was no good and put Mr. Maginnis off the car.

*From an article in the Journal of Accountancy.

PIPING AND POWER STATION SYSTEMS—LI.

BY W. L. MORRIS, M. E.

If the fire mains are located away from the buildings and underground, it will be necessary to provide an underground waste cock to empty the water from pipes discharging water above the surface of the ground. These waste cocks are provided to drain the water from the standpipes. In no case should these cocks be located in such a manner that the destruction of the building will cause a broken connection and thus a waste of water from the fire main.

These connections are so little used that the ground hose connections would ordinarily be found quite sufficient.

The devices intended for fire protection should not be used for other purposes. The danger in protecting fire appliances from interference is that there is a chance that they cannot be found in time to be of service. If the fire tools and appliances cannot by ordinary methods be kept where they belong it may then be necessary to arrange them in such a manner that a light copper wire with a lead seal must be broken in order to remove any fire protection device.

Water Treatment—Water Supply—Class M 1.

If a water treatment plant is necessary it is quite evident that there is little or no choice in regard to the water which is to be used for the steam plant. Regardless of the system of chemical treatment which is used, it is advisable, if not absolutely necessary, that the temperature of the water be raised to facilitate the treatment. Nearly all chemicals soluble in water dissolve more easily as the temperature of the water is increased, and chemical action also takes place

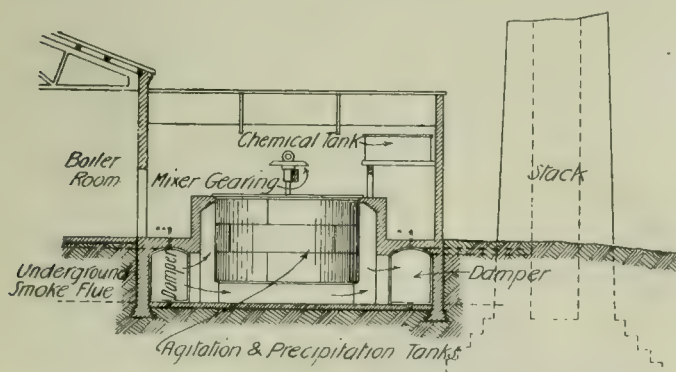


Figure 311 (N 1-1).

more readily in warm than in cold solutions. The efficiency of the treating apparatus is therefore increased if it is kept sufficiently warm. If the plant is run condensing then the water should be taken from the hot well.

Three different chemical treatment systems are shown in Figures 63, 64, 65 and 66. Figure 63 shows the water being taken from the condenser discharge (this being the regularly used connection) and this discharge should be trapped so that it will retain the water, even in case there is little or no flow through it. Ordinarily it is the best practice to fill the precipitation tanks with warm water when the condenser is running.

A chemical-treating plant is a source of economy and if its operation is interfered with, the loss will be proportional to the time it is out of service, but in no case should the continuous operation of the power plant be dependent upon the treating system. If it is possible to deliver sufficient steam for 20 hours a day to raise the temperature of the feedwater to 200 degrees, it would be poor judgment to install a treating system sufficiently large to treat cold water.

It requires careful consideration, however, in deciding upon the use of exhaust steam for warming the purification tank. If there is but a limited amount of exhaust steam, special precautions should be taken to save the heat units

in the exhaust and it would be a mistake to use exhaust steam in such cases for heating the treating tank in order to permit the use of a less expensive installation than would be possible if the water were treated hot. Far more money would be lost in heat radiation from the tanks than would be required to pay the interest and depreciation charges on a treating plant sufficiently large to treat cold water which would not give rise to the loss by radiation.

A very efficient plan of raising the temperature of the mixing tank is that shown in Figure 311 (N 1-1). In the arrangement shown there is not so great a heating surface exposed to the flue gases as there would be in an economizer, but this is not objectionable, because it would be quite undesirable to raise the temperature of the water above about 200 degrees, otherwise vapor would be given off. In the plant shown in Figure 311 there are two tanks side by side, with flue dampers which can be opened and closed to shut off the gases from either tank.

Ample space should be left around the tank for cleaning out and making repairs. When the heat is applied it may be found necessary to use the three tanks so that the circulation of the water may be stopped to allow the material to precipitate.

When a tank is filled with water, the chemicals are run into it and the mixer is started. The mixer should run as long as the flue gases are passing around the tank to keep the water in circulation. The flue gases should pass around but one tank at a time. One of the other tanks, just previously agitated, should be shut down to settle, ready for supplying water. There would be three operations to be carried out by each shift of operators—agitation, precipitation and supply.

The time required to change the tanks is a very small item if the necessity for watching is eliminated. This difficulty can be overcome quite readily by attaching an alarm to the suction pipe in the tank having a float at its movable end, as shown in Figure 63. The alarm will notify the operator when the tank is pumped full and also when the tank being drawn from is empty. Such a system of water treatment is very efficient because the water is at rest for so long periods of time. When the tanks are changed every eight hours it will be necessary to make them 20 feet in diameter and 14 feet high for a 1,000 boiler horsepower plant. If the continuous system shown in Figure 65 were to be heated by waste flue gases it would be necessary to use a separate tank for mixing and agitation, otherwise but little heat would be taken up by the water.

When the feedwater is heated as shown in Figure 311 there will be but little use for exhaust steam and it will be found to be a more economical arrangement to run the air and circulating pumps for the condenser from the engine shafting or use a motor-driven centrifugal pump. The feed pump should be compounded and a small closed heater used to condense its steam. The pump used to fill the heating tanks may be of the motor-driven centrifugal type. A plant equipped in this manner will show very good economy, the tanks located in the smoke flue effecting a saving the same as economizers would, but without offering an equal obstruction to the draft. The saving in chemicals alone is a great advantage with the heating tanks and whatever heat is transferred from the flue gases to the water there should be as much of a saving as from economizers.

Water Treatment Boiler Supply—Class M 2.

The water from the treating tank or apparatus should only be connected to feed pump suctions which can readily be shut off without interfering in the least with the running of the pump. The treating pump should be arranged the same as though it were merely a convenience, the loss occasioned by shutting it down being too slight to justify any expense in providing emergency arrangements to insure its continuous operation.

The feed pump should have a suction direct from the hot well and also one from the intake. These different connec-

tions are clearly shown in Figures 64 and 65. The discharge from the feed pump to the boiler is the same as for any other water supply. It is only in the pressure system shown in Figure 66 that the water treatment apparatus is located between the pumps and boilers. In this case the treating system is operated in much the same manner as a closed heater.

There is one point which must constantly be borne in mind in considering chemical treatment, and that is how to remove the impurities from the water before it is taken into the pump suction. The velocity of the water in a pressure system is quite rapid because of the smaller size of the water tanks which must be used in order to withstand the boiler pressure. To accomplish the same results as are obtained with larger precipitation tanks a filter bed must be used. To facilitate a precipitation it is necessary that no water flow in or out of the tank and that no mixer or other device be in motion while the process of settling is taking place.

There is still another condition which will prevent the successful operation of a precipitation plant and that is caused by varying temperatures of the water. Circulation of the water prevents the precipitate from settling. In a steam boiler circulation serves a useful purpose and partially prevents exactly what is desired in a precipitating tank. For instance, if heat is applied to the under side of the tank shown in Figure 311, circulation of the water will be set up. Also, if the surface of the water is exposed to a cold atmosphere circulation of the water will likewise take place. For these reasons the gases must be shut off from the tank while precipitation and settling are taking place. By permitting the bottom of the tank to become cooler than the top circulation is also prevented.

It is desirable to have water in the boiler circulating at all times to prevent the fine impurity from settling. There are times, however, when the circulation in the boiler is sluggish and then the finely divided precipitate settles on the tubes and other parts of the boiler. The amount of precipitation which will settle depends upon the length of time the circulation is retarded. The amount of scale which is formed each time the circulation in the boiler is retarded is easily seen by counting the number of laminations in the scale and noting the thickness of each. Scale half an inch thick may be made up of a number of equal laminations or it may be composed of one lamina $\frac{1}{4}$ inch thick and a number of thinner ones $\frac{1}{16}$ inch or less in thickness. A piece of scale thus laminated would indicate that the boiler had been banked for one long period and a number of shorter ones, or it may indicate that more scale-forming material entered the boiler during one period than at another.

The precipitation of the impurities in feedwater is much the same whether the process is carried out in a settling tank or in a boiler. The heat or chemicals will liberate the gas which is necessary to hold the impurities in the solution, and the problem at all times resolves itself into that of freeing the material of this gas and precipitating the impurities before the water enters the boiler. The use of compounds or chemicals which precipitate the impurities in the boiler is extremely objectionable, because all the impurities are thus delivered into the boiler and in addition the chemicals which are used to throw down the scale-forming salts.

In order to operate a boiler with such mud in it it is necessary to constantly throw away part of the boiler water by blowing off and to thin down the salts left in the boiler by the addition of fresh water. This is necessary to prevent foaming and priming, which would make the quality of the steam very poor and might cause serious injury to the engines.

(To be continued.)

The bulletin of the United States department of commerce and labor states that a plan for the construction of a tramway line at Pekin elaborated by a Japanese has been presented to the bureau of foreign affairs by the Japanese minister at Pekin. He demands a monopoly of 10 years, after which the concern may be bought by China.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Previous Derailments as Evidence—Presumptions.

Overcash v. Charlotte Electric Railway Light & Power Company, 57 Southeastern Reporter, 377.—The supreme court of North Carolina holds that it was not error to exclude testimony offered to show that other cars at other times ran off the track at the same place, in the absence of proof of like or similar conditions existing on the occasions upon which it was sought to show that the other cars ran off, and those at the time when the plaintiff was injured. It is undoubtedly true, the court says, that, within certain limitations, this class of testimony is competent to show both the condition of the track and knowledge of the defendant. The general principle controlling its competency is well settled. The difficulty in applying it arises from the varied forms in which it is presented. The question to be decided, when this class of testimony is offered, is whether it is relevant; that is, whether it reasonably tends to prove the fact in issue, or is so related to it as to form a reasonably safe basis for a conclusion in regard to the fact in issue.

When a common carrier undertakes to carry passengers, the law imposes upon it the duty of exercising the highest practicable degree of care, to provide safe modes of transportation, and to keep them in good and safe condition. When an injury is sustained by a passenger by reason of collision, derailment or other miscarriage of the car, the carrier is required to show either from the testimony of the plaintiff and his witnesses, or by the introduction of affirmative evidence, that it has discharged this duty. In the absence of either the jury should find that the conditions producing the injury were caused by negligence of the carrier. When it has done so, the derailment or other condition is necessarily attributed to an accident. Hence it is that the presumption or prima facie case established by proof or admission of the derailment is always open to be explained, to be rebutted; that is, that, notwithstanding the presumption raised upon the fact of derailment, in truth, there was no defect in the car, track or operation, the derailment was the result of some independent cause, or what is called accident, and at this point legal and moral liability ceases.

Character of Road and Right of Condemnation.

In re Minneapolis & St. Paul Suburban Railway Company, 112 Northwestern Reporter, 13.—The supreme court of Minnesota says that the company's articles of incorporation authorized it to purchase, lease, build, own and operate suburban street railways extending from the limits of the cities of St. Paul and Minneapolis to and into outlying cities, towns and villages—namely, from St. Paul to North St. Paul, White Bear and Stillwater; from St. Paul to South St. Paul; from Minneapolis to Anoka; and from Minneapolis to Lake Minnetonka. Among its other stated powers was the right to own and operate by electric or steam power such steamboats, launches or other boats as might be determined upon by the company upon the lakes of Minnesota, and power to purchase and own stock or stocks of suburban or other street railway companies and to purchase or lease railways within the state, and to lease, construct and operate electric or other power stations for the purpose of furnishing electric light or power.

The court holds that, as determined by the main purport of its articles, such corporation was a work of internal improvement and a common carrier, and its articles having been executed in compliance with Title 1 of Chapter 34 of the general statutes of 1894, it was entitled to exercise the right of eminent domain conferred by Section 2592 thereof, even though the incorporators declared in the articles that they proposed to incorporate under the provisions of Title 2.

Such corporation was none the less a common carrier, as defined by Section 379 of said general statutes, though its

articles did not in terms prescribe that one of its powers was to carry freight.

In determining under what title the corporation was organized, the fact that the organizers denominated the proposed improvement a "street railway" was not controlling, since it conclusively appeared from the articles that it was not the purpose of the company to construct and operate street, but interurban, railways from place to place. What is a street railway? The authorities generally clearly show that, while the reasoning varies somewhat according to the statutes in force in the different states, the distinction between the two classes of roads is well defined. The difference does not depend upon the motive power employed, nor alone upon the character of the cars, rails or equipment. The essential and predominant distinction is that a street railway is operated upon the street in aid of the street as a highway. A street railway is an improvement on the coach or omnibus, and is operated for the use and benefit of persons desiring to be transported along the street. It is local, and under the special control of the municipality. A commercial railroad gathers its business at termini and operates from place to place.

Section 2915 of the revised laws of 1905, authorizing a railroad company to cross the tracks of another such company at points of intersection, and to acquire such easement by condemnation, confers such right on all railroad corporations organized under the former statutes, as well as those organized under the revised laws.

The crossing of streets and alleys incidental to constructing a railroad from place to place does not constitute the occupancy of such streets or alleys for the purpose of operating a railway thereon, within the provisions of Section 2841 of the revised laws of 1905; and a railroad company has the right to acquire by condemnation, under Section 2916, a right of way over the streets and alleys of cities and villages, and over private property within such limits, without securing a franchise from the municipal authorities.

Permitting Child to Sit at End of Seat in Open Car.

Indianapolis Traction & Terminal Company v. Beckman, 81 Northeastern Reporter, 82.—The appellate court of Indiana, Division No. 2, says that a mother and her children, of whom the oldest was a boy seven years and two months of age, sat in the first seat back of the motorman, the boy sitting on the end of the seat next to the wire screen designed to protect passengers, but which did not reach to the floor of the car. The car was an ordinary summer car. It was running with such speed that, in going around an abrupt curve, the child was thrown from his seat under the wire screen to the ground, run over and killed. It was contended that the mother was contributorily negligent in permitting the child to sit at the end of the seat next to the screen, in looking after the "little ones," instead of giving attention to him; that if she had sat at the end of the seat the boy could not have been thrown out of the car; that the crowded condition of the car did not compel the boy to sit on the end of the seat; that the company did not require him to sit there; and that a person of ordinary prudence would not have permitted him to do so.

The court, however, does not think that the mother was guilty of contributory negligence barring a recovery of damages. It says that there have been a great many cases decided in which it has been contended that the passenger in selecting a place to ride not provided for such use was negligent. But the facts herein did not present a case of the class indicated. The seats were all intended for use by the passengers. Had the car been operated with ordinary care all of them would have been perfectly safe. It is difficult to select safe places before the accident, but after the event it is not difficult to tell what was safe or to point out what was dangerous. The quality of the act of the person who is charged with contributory negligence depends upon conditions known to him before the accident occurs. The location of the

child, in view of the accident which did occur, can now be seen to have been dangerous, but in some other accident which might have taken place it might have proved to have been the only safe place in the car.

Liability for Omission of Overworked Motorman.

Ft. Wayne & Wabash Valley Traction Company v. Crosbie, 81 Northeastern Reporter, 474.—The supreme court of Indiana holds the company liable for injury to a motorman in a collision caused by the non-observance by the motorman of the car following of a rule requiring a car following another to keep 100 feet in the rear, the jury having found that his omission to observe the rule was not the result of his negligence, but the result of his overwork and loss of sleep. It says that the company, having placed him in charge of the car as motorman at a time when, as shown, it knew he was overworked and had gone without sleep or rest for 24 hours and over, ought to have known that under the circumstances he was not in a condition to properly exercise the faculties or senses with which he was endowed. Having placed him in charge of the car in his unfit condition because of his overwork and loss of sleep, the company was not in a position, under the circumstances, to successfully interpose his non-compliance with the rule in question in order to exempt itself from liability on the ground that his omission was that of a fellow servant of the injured party.

Liability for Injury from Electrified Plate in Doorway.

McRae v. Metropolitan Street Railway Company, 102 Southwestern Reporter, 1032.—The Kansas City court of appeals says that on a day in January, when it was thawing and the soles of the plaintiff's shoes had become wet from the water and slush in the streets, she entered the vestibule of a car, and, stepping on a metal plate, received a slight shock from electricity. The conductor, who was standing near the rear door, then cautioned her to "step high," but, observing no obstacle in the way, she proceeded to enter through the doorway, and, in doing so, stepped on a metal plate at the threshold, from which, according to her testimony, she received an electric shock of great severity.

At the end of the run the car was put out of service for examination and repairs, and the inspection which followed disclosed that mud had collected between one of the wires used in the transmission of power to the machinery and the underside of the car, in a way to afford a good conductor of electricity between the wires and the screws which served to fasten the plate.

The plaintiff obtained a judgment for \$1,000 damages, which is affirmed.

The jury was instructed that if it believed from the evidence that the plaintiff received an electric shock while a passenger on said car the presumption was that this shock was occasioned by some negligence of the defendant, and the burden of proof was cast upon the defendant to rebut this presumption of negligence, and establish the fact that there was no negligence on its part. The court holds that this correctly stated the rule applicable to the facts of the case. The conceded facts demonstrated that the shock was caused by a defective condition of one of the appliances of transportation. The existence of a highly electrified metal plate in the passageway for passengers constituted such a defect, and the burden was cast on the defendant to show that its presence could not have been detected and prevented by the exercise of the highest degree of care.

It is not required of a passenger who is injured by some casualty to the vehicle or by some defect in the appliances used in the transportation to allege the specific act of negligence which brought about the casualty. The averment that he was injured by a collision, derailment, breaking down of vehicle, or by a defect in a given appliance, coupled with a general allegation of negligence, is enough to state a cause of action.

News of the Week

Chicago Officials Investigate New York Electrification.

Mayor F. A. Busse of Chicago and a party of city officials visited New York last Saturday and spent the day inspecting the electrified New York Central terminals, accompanied by Vice-President W. J. Wilgus, with the view to advocating similar improvements for the Chicago railroads. The mayor was very enthusiastic about electrification and was especially impressed with the improvements now being made at the Grand Central station, where trains will be brought in on three levels. He expressed himself as fully persuaded that it is feasible for the railroads entering Chicago to electrify their terminals and thus abolish the smoke nuisance, and announced his intention of engaging Mr. Wilgus, who has had charge of the New York Central work and whose resignation becomes effective on October 1, to make a complete investigation of the conditions in Chicago, with a view to convincing the railroads of the practicability of electrification. The matter is expected to be brought before the city council when it convenes on September 9.

Cannot Tax Subway Franchise.

Justice Fitts of the New York supreme court has decided in the case of the Interborough Rapid Transit Company against the state board of tax commissioners that there is no special franchise to be taxed in the case of the subway, which the company is operating under a lease from the city. In 1905 the tax commission assessed the franchise at \$9,000,000, in 1906 at \$18,000,000 and in 1907 at \$24,000,000. The company appealed to the courts and the case was submitted to Justice Fitts about a year ago.

Justice Fitts says in his opinion:

"The underground road which is now operated by the relator in this proceeding is not operated under a franchise purchased from the city, according to the provisions of the original act passed in 1891, but under the provisions of a scheme of municipal ownership. Accordingly this special franchise for the construction, maintenance and operation of a railway and lease of the same to the relator is a grant and transfer of this franchise. No authority or power was lodged in the state board of tax commissioners to assess the same as a franchise, as the property of the relator in this proceeding. The city of New York is vested with the special franchise and owns the railroads. The relation in the case is that of the right of possession for a term of years under a contract or lease. Ownership of the property to be taxed is a condition precedent to the jurisdiction to tax. The determination of the state board of tax commissioners is clearly erroneous."

Minneapolis Council Cannot Regulate Fares.

Judge William Lochren of the United States federal court at Minneapolis, Minn., on August 24 granted an injunction asked by the Minneapolis Street Railway prohibiting the city officials from publishing or enforcing an ordinance passed on February 9, 1907, which ordered the street railway company to sell six tickets for 25 cents. Immediately after the passage of the ordinance the company secured a temporary injunction restraining the city from enforcing the ordinance pending a trial. The case was called on August 20 and lasted five days. The court upholds every point made by the company's attorneys.

The principal point involved in the case was whether the company was incorporated in 1873 under Title 1, Section 34 of the laws of 1866 as a railway and consequently a quasi-public corporation, with the right of eminent domain, for a period of 50 years, or whether it was incorporated under Title 2, as a corporation formed for pecuniary profit only, for a period of 30 years, as contended by the city. Judge Lochren decided that the company was incorporated as a railway and consequently its charter holds good for 50 years from July 1, 1873. The court also decided that the company's contract with the city, made in 1875, and validated by the legislature in 1879, which fixes the rate of fare at five cents, is still in force and consequently prohibits the city council from lowering the rate of fare without the consent of the company under the ordinance of 1890, relating to the power of regulation over the street railway. It is stated that the city will appeal the case.

The Cleveland Traction Situation.

The Municipal Traction Company on August 26 formally accepted the curative ordinance passed by the city council on August 3 regranting all of the company's franchises which were alleged to have been made invalid by Mayor Johnson's financial interest. On the same day the company served

notice on the Cleveland Electric Railway, according to agreement, that it would begin tracklaying on Central avenue and Quincy street the following day. Four suits were at once filed asking for injunctions to restrain the low-fare company from beginning construction work. Two were filed by the Cleveland Electric Company, as a taxpayer and as a property owner, and two others were filed by residents of the streets affected. The petitions for injunctions declared the curative ordinance invalid and that the property owners' consents had not been properly obtained.

On Tuesday, August 27, the suits were called before Judge Estep, but were postponed until Thursday to be heard before Judge Lawrence. It was agreed that the Municipal Traction Company should not begin construction till 9:30 Thursday morning.

On August 26 President A. B. du Pont, president of the Municipal Traction Company, and H. J. Davies, secretary of the Cleveland Electric Railway, appeared before the city council and presented their report of the percentage of the Cleveland Electric earnings due the city for the operation of the Central-Quincy lines from March 22, 1905, when the franchises expired, to January, 1907. The report showed gross earnings for the two lines of \$464,833.52 and operating expenses \$302,141.79, leaving a balance of \$162,691.73. Of this 6 per cent interest was allowed the company as a return on the investment, leaving a surplus of \$84,488.37 due the city.

Strike at Henderson, Ky.—The system of the Henderson City Railway was tied up on August 27 by a strike of 18 motor-men. The men claimed that the company tried to lengthen the workday from 9 to 12 hours. All cars were run into the car house, power was shut off and the fires under the boilers extinguished.

Pittsburg & Butler to Carry Freight.—The Pittsburg & Butler Street Railway of Pittsburg, Pa., will establish a freight and express service some time in September on its line from Pittsburg to Butler. Special cars are being built for the service and until these are received the baggage compartment cars will be used. The service will be confined to parcels, express packages and truck farm and dairy products.

Louisville Carmen Vote to Strike.—After having had one strike only six months ago the members of the local union of the street car employees of the Louisville (Ky.) Railway on August 26 voted unanimously to go on strike again, leaving the time for calling the strike in the hands of the executive committee. The ground for the action, as alleged by the men, lies in persistent discrimination by the company in favor of non-union men.

Free Transportation Cut Off in Birmingham, Ala.—George H. Harris, manager of the railway department of the Birmingham (Ala.) Railway Light & Power Company, has announced that after September 3 no free transportation will be accepted on the company's cars, except from steam railroad officials and employees of the company. This action is in accordance with a recently enacted state law and affects policemen, firemen, city officials, newspaper men, etc.

Joint Traffic Agreement with Steam Line.—The Spokane & Inland Empire Railroad has made a joint traffic agreement with the Great Northern Railway and is handling a heavy traffic in wheat from the Palouse country to points on Puget sound. Several warehouses are being erected along the electric line and at present 25 receiving stations are in operation. The grain is hauled to Spokane, Wash., by the electric road and from there to the sound by the Great Northern.

Milwaukee Hospital Car.—The Milwaukee Electric Railway & Light Company has recently rebuilt an old private car and equipped it for service as a hospital car, to be used in case of accidents at some distance from the city to remove injured persons at once to their homes or to hospitals. The car will be held in readiness for a trip at all hours and is equipped with complete surgical outfits, four stretchers and various articles for "first aid to the injured." A doctor and a nurse will accompany the car.

Sleeping Cars from Springfield to St. Louis.—The Illinois Traction Company's sleeping cars, which have heretofore run between Decatur and St. Louis, via Springfield, Ill., will hereafter run only between Springfield and St. Louis. The business between Decatur and Springfield has been so small that it was decided to run the car from Springfield. A car leaves Springfield every night at 12:30.

Cave-In in Philadelphia Subway.—By the collapse of timber supports a portion of the subway being constructed under Market street in Philadelphia for the Philadelphia Rapid Transit Company caved in on August 21, just below Thirteenth street. When the supports gave way water gushed in and the earth under about 25 feet of surface car tracks was loosened. Fortunately there were no cars or teams on the

street at that point at the time. The accident will delay the work in the subway to some extent and also require routing the surface cars by another street.

Test of Union Pacific Motor Car.—As an endurance test of speed, on August 22, 1907, Union Pacific motor car No. 12 made the continuous run from Omaha to Denver, 570 miles, in 16 hours 34 minutes, running as the second section of No. 1, the Overland Limited, from Omaha to Julesburg. The running time of the regular Denver fast train is 17 hours 15 minutes. Since the previous cars have been sent to Denver they have been in daily service, making 172 miles, and have been on time constantly. The company still has in various processes of construction 18 additional motor cars.

New York Commission to Investigate Mileage Tickets.—In connection with complaints on passenger rates the New York public service commission of the second district has notified every railroad corporation and street railroad corporation within the jurisdiction of the commission to prepare and file before September a full and complete verified statement showing what, if any, passenger mileage books or mileage tickets of any description it has on sale, the price at which each book or ticket is sold, and all rules or regulations governing the sale, use and redemption of such books or tickets, and to attach thereto a complete form of each such mileage book or ticket.

Sinkhole Swallows Concrete Arch.—The Winona Interurban Railway of Winona Lake, Ind., which is building a line between Peru and Warsaw, Ind., has been having considerable trouble on account of a sinkhole near Gilead, which last week engulfed a concrete arch costing \$2,500. The hole made its appearance during the grading and several hundred carloads of gravel were dumped into it. Piling was then driven to a depth of 25 feet and connected on top with old rails. The concrete bridge, 47 feet long and 15 feet wide, was built on this, but the foundation proved insufficient and the bridge sunk almost out of sight. This will probably delay the completion of the line.

Electrification of the Chicago Milwaukee & St. Paul.—The Chicago Milwaukee & St. Paul Railway on August 24 accepted the ordinance passed by the Chicago city council on July 1 providing for the electrification of the company's suburban tracks from Evanston to the Chicago city limits and a connection with the elevated tracks of the Northwestern Elevated Railroad, so that through cars may be operated from Evanston to the Union loop in the heart of Chicago's business district. It is planned to begin the work at once and E. W. McKenna, second vice-president of the Milwaukee road, has announced that it should be completed in three months. The cars will be operated by the Northwestern road, although the cost of the improvements will be borne by both companies. The fare will be 10 cents, one-half going to each road. It is planned to establish an express service, making the distance in 43 minutes.

Electric Package Company.—Announcement is made that the Electric Package Company of Cleveland, O., operating over the Lake Shore Electric Railway and other Everett-Moore properties, has decided not to close an exclusive contract with any express company, such as was sought by the United States Express Company. The Electric Package Company has therefore decided to accept business on its lines from any express company. The same condition applies to the Toledo Railways & Light Company. Officials of the Electric Package Company believe that in this way it will increase its business more than if it were to make an exclusive contract with one of the old express companies. The United States Express Company began negotiations with the Electric Package Company several weeks ago with a view to securing exclusive control of the express business over the Everett-Moore lines.

Los Angeles Fender Ordinance Enjoined.—The Los Angeles-Pacific Company and the Los Angeles Interurban Railway have secured from Judge Bordwell an injunction temporarily restraining the city of Los Angeles from enforcing the ordinance requiring the use of a certain type of fender on the interurban cars. As reported in last week's issue of the Electric Railway Review, J. McMillan, traffic manager of the Los Angeles Interurban Railway, and a motorman and conductor were fined on August 21 for operating a car without a fender. Immediately following the court's action City Prosecutor E. J. Fleming began a raid on the company and arrested nine train crews on the Interurban and Pacific Electric lines, leaving the cars on the streets without trainmen and blocking traffic until new crews could be sent to take charge of them. T. R. Gabel, general manager of the Los Angeles-Pacific company, was also arrested. Before the injunction was granted Mr. McMillan threatened to stop all the Interurban cars at the city limits. The hearing on the injunction will be held on August 30.

Construction News

FRANCHISES.

Atlanta, Ga.—The committee on roads and bridges has granted the application of the Georgia Railway & Electric Company to build an electric line five miles long, extending from Brookwood to Buckhead, Ga. Construction, however, is not to begin until the department of public works is ready to begin the paving of the road. It is announced that the cars of the Buckhead line will run into the city over the West Peachtree line.

Bemidji, Minn.—Carl Gowran, Grand Forks; George Teitsworth, Minneapolis; and A. A. Carter, Bemidji, Minn., have applied for a franchise to construct and operate an electric street railway in Bemidji.

Chattanooga, Tenn.—The disagreement which has existed for some time between the city of Chattanooga and the Chattanooga Railway Company regarding the matter of franchises will have been adjusted to the satisfaction of both the city and the company when the ordinance just framed and presented with the approval of both parties concerned is passed by the council. The ordinance provides for a 40-year franchise, dating from October 1, 1907, and the payment by the company to the city of 1 per cent per annum of its gross earnings, which will net the city about \$6,000 at the end of the first year. The old tracks on Lookout, Sixth, Walnut, Tenth, King and Eighth streets, together with the third track on Broad street, are to be taken up.

Cleveland, O.—The Cleveland Brooklyn & Elyria Railway has applied to the Cuyahoga county commissioners for a 25-year franchise for a road from Cleveland to Elyria and Lorain, O. It is proposed to use the tracks of the Cleveland Electric Railway out Twenty-fifth street to the city limits.

Dallas, Tex.—The Dallas Interurban Electric Railway has applied for a six months' extension of its county franchises for the proposed lines from Dallas to Sherman and Greenville, Tex.

Fitzgerald, Ga.—A 40-year franchise has been granted to a syndicate of local and New York capitalists for an electric street railway in this city. A graduated scale of from 1½ to 4½ per cent of the gross earnings of the road after the first 10 years is to be paid to the city in return for the privilege. One and one-half miles must be in operation at the end of the first year.

Hibbing, Minn.—The application of the Mesaba Traction Company for a franchise to operate its interurban line through Hibbing has been denied by the village council.

Monroeville, O.—The Cleveland & Indianapolis Interurban Railway has been granted a 25-year franchise for the operation of its line through this village. The company also has secured a franchise in Norwalk. Announcement is made that the necessary funds for the construction of the line from Norwalk to Bluffton, Ind., have been secured. J. Y. Todd, Toledo, O., is promoting the new road.

Oakland, Cal.—Application for a franchise has been made by the Oakland Traction Consolidated for a franchise to build an electric line in Thirteenth avenue.

Playa del Ray, Cal.—W. I. Hollingsworth has applied for a franchise to construct and operate an electric railway in this city.

Wilmington, Cal.—As the result of a recent order issued by the secretary of war, ordering the construction of drawbridges of the double-leaf bascule bridge type to replace the trestles over the west basin of the inner harbor between San Pedro and Wilmington, the Pacific Electric Railway has applied for a franchise to run its tracks around the bay to the westward. Action on this application has been deferred. A meeting will be held in San Pedro, Cal., on September 19, at which time the railroads will be allowed to present their objections to the order issued from the war department.

RECENT INCORPORATIONS.

Dauphin Street Railway, Pittsburg, Pa.—Interests associated with the Central Pennsylvania Traction Company of Harrisburg, Pa., have applied for a charter under the above name to construct an electric railway from Pittsburg to Dauphin, Pa. Incorporators: Frank B. Musser and W. J. Calder, Harrisburg; A. G. Knisely, L. J. Wolfe and C. L. Bailey, Jr.

TRACK AND ROADWAY.

American Electric Railway, Des Moines, Ia.—At a meeting of the directors of this road held in Des Moines recently, announcement was made that financial backing had been secured and that construction work would be commenced within the next 60 days. The line will connect Des Moines with Indianola and Knoxville, and it is planned to have it in operation within one year. Contracts are stated to have been let for the steel bridges, poles, ties and rails. C. W. Baker, Des Moines, is president.

Anderson (S. C.) Traction Company.—Surveys have been made and right of way secured for the extension from Belton to Greenville, S. C., and contracts will be let in September. The route is through Williamston, Piedmont and Pelzer, with a maximum grade of 2 per cent. William Elliott, Jr., of Columbia, S. C., is general manager.

Buffalo Lockport & Rochester Railway, Niagara Falls, N. Y.—Edmund Wragge, chief engineer, Toronto, Can., writes that 33 miles of track has been laid this year on the line from Lockport to Rochester, N. Y., 54 miles. The route includes Gasport, Middleport, Medina, Albion, Holley, Brackport and Spencerport. The overhead work is completed for about 25 miles. This is partly center pole and partly span construction. Three substations have been completed and two are under construction. J. G. White & Co. are contractors for the entire work. Charles B. Hill of Buffalo is president.

Carmichaels Waynesburg & Brownsville Street Railway.—W. J. Sheldon of McKeesport, Pa., who is interested in the construction of this line, which will connect towns and cities in Fayette, Washington and Greene counties in Pennsylvania, has received the first blue prints of the new route. Right of way for almost the entire route has been acquired. The road will be 32 miles long.

Chester, Pa.—Moore Buchanan of Kendall, Pa., is meeting with success in forming a company to construct an interurban road from Frankfort Springs, Beaver county, Pennsylvania, to Chester, in Hancock county, West Virginia. The new road will be 15 miles in length and surveys will be started at an early date. At Chester connections will be made for all towns and cities in the southern Ohio valley as far as Sistersville, W. Va., which includes Wheeling, W. Va.

Columbus Delaware & Marion Railway, Columbus, O.—Work on this company's extension between Marion and Bucyrus is being pushed and it is stated that the line will be in operation by September 1. Through service from Bucyrus to Columbus will be inaugurated as soon as the work is completed.

Danville Light Power & Traction Company, Danville, Ky.—It is stated that this company, which for two years has furnished the electric lights of Danville, is now planning to construct an electric railway system. It later will be merged into a larger company, which proposes to establish interurban lines in this section, with Danville as the center, and extending to Lancaster, Stanford, Hustonville, Junction City and Harrodsburg, Ky. The General Electric Company is engaged in making estimates on the cost of the Danville line.

Davenport & Manchester Interurban Railway, Davenport, Ia.—George T. Baker, president, writes that surveys are now being made for this company's proposed line from Davenport to Manchester, Ia., 28 miles.

Denver & Interurban Railroad, Denver, Colo.—This company has filed a mortgage of \$1,250,000 in favor of the Guaranty Trust Company of New York, to secure an issue of 6 per cent bonds. The company is building an electric road from Denver to Boulder, using the tracks of the Colorado & Southern Railway for part of the distance. The road is controlled by the Colorado & Southern, and A. D. Parker, vice-president of the latter, is president. A map and a description of the plans of the road were published in the Electric Railway Review of February 16, 1907, page 221.

Des Moines, Ia.—Announcement has been made of proposed improvements to the Polk lines in Des Moines, including the Des Moines City and the Inter-Urban railways, contemplating an expenditure of about \$500,000. These improvements will consist principally of double-tracking all lines within the city limits, with the exception of about 25 miles, which are now double-tracked, thus doing away with the present loop system. The work is to be commenced early next year.

East Liverpool (O.) Traction & Light Company.—A construction force of nearly 400 men has been taken from the eastern extension work of this company and is now engaged in rushing the completion of the western extension from Wells-

ville to Empire and Toronto, O. Tracklaying has been completed on this extension except over bridges, the completion of which is held up for a time, pending the delivery of steel. J. C. Rothery, general manager.

East St. Louis Columbia & Waterloo Electric Railway.—Arrangements are being made for the construction of this line to the northwestern section of Randolph county. The line later will be extended to Cairo by way of Red Bud, Sparta and Murphysboro, serving the coal and oil belt of that section. It is stated that Falling springs and Burksville cave, two picturesque points in the vicinity of Sparta, will be converted into pleasure resorts by the company. E. C. Douk and E. H. Conrads of St. Louis are making the preliminary arrangements.

Evansville Princeton & Vincennes Interurban Railway, Evansville, Ind.—We are officially advised that this company, which now operates a line connecting Evansville and Princeton, Ind., 28 miles, is building an extension to Patoka, four miles, and is contemplating an extension to Vincennes.

Fairmont & Mannington Electric Railway, Fairmont, W. Va.—It is reported that this road will be extended to Smithfield, 18 miles, after it is completed as far as Mannington, and that eventually the line will be extended to New Martinsville.

Fayetteville Street Railway & Power Company, Fayetteville, N. C.—It is announced that construction work on this company's 7-mile electric line from this city to Hope Mills will be started immediately.

Ft. Dodge Des Moines & Southern Electric Railway, Boone, Ia.—The construction work on this road is progressing rapidly and it has been announced that service on the line between Boone and Ft. Dodge will be inaugurated on October 1.

Grand Central Traction Company, Indianapolis, Ind.—H. E. Huntington, right of way agent, states that construction on this line from Indianapolis to Evansville, Ind., will start in about 60 days. Much of the right of way is secured. A branch is to be built from the main line to Terre Haute.

Illinois Traction Company, Champaign, Ill.—Soundings are being made for the bridge over the Mississippi river at St. Louis and it is thought that it will be several weeks before construction work will be started. Surveys for the approaches on both sides of the river have been started. The contract for the superstructure has been awarded, as previously announced, to the Missouri Valley Bridge & Iron Company of St. Louis.

Jackson Electric Railway Light & Power Company, Jackson, Miss.—The work of building the extensions of the local lines in this city, which has been delayed on account of the non-delivery of rails ordered from eastern manufacturers, will be resumed in November, according to General Manager F. G. Proutt, who states that the rails have been promised by the first of November.

Jeannette, Pa.—Engineers are at work locating the route of a proposed electric railway between Jeannette and Vandergrift, Pa., by way of Claridge, Export, Bouquet, Delmont, New Alexandria and New Kensington. Harrisburg and Philadelphia capitalists are said to be back of the enterprise.

Little Rock & Pine Bluff Traction Company, Little Rock, Ark.—J. J. Fiske, president and general manager, writes that this company proposes to build about 50 miles of electric railway between Little Rock and Pine Bluff, Ark., and that the company is now ready to receive estimates from contractors for the grading in sections, bridging, tracklaying, overhead construction and erection of power house, and is also ready to receive figures from supply houses for wire, steel bridge material, overhead material, power house equipment, cars, etc. Address 501½ Main street, Little Rock.

Louisville & Southern Indiana Traction Company, New Albany, Ind.—The work of surveying this interurban line, which is to be built between New Albany and Corydon, Ind., has progressed to King's Cave, a point about two miles east of Corydon. The line will pass through Georgetown and Lanesville, branching off at Mooresville from the main route already surveyed between New Albany, French Lick and West Baden Springs. F. E. Cole, superintendent, New Albany, Ind.

Marion & Logansport Traction Company, Marion, Ind.—The question of the right of way to be traversed by this company for entrance into Logansport, Ind., which has been delaying the construction of this road, is to be settled this week. As soon as these arrangements have been completed the United Construction Company, New York City, which has the contract for the construction of the roadbed and electrical equipment of the new line, will begin operations. The line will connect Marion and Logansport, by way of Sweetzer, Mier,

Cowan, Amboy, North Grove, McCrawfordsville, Loree, Bunker Hill, Onward and Anoka Junction, serving a rich farming section. A meeting of the stockholders was held recently at which officers were elected as follows: President, James R. Poole; vice-president, John O. Spurgeon; treasurer, Louis S. Marks; secretary, J. O. Wilson.

Marquette, Mich.—J. W. Barber of the Lake Superior Construction Company, which is planning to build a line from Marquette to Negaunee, Mich., states that the Roberts & Abbott Company of Cleveland is making an investigation of the project and that if the report is favorable the line will be financed in Cleveland and construction work started in the spring. Surveys are now being made.

Mercer, W. Va.—The Mercer Construction Company has been organized to build an electric railway from Mercer to Greenville, and it is stated that right of way has been secured. It is also reported that eventually the line will be extended from Greenville to Sharpsville.

Mid-Continent Traction Company, Tulsa, I. T.—Announcement is made that financial backing has been secured for the construction of this road, recently organized to build an interurban railway from this city to the Glenn oil field, and that the work of construction will be started in the near future. The line will be 21 miles long, starting from the foot of West Fifth street, in Tulsa, passing through West Tulsa to Red Fork and from there running in a southeasterly direction to the oil field.

Milwaukee Western Electric Company, Milwaukee, Wis.—This company has given a trust deed for \$35,000 to the Citizens' Trust Company for the purpose, it is stated, of promoting an electric railway from Milwaukee to Pewaukee, Beaver Dam and other points. William Ross, president.

Minneapolis Rochester & Dubuque Traction Company, Minneapolis, Minn.—This company is making rapid progress with the grading of its line south from Minneapolis and it is stated that the line will be completed as far as the Minnesota river this year. Rails and ties for 15 miles of road have been ordered. The Twin City Rapid Transit Company has agreed to furnish the company with an entrance to Minneapolis. M. W. Savage, president.

New Castle, O.—B. E. Cutler of Grove City, O., has asked the New Castle chamber of commerce to assist in promoting an electric line from New Castle to Franklin, Pa.

Northern Electric Street Railway, Scranton, Pa.—It is stated that this company will soon build a steel viaduct 500 feet long, also six miles of track and overhead construction.

Norwalk, O.—Sherman Culp of this city, vice-president of the Sandusky Norwalk & Mansfield Electric Railway, is reported to be interested in a new electric line, which will shorten the distance between Norwalk and Sandusky and secure a more direct outlet to the lake for the towns along the former road. He is quoted as saying that sufficient eastern capital has been enlisted to finance the project and that it will probably be constructed within the next year or so. The route will follow practically that laid out by the old Sandusky Bellevue Monroeville & Norwalk Railway, later abandoned for lack of sufficient capital, with the exception that private right of way may be purchased for a portion of the distance. Although the Sandusky Norwalk & Mansfield is not back of the new project, according to Mr. Culp, if the line is built the two roads later may be merged with a view to doing away with the necessity for transferring passengers from one line to the other at Norwalk.

Pueblo, Colo.—The work of completing preliminary arrangements for the construction of interurban lines in this vicinity is being pushed by three different companies, as follows: The Canyon City Pueblo & La Junta Railway & Power Company contemplates building a line the entire distance down the Arkansas valley, surveyors having been at work for the past two weeks locating the line between Pueblo and La Junta. Andrew J. Behmyer is general manager. Another company, recently incorporated as the Arkansas Valley Traction Company, La Junta, Colo., is working on a line between Rocky Ford and La Junta, while a third company proposes to build a road from Pueblo to Fowler, Colo.

Raleigh (N. C.) Electric Company.—A 2½-mile extension to Crabtree Creek is reported to be under consideration by this company.

Redlands & Yucaipe Electric Railroad, Redlands, Cal.—It is stated that C. B. Eyer, a Chicago attorney, who is interested in the Beaumont townsite, comprising some 5,000 acres recently opened about 18 miles from Redlands, at the summit of San Geronio pass, is negotiating with this company for an extension of its proposed interurban line between Redlands and Yucaipe to Beaumont.

Redlands Central Railway, Redlands, Cal.—Ground has been broken preparatory to the construction of the new street railway in this city. Notification of the shipment of the rails from Pittsburg on August 12 has been received, and as soon as delivery is made the work of construction will be commenced. It is stated that the line ultimately may be built to Riverside or some point in Bear valley. The people of the Hemet-San Jacinto country are also anxious to be reached by this road and are stated to be willing to raise one-half of the cost of its construction. J. H. Fisher, Redlands, is general manager.

Rochester Corning & Elmira Traction Company, Rochester, N. Y.—The Rochester & Southern Construction Company, 27 Church street, Rochester, N. Y., has the contract for building this line from Rochester to Conesus Lake, Dansville, Wayland, Bath, Corning, Horseheads and Elmira, N. Y., about 115 miles. William C. Gray is chief engineer and Max Schultze, 42 Broadway, New York, is president. Surveys have been made and the right of way is practically secured.

San Francisco Vallejo & Napa Valley Railway, Napa, Cal.—This extension of the Vallejo Benicia & Napa Valley Railroad from Napa to St. Helena, Cal., 18 miles, has been completed with the exception of the ballasting, and a car was run over the route last week. L. J. Perry is general manager.

Seattle-Everett Interurban Railway.—One hundred and twenty-five men are at work on the construction of this line which practically has been completed between Ballard and Hall's Lake, Wash. It is announced that 17 miles will be in operation the first of September and the remainder of the track will be laid at once. Fred E. Sander, general manager, Seattle, Wash.

Seattle & Tacoma Short Line.—This is the name under which the new interurban line between Seattle and Tacoma, promoted by Merle J. Wightman and C. E. Muckler, will be incorporated within the next few days. It is stated that within the very near future construction work will be started. The line will be 30 miles long and it is proposed to make the run between the two cities in two hours. Most of the right of way has been secured and franchises were granted some time ago, announcement of which was made in a previous issue. Capital stock, \$2,000,000. L. B. Stillwell, New York City, is consulting engineer.

Sonoma & Lake County Electric Railway, Lakeport, Cal.—Announcement is made that this company, which proposes to build an electric railway from Lakeport to Cloverdale, Cal., is seeking communication with San Francisco over one of the steam roads tapping its territory. As soon as these details have been arranged construction work will be started. The line will be 27 miles long and will handle passenger and freight traffic.

South Morgantown (W. Va.) Traction Company.—Construction of the extension from South Morgantown to the Standard Oil pump station No. 1, nearly 10 miles distant, is expected to be completed by October 1.

Southern Cambria Railroad, Johnstown, Pa.—This company has let a contract to Umbenhauer & Co. of Philadelphia for the construction of the first section of this line from Johnstown to South Fork, Pa., 10 miles. It is proposed to extend the line later to Ebensburg, making a total distance of about 25 miles. Other contracts will be awarded within a few weeks. The company is now ready for estimates for a steel viaduct.

Springfield & Southeastern Traction Company, Decatur, Ill.—At a recent meeting of the stockholders of this company, held at Springfield, it was decided to issue bonds and begin the construction of the road between Springfield and Taylorville, Ill., at once. J. J. Finn, Decatur, Ill., president.

Texas Traction Company, Dallas, Tex.—George Houston of Dallas is engaged in building 14 bridges on the line between Dallas and Sherman.

Toronto Niagara & Western Railway.—Announcement is made that the work of building this road between Toronto and Buffalo, and from Hamilton to Woodstock, will be started in the near future.

Waterbury & Milldale Tramway Company, Waterbury, Conn.—This company will let contracts some time this fall for building its line from Waterbury to Milldale, Conn., eight miles. Surveys will be started at once and right of way secured. Charles H. Clark of Southington is president.

Wheeling & Western Railway, Wheeling, W. Va.—County commissioners of Belmont county, Ohio, have instructed Prosecuting Attorney H. T. Shepard of Belmont county to institute

quo warranto proceedings against this company to compel it to complete its electric railway from Schad to St. Clairsville, O.

Williamsport, Md.—The building of the proposed electric railway between Williamsport, Md., and Martinsburg, W. Va., is now practically assured by the recent formation of a syndicate for this purpose. It is expected that right of way can be secured as soon as a meeting between the property owners along the proposed route and the promoters of the road can be arranged. The line as now planned will go by way of the new \$100,000 concrete bridge to be built over the Potomac river at Williamsport, which it is expected will be completed by next spring.

Wilmington & Edge Moor Railway, Wilmington, Del.—It is announced that this road, which has been under construction in the Ninth ward, will be formally opened for traffic the first week in September. Half of the track has been laid and the work is being hastened as rapidly as possible. This is an affiliated company of the Wilmington City Railway, of which Samuel F. Hoff is general manager.

Yakima Valley Transportation Company, North Yakima, Wash.—Construction work on this company's line from North Yakima to Wide Hollow, by way of Nob Hill, was begun on August 22. Right of way for three miles has been donated by the property owners along the route, who, it is stated, have further shown their interest in the building of the road by offering to pay for the distribution of material along the line. An agreement is said to have been made with the Northwest Light & Water Company for power to operate the line and an order for some of the electrical equipment has been placed. Three miles of track is to be completed and in running order by January 1.

Youngstown Alliance & Akron Electric Railway, Alliance, O.—The consent of property owners in Salem and Alliance for right of way has been secured by this company and franchises soon will be asked for. The securing of right of way in Sebring and Canfield is now in progress and when this has been completed right of way will be negotiated for in the rural districts through which the road will pass. It is stated that construction work will be started as soon as these matters have been settled.

Youngstown & Ohio River Railroad.—The offices have been removed from Salem to Lisbon, O., which will be the permanent headquarters of the company. The company is building a road from Youngstown to East Liverpool, O., which will be in operation this winter. The Leontonia-Lisbon division has been placed in operation. Construction from Lisbon to East Liverpool, a distance of 17 miles, is progressing rapidly.

POWER HOUSES AND SUBSTATIONS.

Ft. Smith (Ark.) Light & Traction Company.—J. W. Gillette, general manager, has recently purchased a large amount of new equipment for the power house at Ft. Smith, including a new boiler, new generators, etc. A number of other improvements to the plant are contemplated.

Lake Charles (La.) Street Railway.—It is reported that this company is erecting a brick extension to its power station and that it has ordered a 1,000-kilowatt Westinghouse steam turbine, to be delivered in September. P. J. Daspit is engineer of the power station.

Little Rock & Pine Bluff Traction Company, Little Rock, Ark.—This company is ready to receive estimates for the erection and equipment of a power house. J. J. Fiske, president, 501½ Main street, Little Rock.

New York New Haven & Hartford Railroad.—The capacity of the company's power station "A" at New Haven, Conn., will be increased by the removal of nine 125-horsepower boilers and the installation of four 600-horsepower boilers; also the removal of three 275-kilowatt direct-current units and the installation of two 1,000-kilowatt direct-current units.

Oklahoma City Street Railway.—It is reported that this company proposes to erect a power house costing \$180,000, provided an amendment to the charter can be procured permitting it to build outside the city limits.

Oskaloosa (Ia.) Traction & Light Company.—Contracts have been let by this company for one 500-horsepower Buckeye cross-compound engine, one 300-kilowatt General Electric three-phase belted alternator, one 200-kilowatt 5,000-volt railway generator, also switchboard, exciters, etc.

Trinidad (Colo.) Electric Railroad.—This company has just installed a new 1,000-horsepower turbine in its power house at Trinidad, and a number of improvements to the plant are being made.

Personal Mention

Mr. F. A. Hewett has resigned as superintendent of the Eastern Pennsylvania Railways, Lansford, Pa.

Mr. D. P. Barnes of Denver, Colo., has been appointed assistant manager of the Berkshire Street Railway, Pittsfield, Mass.

Mr. C. E. Swan has been appointed claim agent of the Spokane & Inland Empire Railroad, Spokane, Wash., to succeed Mr. C. M. Delamacer.

Mr. J. D. Gaboury has resigned as manager of the Gadsden Alabama City & Attalla Street Railway and also the lighting and ice plant owned by that company.

Mr. R. W. Bailey has resigned as superintendent of the Alton Granite & St. Louis Traction Company, Alton, Ill., to become general superintendent of the Peoria (Ill.) Railway; effective on September 1.

Mr. Alfred R. James, until recently assistant engineer of the United Railways & Electric Company, Baltimore, Md., has been appointed to a position on the engineering staff at present engaged in work on the Panama canal.

Mr. Walter Caverhill, president of the Montreal board of trade, and Mr. Paul Galibert were recently elected directors of the Montreal Street Railway, Montreal, Can., thus increasing the total membership of the board of directors to seven.

Mr. E. A. Evans, manager of the Quebec Railway Light & Power Company, Quebec, Can., has been elected president of the Canadian Street Railway Association. Mr. James E. Hutchinson, superintendent of the Ottawa (Ont.) Electric Company, has been elected vice-president.

Mr. O. H. Murlin, formerly auditor of ticket accounts of the Dayton & Troy Electric Railway, Tippecanoe City, O., has been appointed general passenger agent of that company, with offices at Tippecanoe City and at Dayton. Mr. L. D. Johnson, formerly traveling freight and passenger agent of the company, has been appointed general freight agent, with headquarters at Tippecanoe City.

Mr. L. C. Shipherd, who has just been appointed superintendent of the Evansville Princeton & Vincennes division of the Evansville & Southern Indiana Traction Company at Evansville, Ind., succeeding Mr. W. P. Larcey, resigned, has been connected with street railway work practically all his life and continuously since 1898, when he was appointed storekeeper of the St. Louis & Suburban Railway, St. Louis, Mo. A year later he was appointed auditor and in 1900 he was made purchasing agent. After holding this position for a year he resigned and was treasurer of the Evansville Electric Railway until August, 1906, when that road was sold to the Evansville & Southern Indiana Traction Company. During the first part of 1907 he had charge of the Michigan City-Laporte division of the Chicago South Bend & Northern Indiana Railway, which, as well as the Evansville property, is controlled by the Murdock syndicate.

Mr. J. P. Pulliam, who was recently appointed superintendent of the Winnebago Traction Company, Oshkosh, Wis., assumes the duties formerly handled by the general manager, Mr. E. B. Kirk, who resigned to become general manager of the Sterling Dixon & Eastern Electric Railway. Mr. Pulliam began his railroad career in 1888 with the Kentucky & Indiana Bridge Company, Louisville, Ky., which was one of the first roads to combine electric and steam operation on the same rails. He served with that company until 1903 in various capacities, from messenger boy to agent in charge of terminal switching, and left in 1903 to become chief clerk to the superintendent of the St. Louis-Louisville lines of the Southern Railway. He remained in this position for one year and was engaged in other business for a short period. In March 1904, he was appointed trainmaster of the Grand Rapids Grand Haven & Muskegon Railway at Fruitport, Mich., and continued with that company up to July 15 of the present year.

Obituary.

R. H. Conover, secretary and treasurer of the People's Street Railway, Nanticoke, Pa., is dead.

William Walker Colket, formerly president of the City Passenger Railway of Philadelphia, now the Chestnut and Walnut street division of the Philadelphia Rapid Transit Company, and also of the old Chestnut Hill Railroad, died at his home in Strafford, Pa., on August 24, aged 68 years.

Financial News

American Light & Traction Company, New York.—This company has offered to shareholders the right to subscribe at par to \$1,500,000 collateral trust 6 per cent notes, payable after two, three or five years from October 1, 1907. The company's stockholders are allowed to subscribe in proportion to the amount of their holdings of the common or preferred stock. The purpose of the note issue is to provide funds for the subsidiary companies, the poor market for bonds making it advisable for the American Light & Traction Company to provide capital for its subsidiaries, taking therefor the securities of the subsidiaries and carrying them until they can be sold at fair prices. The collateral trust notes may be converted into either the common or preferred stock of the company at par.

Ashtabula (O.) Rapid Transit Company.—The stockholders have voted to increase the capital stock from \$150,000 to \$500,000, as a preliminary step to consolidation with the Pennsylvania & Ohio Railway Company.

Boston & Northern Street Railway, Boston.—The Massachusetts railroad commission has been asked to approve the issue of \$450,000 refunding mortgage 4 per cent bonds, the proceeds to be applied as follows: Additions to the Chelsea power station, \$106,000; track and line construction, \$39,853.93; cars and electrical equipment, \$107,850.69; land and buildings, \$24,793.87; for sundry and other property, \$20,268.31; for betterments, heavier rails, etc., for which the company has expended, \$210,146.03; power station and machinery, \$2,816.48.

Chippewa Valley Electric Railroad, Eau Claire, Wis.—The Harris Trust and Savings Bank of Chicago has purchased \$650,000 first mortgage 5 per cent bonds of this company. The bonds are dated July 1, 1907, are due on July 1, 1924, and are optional on and after July 1, 1913, at 105 and interest. The Harris Trust & Savings Bank is trustee under the mortgage, which secures a total authorized issue of \$2,000,000 bonds, of which \$1,350,000 bonds are reserved for future requirements. Earnings for the year ended June 30, 1907, were as follows: Gross earnings, \$131,636.47; operating expenses, including taxes, \$69,680.46; net earnings, \$61,956.01; interest on \$65,000 first mortgage bonds, \$32,500; surplus earnings, \$29,456.01.

Columbus (Ind.) Street Railway & Light Company.—Control of this company is reported to have been purchased by the Indiana Central Lighting & Power Company.

International Railway, Buffalo.—Earnings for the fiscal year ended June 30, 1907, with a comparison, were as follows:

Year ended June 30—	1907.	1906.
Gross earnings	\$4,522,924	\$4,093,912
Operating expenses	2,698,778	2,409,934
Net earnings	\$1,824,146	\$1,683,978
Other income	184,529	121,615
Total income	\$2,008,675	\$1,805,593
Charges	996,574	962,646
Surplus	\$1,012,101	\$ 842,947
Dividends	652,820	652,820
Surplus	\$ 359,281	\$ 190,127
Previous surplus	729,949	677,207
Total surplus	\$1,089,230	\$ 867,334
Betterments	750,504	128,422
Profit and loss surplus	\$ 338,726	\$ 738,912

Interurban Railway & Terminal Company, Cincinnati, O.—The stockholders of this company voted on August 20 to increase the capital stock from \$2,500,000 to \$3,600,000.

Lewiston Augusta & Waterville Street Railway.—This company has given a trust deed to the Old Colony Trust Company of Boston, as trustee, to secure an issue of \$5,000,000 bonds to provide for the construction of extensions and improvements and the refunding of outstanding bonds of the Lewiston Brunswick & Bath Street Railway and the Augusta Winthrop & Gardiner Street Railway. The control of the latter two companies has been acquired by the Lewiston Augusta & Waterville Street Railway.

Ohio Electric Railway, Cincinnati.—This company, organized to acquire Schoepf-McGowan electric railways in Ohio which are not controlled by the Ohio Traction Company, has

increased its nominal capital stock of \$100,000 to \$25,000,000, divided equally between preferred and common. In 1908 the preferred stock will be entitled to 2 per cent dividends, in 1909 to 3 per cent, in 1910 to 4 per cent, and in 1911 and thereafter to 5 per cent per annum.

Old Colony Street Railway, Boston.—This company has asked the Massachusetts railroad commission to approve the issue of \$200,000 refunding mortgage 4 per cent bonds, the proceeds to be used toward the following improvements: Track and line construction, \$37,415.60; cars and electrical equipment, \$96,629.03; buildings, \$524.33; for sundry and other property, \$7,369.73; additions to Quincy power station, \$92,000; total, \$233,938.69.

ELECTRIC RAILWAY EARNINGS.

Cape Breton Electric Company, Ltd., Sydney, N. S.

	1907.	1906.	Increase.
June gross	\$ 20,685	\$ 21,301	*\$616
June net	8,091	8,814	*723
June surplus over charges ..	3,815	4,562	*747
Twelve months gross	251,330	244,435	6,895
Twelve months net	93,508	93,987	*479
Twelve months surplus over charges	42,411	41,431	980

Kansas City Railway & Light Company.

July—	1907.	1906.
Gross earnings	\$513,444.80	\$469,975.39
Operating expenses	265,511.93	233,561.86
Net earnings	247,932.87	236,413.53
Taxes and interest	154,599.23	143,460.42
Surplus	93,333.64	92,953.11
Two months ended July 31—	1907.	1906.
Gross earnings	\$1,029,260.80	\$927,763.36
Operating expenses	546,787.06	478,663.90
Net earnings	482,473.74	449,099.46
Taxes and interest	307,827.66	285,486.04
Surplus	174,646.08	163,613.42

New Orleans Railway & Light Company.

July—	1906.	1907.
Gross earnings, all sources	\$443,831.30	\$466,748.16
Operating expenses	100,936.66	110,149.18
Net earnings	179,146.17	179,038.12
Fixed charges	158,119.55	166,972.40
Net income	21,026.62	12,065.72
Other deductions	3,330.52	2,936.88
Surplus	17,696.10	9,128.84
January 1 to July 31—	1906.	1907.
Gross earnings, all sources	\$3,342,919.73	\$3,532,903.25
Operating expenses	1,805,153.07	1,864,880.88
Net earnings	1,537,766.66	1,668,022.37
Fixed charges	1,059,558.88	1,148,776.99
Net income	478,207.78	519,245.38
Other deductions	18,177.48	21,694.61
Surplus	460,030.30	497,550.77

Northern Ohio Traction & Light Company, Akron, O.

July—	1906.	1907.
Gross earnings	\$183,744.04	\$209,040.17
Operating expenses	100,936.66	110,149.18
Net earnings	82,807.38	98,890.99
Fixed charges	40,660.27	43,624.31
Surplus	42,147.11	55,266.68

United Railways of St. Louis.

July—	1907.	1906.	Increase.
Total receipts	\$ 941,878	\$ 901,354	\$ 40,524
Expenses, taxes, etc.	573,936	565,578	8,358
Net earnings	367,942	335,976	31,966
Charges	232,511	231,850	661
Surplus	135,431	104,126	31,305
From January 1—			
Total receipts	6,229,490	5,851,186	378,304
Expenses, taxes, etc.	4,099,972	3,686,358	413,614
Net earnings	2,129,518	2,164,828	*35,310
Charges	1,618,820	1,622,614	* 3,794
Surplus	510,698	542,214	*31,516

*Decrease.

Dividends Declared.

Galveston (Tex.) Electric Company, preferred, semi-annual, 3 per cent.

Northern Texas Electric Company, Ft. Worth, Tex., preferred, semi-annual, 3 per cent.

Rochester Railway, common, quarterly, 1 per cent.

Rochester Railway & Light Company, preferred, quarterly, 1½ per cent.

Manufactures and Supplies

ROLLING STOCK.

Green Bay Traction Company, Green Bay, Wis., will be in the market soon for four cars.

Pittsburg & Butler Street Railway, Pittsburg, Pa., is reported to be in the market for several cars.

Southwest Missouri Electric Railroad, Webb City, Mo., is reported to be in the market for three double-truck cars.

Marion-Bucyrus Railway & Light Company, Bucyrus, O., it is reported, will buy four passenger cars and one flat car.

Easton Transit Company, Easton, Pa., has placed an order with The J. G. Brill Company for six semi-convertible cars.

Brooklyn Rapid Transit Company, Brooklyn, N. Y., is in the market for 100 cars for elevated service and 100 for surface use.

Danville Street Railway & Light Company, Danville, Ill., is having six cars for city service built by the Danville Car Company.

Oklahoma City Street Railway, Oklahoma City, Okla., is building an electric locomotive in its shops, for general construction use.

Northern Electric Street Railway, Scranton, Pa., is reported to be asking prices on 10 double-truck combination smoking and passenger cars.

Kansas City Railway & Light Company, Kansas City, Mo., advises us that it has not sent out inquiries for 100 cars, as reported, but later on may be in the market for 25 cars.

Cape Breton Electric Company, Limited, Sydney, N. S., is reported to be in the market for one double-truck nose snow plow, 4-motor equipment, to be fitted with air brakes; noses and wings to be operated by air.

Ft. Dodge Des Moines & Southern Railway, Des Moines, Ia., has placed an order with the St. Louis Car Company for several double-truck cars. J. L. Blake, Des Moines, is general manager.

Little Rock & Pine Bluff Traction Company, Little Rock, Ark., under construction between Little Rock and Pine Bluff, Ark., officially advises that it is in the market for cars. J. J. Piske, president and general manager, 501½ Main street, Little Rock.

Utah Light & Railway Company, Salt Lake City, Utah, on August 20 placed an order with the St. Louis Car Company for 50 semi-convertible, double-truck cars, as reported in the Electric Railway Review of August 24. Delivery is to be made November 1, 1907, and February 1, 1908. The specifications call for the following details:

Seating capacity	44	Width, inside	8 ft. ½ in.
Weight	22 tons	Over all	8 ft. 6 in.
Wheel base	4 ft. 6 in.	Body	Wood
Length of body	30 ft.	Underframe	Wood
Over all	44 ft.		

Special Equipment.

Air brakes	National Brake & Electric Co.	Gongs	St. Louis
Axles	4½ in.	Hand brakes .....	.....
Center bearings	Baltimore	.....	Adams & Westlake
Couplers	Tomlinson	Heating system	Electric
Curtain fixtures .....	.....	Interior finish	Cherry
.....	Curtain Supply Co.	Motors	4 GE-80
Destination signs	Illuminated	Safety tread	Mason
Gears and pinions .....	.....	Sanders	Nichols Lintern
.....	General Electric	Seats	St. Louis
		Trucks	St. Louis

Warren-Bisbee Railway, Bisbee, Ariz., which was reported to have placed an order for cars with the St. Louis Car Company, officially advises us that this is incorrect. The McGuire-Cummings Manufacturing Company received the contract, which calls for six closed cars, to be delivered on September 20. The specifications include the following details:

Seating capacity	40 passengers	Width, inside	8 ft. 2½ in.
Weight	52,000 lb.	Over all	8 ft. 6 in.
Wheel base	6 ft.	Height, track to trolley base	12 ft. 6 in.
Length of body	32 ft.	Body	Wood
Over vestibule	42 ft.	Underframe	Wood and metal
Length over all	43 ft.		

Special Equipment.

Air brakes	Headlights	Electric arc
.....	Interior finish	Golden oak
Control system	Motors	4 GE-80
.....	Sanders	Porter & Berg
Gears and pinions	Trolley poles and attachments	United States
.....		
Heating system	Electric	

SHOPS AND BUILDINGS.

American Railways Company, Philadelphia, Pa.—This company has secured property in Dayton, O., and will build new car barns and repair shops for the People's Railway. Dodge & Day, engineers and constructors, of Philadelphia, have been commissioned to draw up plans for the construction of the buildings.

Easton (Pa.) Transit Company.—This company expects to build two steel and concrete car houses. One will be erected in Phillipsburg, N. J., and the other at Sixteenth and Washington streets, Easton.

Mankato (Minn.) Electric Traction Company.—Property on Broad street, 132 by 173 feet, has been purchased by this company and work on a car house will be started at once.

Marion-Bucyrus Railway & Light Company, Bucyrus, O.—It is reported that this company will place the contract for a car house in the near future.

Rhode Island Company, Providence, R. I.—M. H. Bronsdon, chief engineer, writes that work has been started on the car house at Mt. Pleasant, mentioned in the Electric Railway Review of August 24. The building is to be of mill construction, and the contract, which was awarded to the Humes Construction Company of Providence, calls for its completion by December 1.

TRADE NOTES.

Danville Car Company, Danville, Ill., has increased its capitalization from \$250,000 to \$750,000.

Cooper Heater Company, Dayton, O., is in the market for a liquid burner for the Cooper heater manufactured by it.

H. W. Johns-Manville Company's Minneapolis office has been removed from 26 Washington avenue to 251 Third avenue, South.

Railway Steel-Spring Company, 71 Broadway, New York, has declared its regular quarterly dividend of 1¾ per cent on its preferred stock, payable September 20.

H. B. Underwood & Co., Philadelphia, Pa., have recently shipped a quantity of portable tools and machinery to Colon, Panama, for service in the isthmian canal work.

American Stoker Company, Erie, Pa., manufacturer of automatic underfeed and chain grate stokers, has opened an office at 1207-1209 Park building, Pittsburg, Pa., in charge of H. C. Adam as manager.

Moore Fare Register Company, Indianapolis, Ind., has been organized to manufacture fare registers and other supplies for electric railways. Directors are: C. D. Davis, Albert Deprez and Enos Porter.

D. T. Williams Valve Company, Cincinnati, O., suffered the loss by fire of one of its buildings on Hunt street. Temporary quarters were immediately secured, and the company expects to have its usual facilities again in about 10 days.

American Tie & Timber Company, Shreveport, La., has been incorporated with a capital stock of \$25,000. The officers of the company are: President, D. G. Petty, Sr.; vice-president, D. G. Petty, Jr.; secretary-treasurer, J. J. Marshall.

American Steel Tie Corporation, Albany, N. Y., has been organized with a capital stock of \$50,000 to manufacture metal railway ties. The incorporators are: Aulson S. Bouchard, William H. Davis and John A. Wilkinson, 5 Nassau street, New York.

Maryland Railway Supply Company of Baltimore has arranged with Theodore Thomas & Co., Great Northern building, Chicago, and the T. B. Arnold Supply Company, Missouri Trust building, St. Louis, to represent it in handling the spike strut rail fastener.

F. W. Maltby, who has been principal assistant engineer to J. F. Stevens in the Panama canal work, has resigned to join the staff of Dodge & Day, Philadelphia, as chief engineer. Mr. Maltby is a graduate of the University of Illinois, class of 1882, and in 1907 received an honorary degree from this institution. He has been connected with the Illinois Central,

Wisconsin Central, Missouri Pacific and Great Western railroads, and for the past two and a half years with the canal commission, where he had charge of construction work of railroads, docks and wharves, shops and dredging.

McClintic-Marshall Construction Company, Pittsburg, Pa., has been awarded the contract for the steel work on the large addition to the plant of the Taylor Iron & Steel Company, High Bridge, N. J.

A. E. and T. K. Legare have opened offices at 1422 Main street, Columbia, S. C., as consulting civil engineers. A. E. Legare was formerly connected with the South Carolina Public Service Corporation and T. K. Legare has been assistant city engineer of the city of Columbia.

Western Tube Company, Kewanee, Ill., has opened a district sales office in Cleveland, O., in charge of E. W. Orr. T. R. Talbott, who has been for some time past a special agent of the company in the south, is also connected with the Cleveland office. The Cleveland offices of the company are at 1403 Rockefeller building.

United Expanded Bolt Company, Limited, Brooklyn, N. Y., has been incorporated with a capital stock of \$30,000 to manufacture nuts, bolts and screws. The incorporators are: George B. Martin, 253 Seventy-third street, Brooklyn; William A. Cooper, 336 Forrest street, Jersey City, N. J.; and E. J. Maslaglin, 392 Decatur street, Brooklyn.

Meyercord Company, 138 Washington street, Chicago, has had the plans prepared for the reconstruction, after a fire, of its factory at Willow avenue and Lake street, Austin. It will be two and three story, 100 by 150 feet, mill and brick construction, gravel roof and steam heat. Figures on construction will be taken about September 1.

Wilbur J. Watson has opened offices in the Citizens' building, Cleveland, O., as a specialist in the design, inspection and construction of bridges, buildings and special structures of steel and reinforced concrete. Mr. Watson has heretofore been connected with the Osborn Engineering Company as bridge engineer and is widely experienced in his specialty.

E. H. Symington, manager western sales of the T. H. Symington Company, who was thrown from his horse and seriously injured a few months ago, suffering from a fractured skull, is steadily improving, and leaves this week on an extended trip around the world, including Japan, China, India and other Oriental countries. Mr. Symington hopes to be able to get back to work at his office in Chicago by the first of the year.

Ventilated Cushion & Spring Company, Jackson, Mich., incorporation of which was mentioned in the Electric Railway Review of August 24, announces the election of the following officers: President, S. F. Randolph, Jr., New York; vice-president, B. M. De Lamater; secretary, W. R. Smith; and treasurer, H. E. Edwards, all of Jackson, Mich. The company manufactures the Rough Rider ventilated and spring cushion for railroad cars and for automobiles.

Tool Steel Motor Gear & Pinion Company, Cincinnati, O., has been incorporated to manufacture gears and pinions principally for street car service. A building has been secured on Cook avenue, in Carthage, which is a suburb of Cincinnati. It is 80 by 100 feet, and as soon as machinery is installed the operation of the plant will be commenced. The incorporators are: D. L. Carpenter, C. E. Sawtelle, H. Lee Early, L. B. Daniel, Malcolm McAvo and D. P. Hopkins.

ADVERTISING LITERATURE.

Wickes Brothers, Saginaw, Mich.—The monthly stock list for August is replete with equipment which can be used by electric railways.

Allis-Chalmers Company, Milwaukee, Wis.—Leaflet 4002 describes in detail the Allis-Chalmers direct-current motors and generators, type "K," and mentions also the applications to which they can be put.

Dean Brothers Steam Pump Works, Indianapolis, Ind.—A neat appearing postal card containing on one side a colored reproduction of the Dean Brothers simple pump, and on the other side an embossed trademark in gold, is being mailed to the trade.

Western Electric Company, Chicago.—A complete bulletin describing this company's electric railway and mining supplies is in course of preparation and will be known as Railway Supply Bulletin No. 1. It will be ready for distribution about September 1.

Allis-Chalmers Company, Milwaukee, Wis.—Instruction book No. 5004 contains directions for erecting the well-known Gates elevators. The company's experience is that many

users of these elevators in stone-crushing plants and elsewhere encounter trouble through the omission of such simple precautions as are outlined. The booklet is well printed and copiously illustrated.

Union Switch & Signal Company, Swissvale, Pa.—A 4-page leaflet, which is a supplement to the 1902 catalogue, Section No. 14. It deals with the No. 7-C relay, which is intended to take the place of No. 4-C, Type X and Model 3 relays, and which embodies a number of the best features of each.

Electric Service Supplies Company, Philadelphia.—The Roller direct-reading bond tester is the subject of an interesting booklet issued by this company. The requirements of an ideal bond tester are fully enumerated, all of which are claimed in favor of the Roller tester. The booklet also contains directions for the use of this bond tester.

General Electric Company, Schenectady, N. Y.—Bulletin No. 4527 describes the latest form of Thomson polyphase induction wattmeters, which are made in three types: one for house service with metal cover and two for switchboard use, one having a metal cover and the other a glass cover. The bulletin gives catalogue numbers and capacities, etc., of the various sizes, and a large number of connection diagrams showing the method of installation on different classes of circuits.

C. Lee Cook Manufacturing Company, Louisville, Ky.—The company's new catalogue contains an exhaustive statement of the meritorious features of Cook's metallic packing, presenting as well several excellent engravings showing Cook's standard metallic piston-rod packing, single and double types, and Cook's standard metallic Corliss valve-stem packing, single and double types. A long list of users of this company's packing is also given, among which are included a large number of electric railway companies. The catalogue also contains an engraving showing the company's handsome new plant.

Ventilated Cushion & Spring Company, Jackson, Mich.—A handsomely illustrated booklet, entitled "Automobile Comfort," recites the merits of this company's Rough Rider ventilated and spring cushion for automobiles. The springs contained in the cushion consist of a well-made main spring and a lower or auxiliary spring. A jar of the machine will bear the weight of the occupant heavily against the first spring, but the secondary spring is then met, and it is impossible for both springs ever to come together, thus absolutely preventing bad bumps. The same principle is embodied in cushions for railroad equipment, the company now being engaged in making these goods for sleepers and day coaches.

Green Fuel Economizer Company, Matteawan, N. Y.—"Fuel Economizers at the Manhattan Power Station of the Interborough Rapid Transit Company, New York City," is the title of a pamphlet issued by this company. It is a reprint of a paper read by R. D. Tomlinson before the New York Railway Club, showing by a careful analysis of tests and monthly records that the economizers in this plant are paying a net rate of 30.5 per cent upon the initial outlay. This is based upon a price of \$3.00 per ton for coal and the average load at the time the economizers were put in. The output of the plant has been increased since the test was made. The plant contains 64 boilers of 520 boiler horsepower each and the draft is produced by four brick chimneys. The pamphlet is well illustrated and should be of interest to designers and operators of large steam plants. It may be obtained by addressing the company.

H. B. Underwood & Co., Philadelphia.—One of the most elaborate catalogues issued is that describing the portable tools for railway repair shops manufactured by H. B. Underwood & Co. This is printed on special tinted plate paper and contains about 30 halftone engravings, showing various types of portable boring tools for all classes of service and other machines and attachments. The frontispiece is a portrait of D. W. Pedrick, who has been active for many years in designing and building tools of this kind. The engravings in the book are accompanied by the necessary descriptions and tables of sizes, and the whole is a very complete exposition of the firm's work. This concern, which has a large plant at Philadelphia, is prepared to design and build any special tools that may be required, and to give these the same scientific attention that was necessary to establish their present standards. An interesting feature of the business is the cylinder boring and other work done upon request in any part of the country by the firm's own men. Tools for this service are packed in suitable boxes ready for quick shipment. Calls frequently come from companies which require a large steam hammer or power plant engine cylinder rebored, valves faced, crankshaft journals turned in place or other difficulties requiring quick work for larger portable tools than they have at hand.

A NEW REINFORCEMENT FOR CONCRETE ROOFS.

The advantages of a reinforced concrete roof are generally recognized; such a roof is fireproof, it has no joints or seams and therefore is not affected by extremes of weather, and acid fumes, such as frequently arise in manufacturing processes, do not cause it to deteriorate. Disadvantages sometimes urged against reinforced concrete roofs are that when reinforced with expanded metal or with rods the roofs have been heavier than desired, and as in other forms of concrete construction, centering was required for their erection, this entailing considerable expense. It was to meet the demand for an absolutely fireproof roof which should be light, cheap, strong and which could be put up without centering, that what is known as Trussit reinforcement was developed by the General Fireproofing Company of Youngstown, O. Trussit is expanded from light steel and trussed. It is erected on 4-foot centers and is plastered on both sides. The reinforcement does not separate the upper and under coats of the concrete into two layers, as in fact the terms upper and under coats only indicate the method of applying the concrete. The concrete keys through the mesh of the Trussit, enveloping the metal and sustaining the trussed formation of the steel. The result is a light reinforced concrete slab very strong in proportion to its weight. For roofing the usual practice is to erect Trussit on 4-foot centers and it may be attached to the purlins either by bolts, wire or clips.

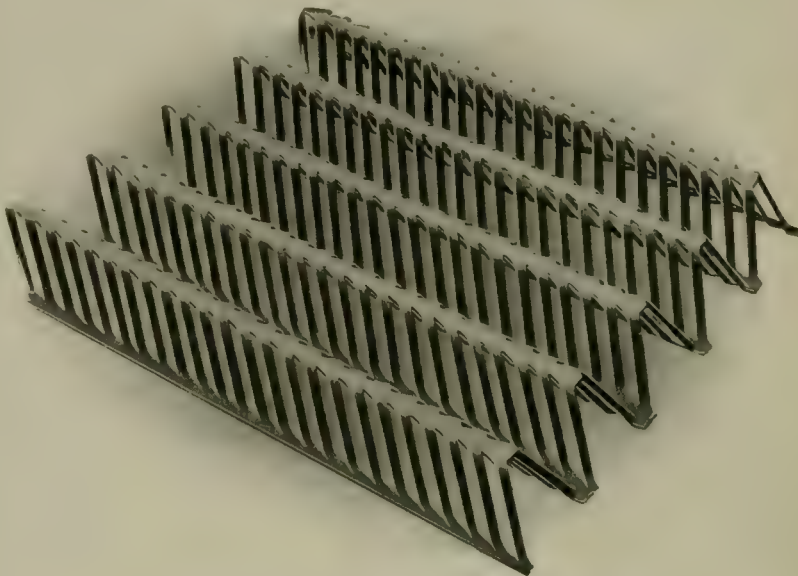
There is quite a variety of methods of waterproofing a roof with the Trussit reinforcement, and it is stated that any method that is satisfactory for use on reinforced concrete roofs of other types works equally well with the Trussit roof. The company's engineers have made a study of the erection of Trussit roofs and of waterproofing them, and have available detailed information which is at the service of interested persons.

Trussit also has been used with excellent results for the erection of solid partitions without the use of permanent studding; temporary studding is used to sustain the metal until one coat of plaster has been applied, then the studding is removed and the plastering completed. The result is a rigid wall and at the same time a very light one.

The material is made in sheets, the stock size of which

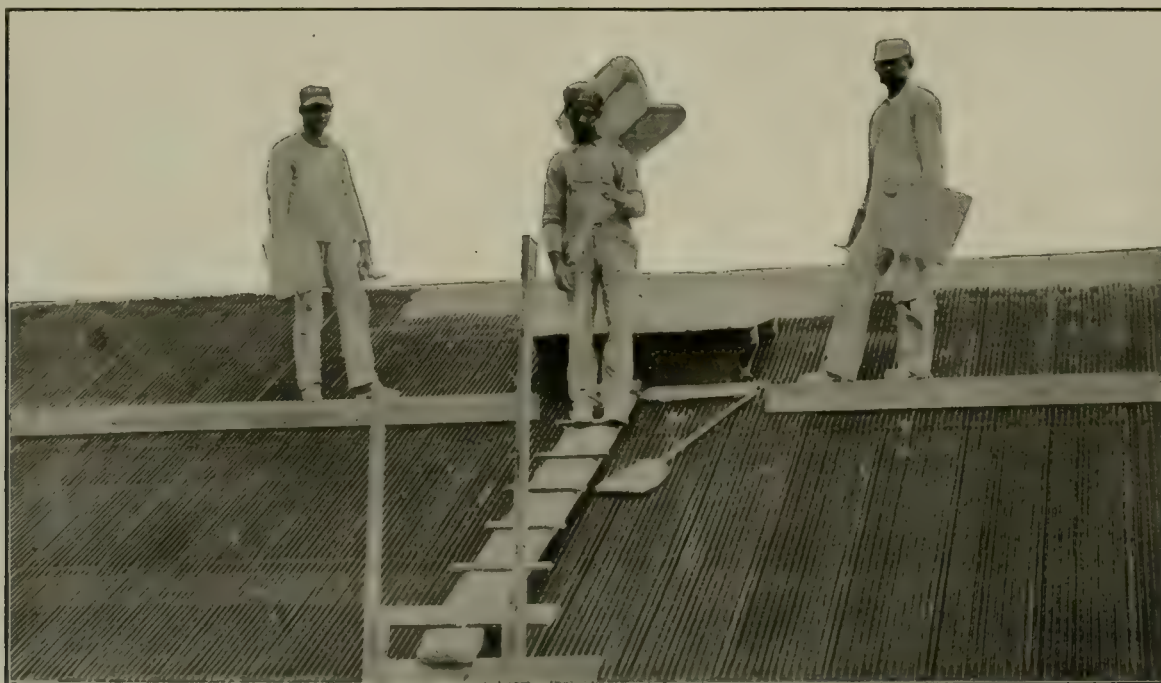
set $\frac{1}{4}$ inch from bottom. Deflection under load at 122 pounds per square foot, 0.072 inch. Breaking load, 464 pounds per square foot.

2. Concrete, 1-3-5. Span, 8 feet. Thickness, $1\frac{7}{8}$ inches. Width, $16\frac{1}{4}$ inches. Reinforcement, 1 sheet No. 27 Trussit $\frac{1}{4}$ inch from bottom. Deflection under load of 17.6 pounds per square foot, $\frac{3}{16}$ inch. Breaking load, 35.5 pounds per square foot.



A New Reinforcement for Concrete Roofs—Trussit.

3. Gravel concrete, 1-3-5. Span, 8 feet. Thickness, 2 inches. Width, $16\frac{1}{4}$ inches. Reinforcement, No. 27 Trussit supplemented with $\frac{1}{4}$ -inch cold twisted lug bar in every third corrugation. Trussit placed $\frac{1}{4}$ inch from bottom of slab and bars in bottom of corrugation of Trussit. Deflection under load of 35.5 pounds per square foot, $\frac{5}{8}$ inch. Breaking load, 166 pounds per square foot.



A New Reinforcement for Concrete Roofs—Applying Concrete to the Trussit.

is $15\frac{1}{2}$ by 96 inches, but lengths of 4, 5, 6 or 7 feet are furnished at a slight increase in cost. The material weighs 0.723 pound per square foot.

The results of tests of slabs reinforced with Trussit are reported as follows:

1. Gravel concrete, 1-3-5. Span, 4 feet. Thickness, $1\frac{7}{8}$ inches. Width, $16\frac{1}{4}$ inches. Reinforcement, No. 27 Trussit,

4. Gravel concrete, 1-3-5. Span, 4 feet. Thickness, 2 inches. Width, $16\frac{1}{4}$ inches. Reinforcement, 1 sheet No. 27 Trussit supplemented by $\frac{1}{4}$ -inch cold twisted lug bar in every third corrugation in bottom of slab. Trussit placed $\frac{1}{4}$ inch from bottom of slab. Deflection under load of 130 pounds per square foot, $\frac{1}{16}$ inch. Deflection under load of 732 pounds per square foot, $\frac{15}{16}$ inch.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 10

CHICAGO, SEPTEMBER 7, 1907

WHOLE No. 228

TABLE OF CONTENTS.

Editorial:		Piping and Power Station Systems—L.H. By W. L. Morris.	
—Preferred Dividend is Passed.....	271	M. E. (Illustrated)	285
—Electrification of Chicago Terminals.....	271	News of the Week:	
—Interurban Telephone Inspection	271	—Hearing in Chicago Reorganization.....	286
—Brakes That Cannot Skid.....	272	—Detroit Franchise Ordinance	286
—The Danger of Lax Discipline.....	272	—Chicago Mayor Asks Publicity for Work of Rehabilitation.....	286
—Another Trunk-Line All-Stock Electric Railway.....	273	—The Cleveland Traction Situation.....	286
Communications:		—Chicago Council to Investigate Electrification	287
—Shop Management	274	Construction News:	
The Ohio Electric Railway Company.....	274	—Franchises	288
Extension of the Easton & Washington Traction Company		—Recent Incorporations	289
(Illustrated)	275	—Track and Roadway.....	289
Mail Service on the Inland Empire System (Illustrated).....	278	—Power Houses and Substations.....	292
Electric Freight Service in Bangor.....	278	Personal Mention	292
Book Table	279	Financial News	294
Extension of the Dewey Decimal System to Architecture.....	279	Manufactures and Supplies:	
New Electrical Engineering Building, Worcester Polytechnic		—Rolling Stock	294
Institute (Illustrated)	280	—Shops and Buildings.....	294
Board to Report on Electrification of Southern Pacific.....	281	—Trade Notes	295
A New Design of Overhead Current Collector (Illustrated).....	281	—Advertising Literature	296
Standardization Committee Meeting	282	A New Cleaning Compound.....	296
Large Oil Furnace at Oakland (Illustrated).....	282	"Electroless" Pipe Covering (Illustrated).....	296
Pennsylvania Test Locomotive (Illustrated).....	283	The Atlas Guy Anchor (Illustrated).....	296
The Interurban Accident at Charleston, Ill.....	284	Empire Bridge Company's Plant at Elmira, N. Y. (Illustrated).....	297
Commission to Order Increased Service.....	284	Gasoline Cars on the Aurora-De Kalb Line (Illustrated).....	298

The necessities of the financial problems which have gathered for the Interborough-Metropolitan Company of New York are indicated in the action of the directors in not declaring the dividend on the preferred stock. Dividends at the rate of 5 per cent per annum were begun on the preferred stock of this holding company on July 2, 1906, and the prospects for early disbursements on the \$92,000,000 of common stock were supposed at that time to be excellent. Owners of Metropolitan Street Railway stock, on which 7 per cent dividends were guaranteed, were given in exchange for their holdings 100 per cent in preferred stock and 55 per cent in common stock of the new company. Interborough-Metropolitan preferred and common stocks sold in 1906 as high as 87½ and 55½ respectively. They were quoted this week a little above the low prices of August, but the figures of 28 and 10, respectively, which are about the present market values, show the extent of the depreciation which has taken place. The next development will probably be in connection with the guaranteed quarterly dividend on Metropolitan Street Railway stock.

The Chicago city council is about to take up seriously the question of enforcing the electrification of terminals and suburban lines of steam roads entering the city. Mayor Busse and a party of city officials visited New York on August 24 and after spending a day in inspecting the electric terminals of the New York Central and New York New Haven & Hartford railroads, returned to Chicago greatly impressed with the advantages of electrification, and, with the true Chicago spirit, determined to go New York one better. At the first meeting of the city council, on September 2, the mayor sent a message to the council expressing the results of his observations in New York and recommending that the committee on local transportation immediately begin investigations and make reports in regard to the possibility of adopting electricity as a motive power. While the general desirability of ultimate electrification is probably almost universally recog-

nized, it appears at present that the city should move slowly and carefully in its treatment of such an enormous subject. The principal object to be gained by electrification, according to Mayor Busse's ideas, is to get rid of the smoke nuisance. This could be accomplished to a great extent in a much simpler manner by attacking the problem on its larger side, that of the factories, department stores, office buildings and power plants, rather than on that of the railroads, which are the lesser offenders. The problem of electrifying the steam roads of Chicago is vastly more complicated than that in New York for a number of reasons, chiefly that the Chicago terminals are all used for freight as well as passenger service and that the application of electricity to extensive freight yards presents difficulties not yet solved. But, admitting the advantages of electricity, would it not be far wiser, before doing anything radical, to await the results of a conclusive test of the New York systems? In the latter city two great railroads have expended millions of dollars for electrification and have adopted two opposing and radically different systems of electrical operation, namely, the direct current and the alternating current. At the present time no man can say which will prove the more satisfactory. It would be manifest folly for the Chicago roads to invest millions in a system of electrical equipment that might be proved out of date before the installation was completed.

Reliable telephone service is the key to punctual traffic movement on important interurban lines, but in many cases the inspection and maintenance given to the telephone system are so casual that breakdowns are seldom anticipated. When a company operates by leased wires and instruments with a contract provision for the repair of the communication system by the Bell or Independent owners the maintenance problem disappears; but the more common practice of buying the telephone apparatus outright throws upon the railway company the burden of inspection and repairs. To the average electric railway man accustomed to the rugged equipment and substantial wiring upon the cars and in power plants the details of telephone mainte-

nance look fussy and distasteful, and there is a natural tendency to slight the work. Anything short of a break in the communication is apt to be overlooked. Without going into the details of the work here, it is important that regular inspection of lines, instruments and switchboards be made a routine duty of some responsible employe, and that the apparatus shall not be left to shift for itself as has been too often the case formerly. Delicate adjustments of transmitters and relay mechanism are preferably left to the manufacturers, but the replacement of injured insulators, the cleaning of lightning arresters, renewals of batteries, testing of ground connections, tightening of contacts and loose parts and the substitution of perfect pieces for damaged portions of the apparatus can be effected by the railway company with better results than as though the equipment were allowed to get into slack condition pending the arrival of a repair man from the factory. A minor defect will often interfere with the handling of traffic as much as a complete breakdown of some important part of the system. A sufficient number of spare parts should be kept in stock to enable the system to be operated continuously, rather than to shut it down at any important point pending the completion of repairs. The cost of extra telephone sets is too small an item to warrant any tie-up of a busy interurban line because a few instruments fail. Too much care cannot be given in the original installation in seeing that the apparatus is of a type easily operated by trainmen, with substantial wearing parts and ample space inside boxes for the operation of ringers.

The English technical journals announce that a new system of brake rigging which includes a graduated release obtained through the medium of springs and levers rather than by varying the air pressure, is receiving a thorough test on one of the principal railroads of their country and so far has thoroughly proved its efficiency.

For the past 30 years it has been recognized that the friction between the brakeshoe and the wheel depends not only on the pressure applied to the shoe, but upon the speed with which the surface of the wheel moves past the shoe. This is because the same pressure at high speeds does not develop so much friction as it does at lower speeds. In the usual application of brakes this frictional characteristic is recognized and the motorman slightly eases off the pressure between the shoes and the wheels as the speed is reduced, until the car is about to come to a dead stop, when, for the sake of relieving the equipment and its passengers from any shock, the total braking force is thrown off. Some types of the more modern air brake equipments include the graduated release feature, which, by means of varying the air pressure, so lessens the pressure of the brakeshoe on the wheel as the car slows down that the amount of friction exerted remains practically constant and thereby the maximum retardation without danger of slipping is obtained through the various ranges of speed. As stated, this desirable performance is obtained by a manipulation of the air pressure, either automatically, as in the graduated release brake equipments, or by a variation of the port openings by the motorman. The new mechanical principle for obtaining the variable brake pressure consists of a mechanism that is operated and controlled directly by the frictional engagement of the shoe with the wheel. It varies the shoe pressure without reducing or wasting the air pressure and it is said to maintain the coefficient of friction between the shoe and the wheel at a predetermined constant, regardless of the speed or slippery conditions of the wheel. This results, of course, when the device is properly adjusted, in obtaining the maximum retardation at the beginning of the application and a like uniform retardation until the car comes to a stop. A very desirable claim is made for this device when it is stated that skidding is impossible and there is no danger of injurious shocks. Com-

parisons have been made between the improved brake and the ordinary air brake which resulted in the finding that the former "exerts nearly 70 per cent more pressure; that it effects 62 per cent more retardation, and that it stops a train in 38 per cent less distance than the ordinary brake."

THE DANGER OF LAX DISCIPLINE.

The appointment on Thursday of a receiver for the Central Illinois Traction Company, the Mattoon Heat Light & Power Company and the Mattoon City Railway follows closely the unfortunate wreck of August 30 near Charleston, Ill. The investigation and legal proceedings which will take place will reveal plainly the true causes of the accident. What effect the receivership will have upon the future of the properties is difficult now to foresee. The three companies constitute one system, and it was the design of the owners to develop the property still further. Now a fresh start will have to be made. Not only will the financial burdens resulting from the collision be heavy, but the company will have to face additional public hostility which the hasty receivership will create.

In considering the Charleston and other recent collisions on interurban roads, one is led to the conclusion that lack of discipline is primarily responsible for much of the trouble. The accidents at Vermilion, O., Elyria, O., and Charleston, Ill., illustrate, each in a different manner, a lack of strict discipline. The large city systems employing hundreds and sometimes thousands of men see the necessity of a very complete rule book and usually make an attempt at its strict enforcement. On a city system a lax enforcement of the rules usually results in nothing more serious than poor service and complaints from the traveling public. Nearly all the city lines are double track and with the speeds low, non-observance of the operating rules seldom results in serious accidents; but on an interurban line the conditions are quite different. The line is usually single track, the speeds are relatively high and the road usually has many sharp curves, often obscured by trees and buildings. It is on these roads, employing a comparatively small number of men, that discipline is most likely to be lax.

Few interurban roads have been in operation so long that comprehensive books of rules have been worked out. It takes time to demonstrate that rules are exact, and that they cannot be misinterpreted. Even on the lines where a fairly satisfactory book of rules has been developed it is a problem to enforce them properly. In the operation of a single-track interurban line safe operation is possible only when the clear and accurate operating rules are obeyed to the letter. No matter how good the rules may be a deviation from them is liable to be disastrous.

The collision on the Lake Shore Electric Railway at Vermilion, O., in August, 1906, is a case in point. The running orders were properly given but not strictly obeyed. If it is made imperative that all rules, however trivial, be absolutely obeyed, the car crews get into the habit of living up to the regulations. The habit of breaking the small and seemingly unimportant rule frequently results in a wreck. As the result of a motorman's allowing his attention to wander from his work a bad collision, in which several lives were lost, occurred on the Cleveland Southwestern & Columbus Railway near Elyria, O., only a few months ago.

The collision on the Central Illinois Traction Company line near Charleston, Ill., in which 15 lives were lost and nearly 50 persons injured, is an illustration of the effect of lax operating regulations. In this last case there was no system of dispatching and an extra car was allowed to run at will, being supposed to keep out of the way of regular cars. A change of schedule, which was not properly understood by all the car crews, resulted in bringing a heavily laden passenger car into collision with an express car on a sharp curve.

If the discipline is lax, faults in methods of operation

may pass unheeded for a long time and no trouble results until a bad wreck calls attention to inadequate operating rules. If strict discipline is maintained it cannot but follow that faults in operating rules will be located and removed.

ANOTHER TRUNK-LINE ALL-STOCK ELECTRIC RAILWAY.

Another great electric railway project based on the easy-payment, low-priced stock, popular subscription plan has materialized so far as a 34-page pamphlet, with a large clear map of the line and illustrations of prospective equipment and pre-existing scenery. The Minneapolis Kansas City & Gulf Electric Railway Company, capital stock, \$50,000,000, place and date of organization unrevealed, Northwestern Securities Company (new) fiscal agent, has determined to build a great trunk electric railway which "will run on direct lines from Minneapolis to Des Moines, Omaha, Kansas City, Wichita, Oklahoma City, Dallas, Waco, Houston and Galveston"—an apparent distance of about 1,200 miles. "Direct lines" from station to station may not be so persuasive as the usual air line promise, but it is more honest, although the course indicated shows considerable indirection between the termini. It would be a good route, however, for a generally north and south line from Minnesota to the gulf if no railways had entered that field. But examination of any map except the one in this prospectus will show that almost the entire line in each of the six states crossed is paralleled already by one or more great railways, while something like 100 steam roads, drawing traffic from these same regions, would have to be crossed—a consideration of large constructive as well as traffic importance. Big rivers and smaller streams innumerable also lie across the path, with bridge building costs later to be reckoned. But let the investor pay and have faith. See here!

"The Minneapolis Kansas City & Gulf Electric Railway is organized for the purpose of building an electric trunk line railroad, double-tracked the entire distance, between Minneapolis, Kansas City and Galveston, Tex. The present shortest running time from Minneapolis to Kansas City is 20 hours. We will build our road from Minneapolis to Kansas City and deliver passengers in 10 hours. The present passenger rate from Minneapolis to Kansas City is \$14 and the shortest possible running time is 20 hours between these two points. The fact that we intend to shorten the distance from Minneapolis to Kansas City about 100 miles will make it possible for us to deliver a passenger from Minneapolis to Kansas City in 10 hours instead of 20 hours, and at a cost of \$7.00 instead of \$14. The present passenger rate from Minneapolis to Galveston, Tex., is \$35.60, consuming 60 hours to make the trip. By reducing the distance, increased speed and economy in operation, we will reduce the rate and time nearly one-half, which will give us absolute control of the passenger traffic between points mentioned."

"If you were traveling to Galveston, Tex., would you, if you were in possession of all your faculties, enter a dusty, sooty, steam railway coach at an expense of \$35.60, consuming 60 hours to reach that city, when you could enter a luxurious coach of an electric passenger train and reach Galveston at about one-half the cost and time? Of course you would not, neither would any of the thousands of travelers who desire to make this trip."

"The enormous saving of time and money in delivering freight from Minneapolis to Galveston is another feature which assures the success of this enterprise. At present the railroad rate on a carload of flour from Minneapolis to Galveston is 50 cents per hundredweight, or \$200 per carload, and there is not a railroad in existence which will guarantee to deliver a carload of flour from Minneapolis to Galveston in less than 12 days. We propose by reason of a shorter route and saving of time to deliver freight or a carload of flour from Minneapolis to Galveston in seven days or less, instead of 12 days, and our charge will be \$135 for a carload instead of

\$200 now charged by the steam railroads. The result will be practically the same from and to all intermediate points."

These and several other things being so, because the prospectus asserts them, it follows that stock in the M. K. C. & G. Electric Railway will be "enormously profitable to the stockholders." Why, "Seventeen great railroads last year paid in dividends to hundreds of thousands of stockholders \$12,194,048. Now, it is an actual fact and statistics prove beyond the shadow of a doubt, that an electric railroad can be operated at 25 per cent less expense than steam railroads. Therefore is it not a common sense argument that if the steam railroads of the country paid such enormous dividends to their stockholders, that the Minneapolis Kansas City & Gulf Electric Railway, which can be operated 25 per cent cheaper than a steam road, will pay much larger dividends than any steam road ever dreamed of paying?"

Therefore, unknown but much desired friends with some hard-earned savings, hand over your money to us and have faith. Security? Ridiculous! When will the road be built? Hurry up your money and see! Will it surely pay? You bet! Just look at this:

"The enormous demand for such a road assures the stock-buying public of the **safest possible** kind of an investment. We want you as a partner in this organization; we want you to take a financial interest in this business with us; if your money is now earning you less than 10 per cent interest, you owe it as a duty to yourself and family to read every word which is contained in this prospectus. The enormous demand for a such a railroad as we propose to construct and the character of the men behind this gigantic enterprise, assures the stockholders of this company an **absolutely safe** investment, which will certainly yield immense profits."

"Enormous profits are practically assured."

"The prospects are simply **enormous**, for the reason that the country demands this road; the people want it, and the absolute control of the freight and passenger business is assured us when completed."

"Railroading is the greatest money-making business in the world."

"Steam railroads are making enormous profits and a modern equipped electric railroad has the **greatest** possibilities for paying larger dividends than any road now in existence."

"Stock purchased in our railway now should make **enormous** profits."

"No sound mind can argue that there is **Any Doubt** about the enormous dividends which our company is **Bound to Earn**."

With many other equally convincing demonstrations and exhortations, the prospectus then declares that while the par value of stock in the M. K. C. & G. Electric Railway is \$25 per share, the timely investor with \$50 can buy five shares, by paying \$5.00 down and \$5.00 per month for nine months; and that \$100, \$300, \$500, \$1,000, \$3,000 and \$5,000 actually can secure proportionally larger holdings without any increase in the price per share.

And the pity of it is that, as in similar instances heretofore, multitudes of honest, confiding, hard-working men and women will hasten to send in their savings and then will wait first hopefully, then fearfully and then despairingly, and finally settle down to the grim fact that they have indeed made a "permanent investment," from which neither interest nor principal ever will return.

A successful experiment in roadbed making has been completed by the Wheeling (W. Va.) Traction Company on its Bellaire, O., division. Old bricks were first scattered and pounded into the earth. This was covered with gravel and then a layer of cement stone and over all a layer of sand. By the sand working through, a solid cement bed was obtained. Ties and rails were then laid upon a solid foundation.

Communications

SHOP MANAGEMENT.

To the Editors:

The article on "Shop Management," published in a recent (August 3) issue of the *Electric Railway Review*, seems to have brought forth considerable comment and as the subject is one of interest to those concerned in the management of electric railway repair shops, a statement of the methods used by our company may be of some value.

We keep accurate mileage and service records of car wheels, trolley wheels, brakeshoes, armatures and armature bearings. To aid in this work we have envelopes with printed cards for car wheels, trolley wheels, brakeshoes, armatures, armature bearings and glass, with one sheet for miscellaneous material that is used for cars and trucks. We number such an envelope for each car and these are kept in the storeroom.

A requisition must be made out for all material used and it must be stated for which car or under which car the trucks are for which the material is needed. The storekeeper then takes the car envelope and records the material delivered. For example: If he gets a requisition for a 6-inch trolley wheel for the register end of car No. 39, he takes the trolley wheel card for car No. 39 from its envelope and finds in the column marked "Date Put On," the following information: Six-inch wheel, August 27, 1904. This wheel will, of course, be taken off to put on the wheel just sent out; so in the column marked "Date Taken Off" he will mark, say, September 28, 1907, and in the column marked "Maker" he writes the name of the maker of the wheel. The next column is marked "Cause of Removal" and in this he writes "worn out" or "bushing worn out," as the case may be.

The next column is marked "Mileage." Our transportation superintendent figures the car mileage daily and makes out a report sheet for the same. This is found readily by reference to dates "on" and "off."

The last column is for cost, and this, also, is filled in for all material as mentioned above. Thus we have a report which shows at a glance how long a particular wheel was used, on what car, the cost and the maker of the wheel, making it easy to compare the different makes and select the best. As this report is kept by the storekeeper, the purchasing agent is sure of the reports on the different makers' material and can act accordingly. This, I think, is a simple and effective method.

The time of repair men is recorded for the jobs they work on; for instance, four hours' repairs to trucks on opposite end of car No. 32; two hours' repairs to seats of car No. 27; two hours' repairs to sand-rigging car No. 29; two hours' repairs to air piping, car No. 38. At the end of a month by adding up the car reports and timecards of the repair men, we have the complete cost of the car, labor and material; then counting up the cost for renewing and maintaining shop tools and reading the wattmeters to see the amount of current that has been consumed, comparisons can easily be made.

The "bonus" system which Mr. Schmidt speaks of probably could be used in large shops where there is always enough work of one kind to keep a gang of men going, but on a 15-car road like ours I think it out of the question. We pay a fair rate of wages and when a man does not do enough work in a day and do it right, we do not keep him; and I think, by making each man responsible for the work he does, better results are obtained.

We have an inspection card for each car, upon which a man must report the condition of the different parts of the apparatus he works on. He must do this whether he has made any repairs or not and in this way avoid the common remark, "Well, I just inspected the motors; Jim worked on the air pumps." If three men are working on a car and one

is told to inspect it, he is held responsible, and I have always found that he is sure of the other men's work before he turns in the inspection card to the foreman's office.

Our scrap heap is divided into two piles, one that has been picked over, and another where all the material except the brass and copper that the shop men call scrap is thrown. At the end of the month this is gone over and all the usable material picked out; thus, an elliptical spring with one half broken is mated with the half of another scrap spring, painted with asphaltum and put in the storeroom. When this spring is sent out of the storeroom for use it is not charged. This same thing is done with brakeshoes. Brake hangers with worn holes are taken to the machine shop, bored out and a bushing of seamless tubing pressed in, making them good for a number of miles more of service. Trolley wheels that are too badly worn at the bushing to insert one of the right size are bored and brass bushings cast larger in outside diameter are pressed in. It is thus seen that when we get done with our scrap heap it is "scrap" in every sense of the word.

H. F. MENTZEL.

Master Mechanic Allegheny Valley Street Railway.
Tarentum, Pa., September 2, 1907.

THE OHIO ELECTRIC RAILWAY COMPANY.

Official announcement has been made that the Ohio Electric Railway Company has acquired the properties of the Indiana Columbus & Eastern Traction Company and the Lima & Toledo Traction Company. At midnight on August 31 the Ohio company began operation of the properties. An official notice from Herbert McNulta, president of the Ohio Electric Railway, Cincinnati, O., states that the property will be operated in the following districts:

Western District—Consisting of the lines between Dayton, O., and Richmond, Ind., and between Dayton, O., and Union City, O.

Central District—Consisting of the lines between Dayton, O., and Columbus, O., and between Springfield, O., and Lima, O.

Eastern District—Consisting of the lines between Columbus, O., and Zanesville, O., and between Columbus, O., and Morgans, O., and that portion of the lines in the city of Columbus as far west as the Cleveland Cincinnati Chicago & St. Louis Railway.

Northern District—Consisting of the lines between Lima, O., and Ft. Wayne, Ind., and between Lima and Defiance, O., and between Lima and Toledo.

The organization of this new company follows the recent formation of the Terre Haute Indianapolis & Eastern Traction Company of Indianapolis, which acquired the control of various properties owned in Indiana by the Schoepf-McGowan interests, comprising about 450 miles of track. Through the Ohio Electric Railway, which has an authorized capital stock of \$25,000,000, divided equally between common and preferred, the Schoepf-McGowan interests will be in control of an additional 550 miles of track, making 1,000 miles of track for these two companies alone, without taking into consideration the Indiana Union Traction Company, the Ft. Wayne & Wabash Valley Traction Company or the Ohio Traction Company, each of which is now independent.

The roads which have been absorbed by the Ohio Electric Railway controlled the following properties:

Indiana Columbus & Eastern Traction Company, Cincinnati. Incorporated in April, 1906. Acquired the properties of the Dayton Springfield & Urbana Electric Railway, the Columbus London & Springfield Railway, the Columbus Grove City & Southwestern Railway, the Urbana Bellefontaine & Northern Railway, the Springfield & Western Railway, the Dayton & Northern Traction Company, the Columbus & Lake Michigan Railroad, and the portion of the Dayton & Muncie Traction Company between Greenville and Union City, O. Leases property of the Dayton & Western Traction Company. Leases the Columbus Newark & Zanesville Electric Railway.

Lima & Toledo Traction Company. Incorporated in March, 1905. Is building electric railway from Lima to Toledo. Leases the properties of the Lima Electric Railway & Light Company and the Ft. Wayne Van Wert & Lima Traction Company.

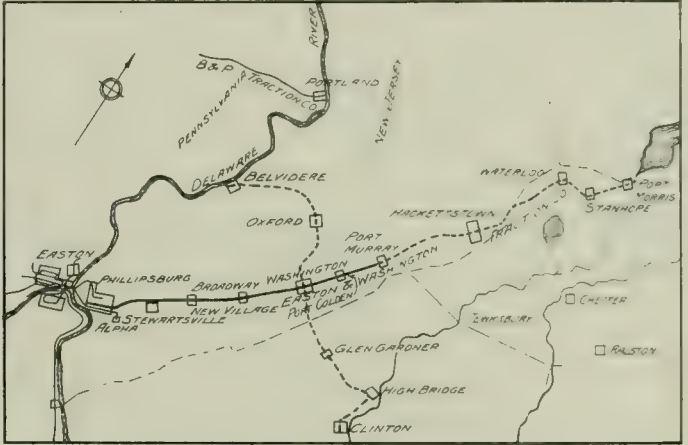
EXTENSION OF THE EASTON & WASHINGTON TRACTION COMPANY.

The Easton & Washington Traction Company, which has hitherto had a 14-mile line from Phillipsburg to Washington, N. J., connecting at Phillipsburg with the system of the Easton Transit Company of Easton, Pa., is now operated to Port Murray, six miles east of Washington. Beyond Port Murray construction is in progress on the extension through Hacketts-town, Waterloo and Stanhope to Port Morris, on Lake Hopatcong. The distance from Port Murray, the present operating terminus, to Port Morris is 20 miles. When the new extension is completed the company will have an east and west line between Phillipsburg and Lake Hopatcong 40 miles long, paralleling the Delaware Lackawanna & Western Railroad be-

electric roads on the Pennsylvania side of the Delaware river, and the Easton Transit Company also operates two branches in Phillipsburg on the New Jersey side. The Easton & Washington Traction Company is the only interurban road extending east of the cities of Easton and Phillipsburg, and the extensions of these lines now building will give the needed development on the New Jersey side and provide a connection by electric line with the summer resorts on Lake Hopatcong. This single-track interurban line of the Easton and Washington Traction Company is built through rolling country, principally on private right of way. The cuts, which are not numerous, are through hard clay banks, but there is considerable rock work at Hardport. The line has been con-



Easton & Washington Traction Company—Standard Car.

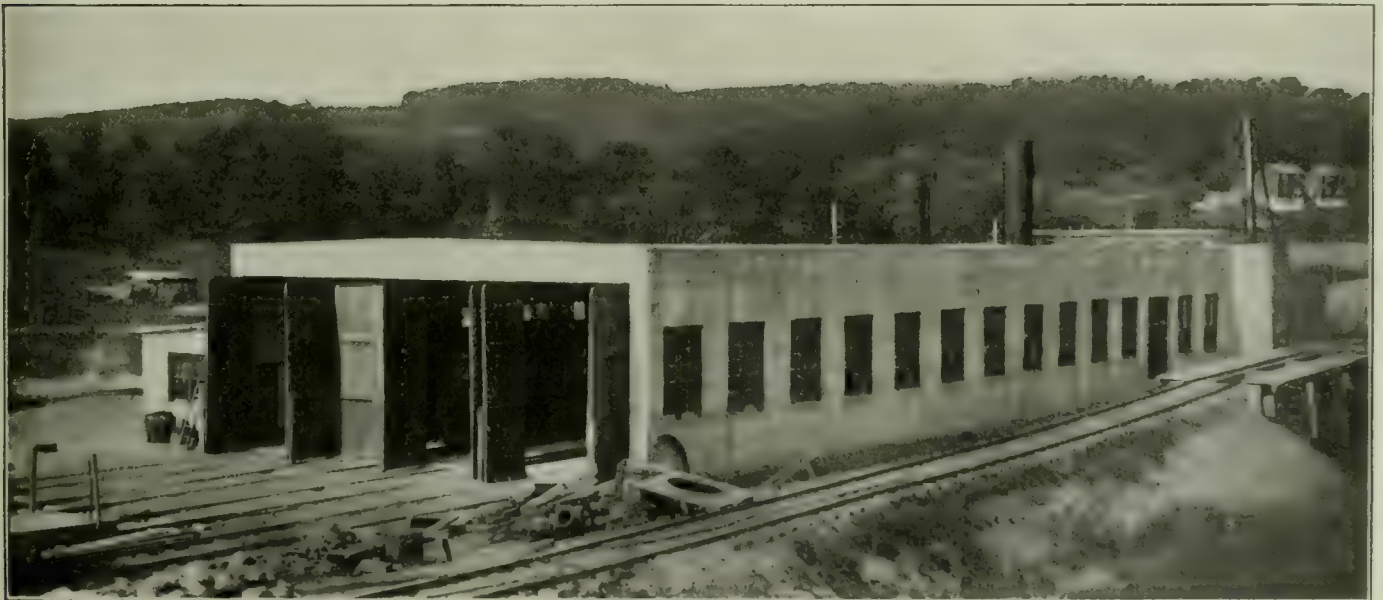


Easton & Washington Traction Company—Map of Territory.

tween these points. Another branch, to be built by the same company, will cross this line at right angles at Washington, N. J., and will connect Clinton, which is 12 miles south of Washington, with Belvidere, 11 miles northwest of the same point, on the Delaware river. Starting at Clinton, which is the terminus of a short spur of the Lehigh Valley Railroad,

constructed in a manner to avoid grade crossings, and all bridges, culverts, cattle guards, etc., are of concrete, as is also the power and car house at Port Colden.

The track is standard gauge, laid with 80-pound T-rail on 6 by 6 inch chestnut ties, 8½ feet long, and spaced 2 feet apart on centers. The ballast is gravel. The rails are joined by



Easton & Washington Traction Company—Port Colden Power Station and Car House.

the new line will proceed to Highbridge, a junction of the Central Railroad of New Jersey, thence to Washington, on the Delaware Lackawanna & Western, and from there through several small communities to Belvidere, a junction of the Pennsylvania Railroad and the Lehigh & Hudson River Railroad.

The city of Easton, Pa., is the terminus of a network of

Weber joints and for electrical purposes by Roebbling soldered bonds.

Concrete Bridge.

The overhead construction of the line is of the bracket type. The brackets supporting the single trolley wire are attached to 35-foot poles, which carry one crossarm to support two No. 0000 aluminum feeder wires.

An interesting use of concrete in the construction of the roadway may be noted in an accompanying engraving from a photograph, showing a reinforced girder structure over the tail race of a canal at a point near Port Murray. It consists of two heavy abutments and two piers, $3\frac{1}{2}$ feet wide at the bottom and $1\frac{1}{2}$ feet wide at the top, intersected by two reinforced concrete deck girders to carry the rails, the girders being 19 inches wide at the top and 12 inches wide at the bottom. The girders, piers and abutments constitute one

which the company has built at its power station at Port Colden.

Power Equipment.

Heretofore the Easton & Washington Traction Company has generated at its Port Colden power station all the current for the line, with the exception of a very small amount taken from the Easton Power Company at the Phillipsburg end. A revision of the power equipment is now under way, and some

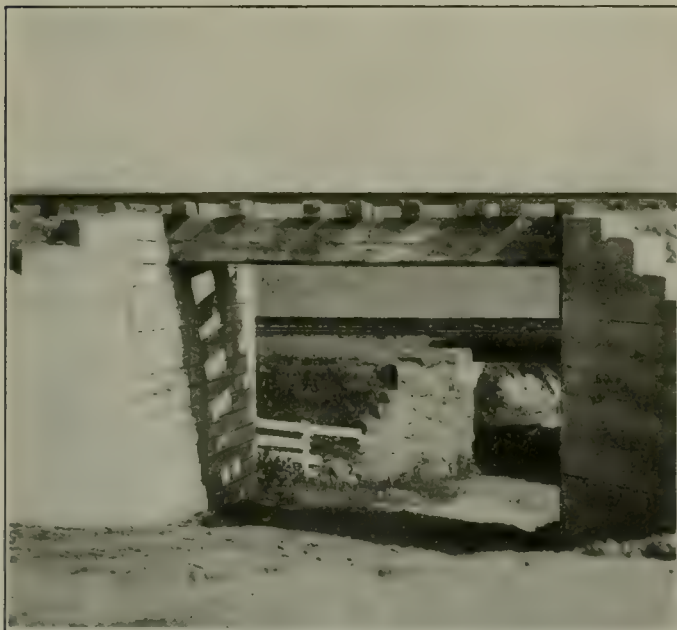


Easton & Washington Traction Company—Plan of Port Colden Power Station and Car House.

solid structure. As the stream to be bridged crosses the right of way at the crest of a grade it was desirable to reduce the elevation of the rail as much as possible, and the girders were therefore designed to take the rail without the use of ties. The girders are reinforced at the bottom with six $1\frac{1}{4}$ -inch iron rods and a number of $\frac{1}{2}$ -inch rods elsewhere. The

of the old and some new apparatus is to be installed in the power plant to double its present capacity.

As may be noted from the accompanying engraving showing the floor plan of the building, the power station is directly behind the car house, in the same structure, and separated therefrom by an 8-inch wall. The general width of the building is 49 feet 4 inches, and the length 193 feet $10\frac{1}{2}$ inches.



Easton & Washington Traction Company—Concrete Bridge over Highway.

reinforcement bars are held by $\frac{1}{2}$ -inch wrought-iron stirrups placed every 12 inches. In order to provide an equivalent for the rail spikes, hooked rods or bolts are secured under the lower reinforcement bars of the girder and extended up through the concrete. Over these were placed cast-iron chairs fitting over the base of the rail, and held in place by nuts and washers. These are staggered along either side of the rail 2 feet $\frac{3}{8}$ inch apart. By this method 8 inches of elevation was saved. The same practice is followed in the coal trestle



Easton & Washington Traction Company—Reinforced Concrete Bridge over Canal.

Of this length 40 feet is devoted to the engine room and 43 feet $10\frac{1}{2}$ inches to the boiler room. The boiler section is made 2 feet 6 inches wider than the remainder to give room for two boilers on each side of the central steps and passageway leading down from the engine room. A small addition to the building 10 feet 8 inches by 11 feet $1\frac{1}{2}$ inches was built to accommodate the pumps and heaters, and this room is reached from a passageway between two of the boilers and the side wall.

MAIL SERVICE ON THE INLAND EMPIRE SYSTEM.

We present herewith an illustration of the exterior of a new United States mail car, which has just been put into commission on the Spokane & Coeur d'Alene Railway division of the Spokane & Inland Empire Railroad, Spokane, Wash. The car was rebuilt at the company's shops in Spokane. One-third of the interior is utilized for the railway mail service and the remainder of the car for baggage and express.

The company's contract with the postoffice department calls for service similar to that given on steam lines, with a distributing clerk in charge. Mail is received and distributed for all points east of Spokane, including Coeur d'Alene, Lake Coeur d'Alene, St. Joe and St. Mary's river points and towns in the Coeur d'Alene mining district. The service includes two round trips daily between Spokane and Coeur d'Alene, a

ELECTRIC FREIGHT SERVICE IN BANGOR.

The Bangor Railway & Electric Company of Bangor, Me., is handling freight and express matter on a large scale for a city of its size, 30,000 to 40,000 population. The electric freight business in Bangor and its vicinity has been growing rapidly of late and the company now handles an average traffic in carload and way freight of about 35 to 40 tons per day, including switching. All kinds of freight are handled, but the bulk of the inbound merchandise consists of products of the soil. Bangor is the chief town of a county embracing upwards of 76,000 inhabitants; it is the trade center and shipping point for a large agricultural section, and is the point of convergence for numerous important railroad and steamship lines.

Electric freight service on this system includes one regu-



Inland Empire System—United States Mail Car.

distance of 34 miles. This is said to be the first instance of electric railway mail service in the far west.

Motor Omnibuses in London.

The motor omnibuses in operation in London have not proved a financial success, according to the report of the auditor of the company, who says: "The company has never made any profits; nothing but a considerable loss from the first; * * * the actual loss on running has been over \$60,000. It has cost over 1s. 6d. (36 cents) per car-mile to earn 11d. (22 cents), and every car-mile run in the recent period of working has made a dead loss of 7d. (14 cents)." Efforts are being made to come to some general agreement for increasing the fares, and inventors are endeavoring to produce some appliance which will be productive of more steady running and will lessen the heavy repair bills which confront the owners of motor omnibuses.

The September outing of the New England Street Railway Club was held on Thursday, September 5, at the Pomham Club house, on Narragansett bay, near Providence, R. I.

lar round trip between Charleston and Bangor, a distance of 26 miles, daily except Sundays, and service to Riverside Park, near Hampden. There is also a considerable amount of switching handled between the Maine Central Railroad and the Hampden territory, and in connection with the Eastern Steamship Company's service. The company owns 10 box cars and 10 flat cars, with five electric locomotives. The freight cars are all 30 feet over all, having a capacity of 10 tons each. They were built by the Portland Company of Portland, Me.

The company's freight department is in charge of Howard Brett, general freight agent, whose headquarters are in Bangor. The company maintains a freight shed on Front street, near the Eastern Steamship Company's Bangor terminal, where the billing is looked after, an agent being stationed at this point. Agents are also located at Kenduskeag, 12 miles west of Bangor; at Corinth, 20 miles west, and at Charleston. At present freight service is not handled on the Oldtown line. The company has a connection with the Maine Central Railroad at North Bangor and interchanges cars freely with this steam road. Extra cars are sometimes handled between Bangor and Charleston with less than carload

freight. Live stock shipments will soon be handled from the Maine Central at North Bangor.

The typical locomotive freight car as used by the company is a double-truck car equipped with four GE-80 motors. It will soon be equipped with compressed air for freight train braking. The locomotive can easily make schedule time with three foreign cars on a 6 per cent grade. It weighs about 14 tons equipped and is about 30 feet over all, with standard drawbar fittings and dimensions. The necessary weight for traction is provided by barrels filled with sand, which, of course, is also available as a remedy against slippery rails. Originally this car was equipped with four GE-800 motors, with which it hauled four or five loaded cars up a 10 per cent grade and around a 56.5-foot radius curve at the same time. Of the other motor cars for freight service one is equipped with four 40-horsepower motors, and is usually employed in handling carload lots. The other cars are held in reserve and are often used in line and track work; being equipped with two motors each. These are all maintained at the Main street shops of the company.

The running time on the Charleston line is as follows: The through car leaves Charleston daily at 6:30 a. m., arriving at Bangor, West Market square, at 9:15 a. m., and at the freight terminal at 9:25. A 3-hour layover is allowed here and the car returns to Charleston at 12:25 p. m., reaching the end of the route at 4:50. Maine Central empties are received and hauled to lumber mills near Riverside Park. Corn and feed, apples, potatoes, milk, cream and many other products are brought into Bangor by the Charleston line. Aroostook county is a world-famous potato field, producing about 13,000,000 bushels annually, and a considerable traffic in this product is daily handled in the season. Two men are required as a regular crew for the Charleston service, and sometimes three. The waybills of the company closely resemble those of the Maine Central, but through billing on interchanged cars is not practiced. The station agents' balance sheets follow the practice of the Illinois Traction Company. Beef is handled between the Maine Central and a local packing house branch of the Schwarzschild & Sulzberger Company.

The minimum rate charged is 15 cents. No regular classification of articles is followed. There is only a few cents' difference between the local steam rates and those of the Bangor trolley express. The latter are slightly in excess of the former, and the speed of delivery is, of course, much greater with the electric system. The alignment and grades are unusually unfavorable to fast time. All charges are prepaid except in carload lots. Orders come to the office by telephone and mail, and the conductors bring in some of the requests for accommodation. The company does not solicit freight nor advertise at the present time. The maximum traffic period extends from the middle of August to the following June. The dull period is during June and July.

Illustrative rates on potatoes are: To Bangor from Charleston, 26 miles, \$28 per carload, or 9½ cents per 100 pounds. To Bangor from East Corinth, 21 miles, \$22 per carload, 7½ cents per 100 pounds. To Bangor from Kenduskeag, 11 miles, \$16.50 per carload and 5½ cents per 100 pounds. Groceries above 500 pounds are handled at 12 cents per 100 pounds between Charleston and Bangor, at 8.5 cents from East Corinth and 7 cents from Kenduskeag. Trunks are taken anywhere on the line for 25 cents each, and apples in carload lots at 14 cents per barrel from Charleston, and 9 cents from Kenduskeag. The rates on hay vary from \$1.10 per ton from Kenduskeag to \$1.65 per ton from Charleston. Manufactured lumber in carload lots brings a rate of \$8.80 per car as far as Kenduskeag and \$13.20 per car to Charleston. Exclusive of Charleston and other way freight the company handled 117 foreign cars in June, 1907, and 156 cars in October, 1906. The total car movement over the lines in these months was respectively 124 and 175. The average detention per car is four days. The passenger and freight schedules are both printed on one card.

BOOK TABLE.

Elements of Electric Traction. By L. W. Gant. New York, 1907. D. Van Nostrand Company. Cloth, 217 pp., 5½ by 8½ in., 38 illustrations. Price, \$2.50.

This book is based upon a series of lectures and practical demonstrations given to a class of motormen and others at the Leeds Institute Technical School, Leeds, England. It serves as an introduction to the more advanced works on electric traction and contains much matter that, while not new, is expressed in an unusually simple manner. All algebraic formulæ have been carefully eliminated and everything needing a formula is expressed in a very simple arithmetical manner. The opening chapter deals with distribution of power for a street railway and gives some very instructive wiring diagrams for one of the simpler forms of power stations. An excellent diagram of a 2-motor car and its wiring is given. The succeeding chapters treat of the principle of magnetism and easily lead up to Ohm's law and a discussion of the principles of the electric motor and dynamo, giving definitions of the various terms and phrases encountered and illustrating wherever possible with diagrams. The construction of dynamos and motors is carefully treated.

Chapter VI deals almost entirely with the measurement of energy in electrical and mechanical form. Motor and car tests are simply and intelligently discussed, the motor being considered both mechanically and electrically, giving numerous illustrative examples.

Another chapter takes up in detail the mechanics of traction, touching upon acceleration, accelerating force, friction, resistance to traction, gradients and gravitational forces, relation between torque and drawbar pull. Numerous examples and diagrams make the presentation of these subjects seem very simple and easily understood.

The characteristic properties of direct-current motors and their application to traction is taken up and discussed in two comprehensive chapters. The effect of the various methods of speed control with different types of motors is taken up with a discussion of controller operation. The principles of the several braking systems are taken up and discussed from a mathematical standpoint and the characteristics of the brake systems compared.

The book is particularly adapted to men who thoroughly understand how to operate a car, but who want to know the how and why thereof. To these men the book will be of great assistance in bringing about a better understanding of the mechanics of the electric car.

Extension of the Dewey Decimal System to Architecture.

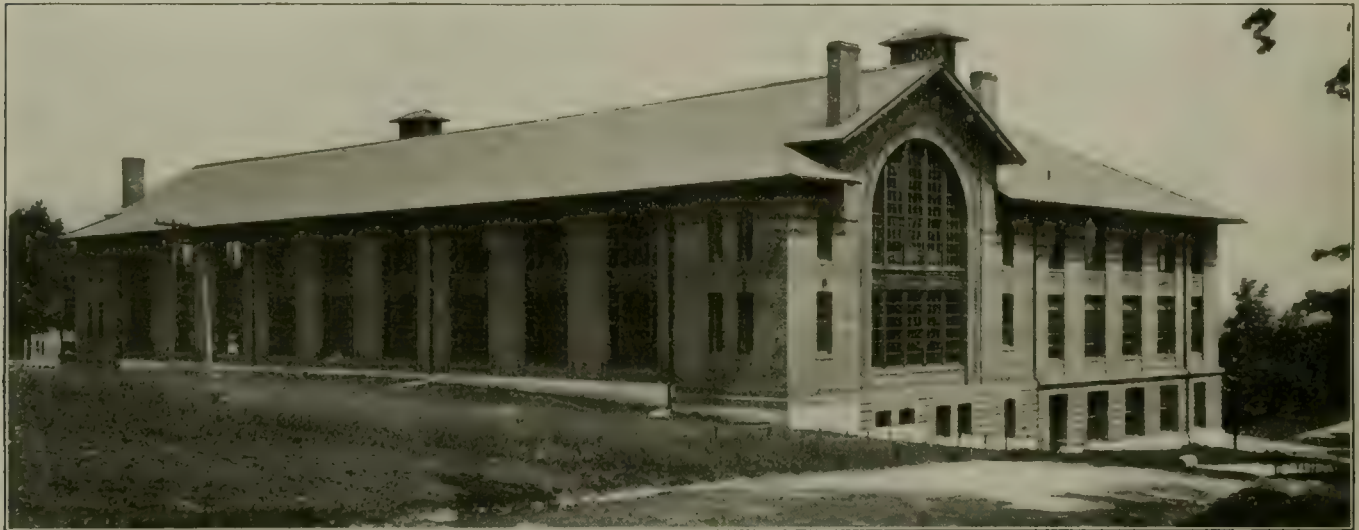
The engineering experiment station of the University of Illinois has just published Bulletin No. 13, "An Extension of the Dewey Decimal Classification Applied to Architecture and Building." This greatly extended classification has been in use in a more comprehensive form in the department of architecture for many years, but it has never before been published. It forms a supplement to the extended classification applied to the branches of engineering previously issued in Bulletin No. 9. It is preceded by a very brief explanation of the exceedingly valuable system invented and introduced by Dr. Melvil Dewey for the classification of books and literary materials, but which has since been found to be the best known method for arranging all tangible things and ideas. For the convenience of persons not fully conversant with the system a relative index of subjects has been added. In its present form it is believed that this bulletin will prove useful to architects, engineers and constructors in classifying books, pamphlets, articles in periodicals, data and all other material relating to architecture and construction. Copies may be secured upon application to Prof. L. P. Breckenridge, the director of the engineering experiment station, Urbana, Ill.

NEW ELECTRICAL ENGINEERING BUILDING, WORCESTER POLYTECHNIC INSTITUTE.

On June 15 the Worcester Polytechnic Institute dedicated its new electrical engineering building. The cost of the new building was \$125,000 and with its equipment \$250,000. It occupies an area of 20,000 square feet. A general description of the building and many of the details of its equipment was presented in the Street Railway Review, June 15, 1906.

The interior brick walls are painted, and the exposed framing timbers and plank ceilings are either stained or oiled. The floor of the general laboratory is of concrete, provided with cast-iron bolt sockets spaced four feet on centers to permit of fastenings for laboratory apparatus. The central portion is made 10 inches in thickness to provide for heavy machines and is underlaid with ducts and handholes for wiring to the apparatus located on this floor.

The cubic contents of the building are about 910,000 cubic



Worcester Polytechnic Institute—Rear View of New Electrical Engineering Building.

page 334. The following description is an abstract of a paper presented before the July meeting of the Society for the Promotion of Engineering Education. The foundations of the building are of concrete, which extends somewhat above the

feet, giving a cost of 13.7 cents per cubic foot. The total floor area is about 43,000 square feet.

The building is furnished with both live and exhaust steam by pipes from the central power plant of the institute



Worcester Polytechnic Institute—Interior of New Electrical Engineering Building.

ground, and are given an exterior finish by rough picking. The walls of red brick and brick and sandstone trimmings are laid in 1 to 3 Portland cement. The framing is of steel columns, girders and roof trusses with beams and rafters of southern pine. The floors are of wood except in the basements and in the general laboratory, where concrete floors are used.

and is heated by direct radiation with the Webster vacuum system.

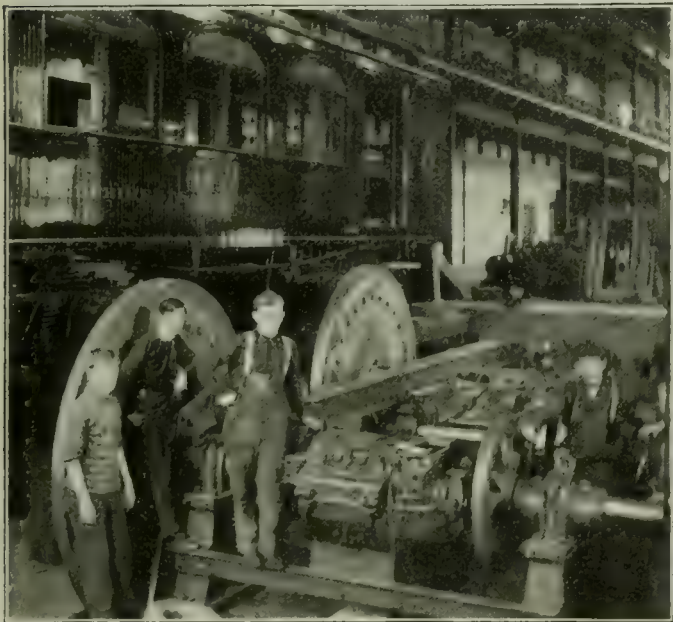
The building is lighted by 220-volt incandescent lamps with holophane shades. To meet special requirements for purposes of illustration, however, nearly all of the methods of artificial electric illumination may be found in the building.

Power for the laboratory is supplied at 2,200 volts by

underground cables from the power laboratory of the institute. The equivalent of nearly 2,000 incandescent lamps and 25 induction motors, aggregating 350 horsepower of motors and lights, are connected, not including experimental equipment. The circuits of this system, because of their varied application, illustrate most of the methods of electric power transmission and distribution.

The large general electrical engineering laboratory contains some 50 generators and motors, including examples of all the principal commercial types and a number which have features designed especially for experimental purposes. The aggregate capacity of equipment for the laboratory is about 1,500 kilowatts.

The transformer equipment numbers over 40 and includes the regular commercial types and several of special design.



Worcester Polytechnic Institute—Near View of Testing Floor.

Among the latter are one giving 500,000 volts and two others of 200,000 volts and of 100 kilowatts capacity each.

The apparatus for testing electric railway equipment was well described in the previous article mentioned and is very complete in all its details.

Board to Report on Electrification for Southern Pacific.

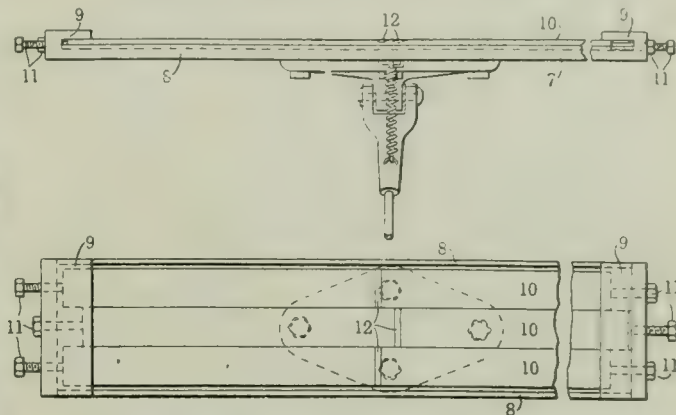
Announcement has been made that the Southern Pacific Company has retained Frank J. Sprague to advise concerning the desirability of equipping that portion of the Sacramento division of the Southern Pacific between Rocklin, Cal., and Sparks, Nev., a distance of 136 miles, for operation by electricity. For the last three years this matter has been under consideration and four reports on the project have been made to the management.

It is now the intention to submit all the data in hand to a board consisting of Frank J. Sprague and the following officials of the Southern Pacific: A. H. Babcock, electrical engineer; John D. Isaacs, consulting engineer; W. Hood, chief engineer; E. E. Calvin, vice-president and general manager; which will report its findings to J. Kruttschnitt, director of maintenance and operation.

On this section of the line are many sharp curves and heavy grades and an aggregate of over 30 miles of tunnels and snowsheds, and the management is considering electrical operation as one of the alternatives for securing increased capacity. The company has recently authorized the construction of a second track from Rocklin, Cal., east to Colfax, a distance of 32 miles, which is at the west end of this division. The new line will have a maximum grade of $1\frac{1}{2}$ per cent as compared with $2\frac{1}{4}$ per cent on the existing line, and the sharpest curve will be 4 degrees as compared with 10 degrees on the old line. The new line will be used for up-grade traffic and the present track for down-grade traffic, and will greatly facilitate operation over some of the heaviest of the Sierra Nevada grades.

A NEW DESIGN OF OVERHEAD CURRENT COLLECTOR.

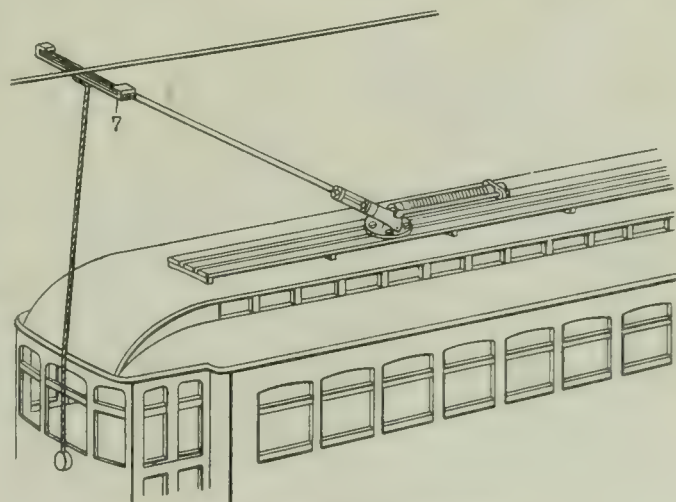
The British Thomson-Houston Company has patented in the name of the General Electric Company of Schenectady, N. Y., a new pattern of current-collecting device for electric railways on the overhead system, which gives a larger contact surface than the ordinary trolley wheel, and at the same time overcomes one of the defects of the ordinary sliding-bar system. In the latter, it is the rule rather than the exception that one or more depressions are soon formed across the con-



Plan and Elevation of Current Collector.

tact, which tend to prevent the conductor from engaging the contact at any other line, and as a consequence deep ruts or grooves are soon cut in the surface of the bar, so that renewals are frequently required, although the greater portion of the contact may be as good as new.

In the device illustrated, the contact is made on a number of bars that can be easily adjusted at right angles to the trolley wire, so that, by occasional adjustment, the formation of a continuous groove is prevented. A rectangular frame, 7, is bolted at its center to the bracket and has side webs, 8, rising slightly above its upper surface and retaining flanges, 9, at its ends which extend upwardly and are folded over the



Current Collector in Position.

end portions of the upper surface of the frame. In the space between the side webs, 8, are disposed a number of parallel contact bars, 10, of a thickness to extend above the webs, 8, and of a length to be retained by the overhanging flanges, 9, but short enough to permit of longitudinal movement. The means for effecting the longitudinal positioning of the contact bars, 10, consist of set screws, 11, tapped through the end flanges, 9, and abutting against the ends of the bars, so that in case of a groove having been cut in the bars by the trolley wire, it is only necessary to turn back a screw, 11, at one

end of a bar, 10, and turn up the screw, 11, at the opposite end of the same bar, and thus interrupt the continuity of the groove as indicated at 12 in the plan. When another groove has been cut in the contact bars in their new positions, the bar that was first moved or either of the others may be readjusted to interrupt the groove so as to prevent the stationary conductor from being confined to that particular part of the contact.—Electrical Engineering.

STANDARDIZATION COMMITTEE MEETING.

W. H. Evans, chairman standardization committee of the American Street and Interurban Railway Engineering Association, has announced in conformity with the proceedings of the Cleveland meeting, that the discussion of standards again will be considered at a meeting to be held in New York on September 12 and 13. The place of meeting will be at the office of secretary-treasurer of the American Street and Interurban Railway Association in the Engineering Societies building, 29 West Thirty-ninth street.

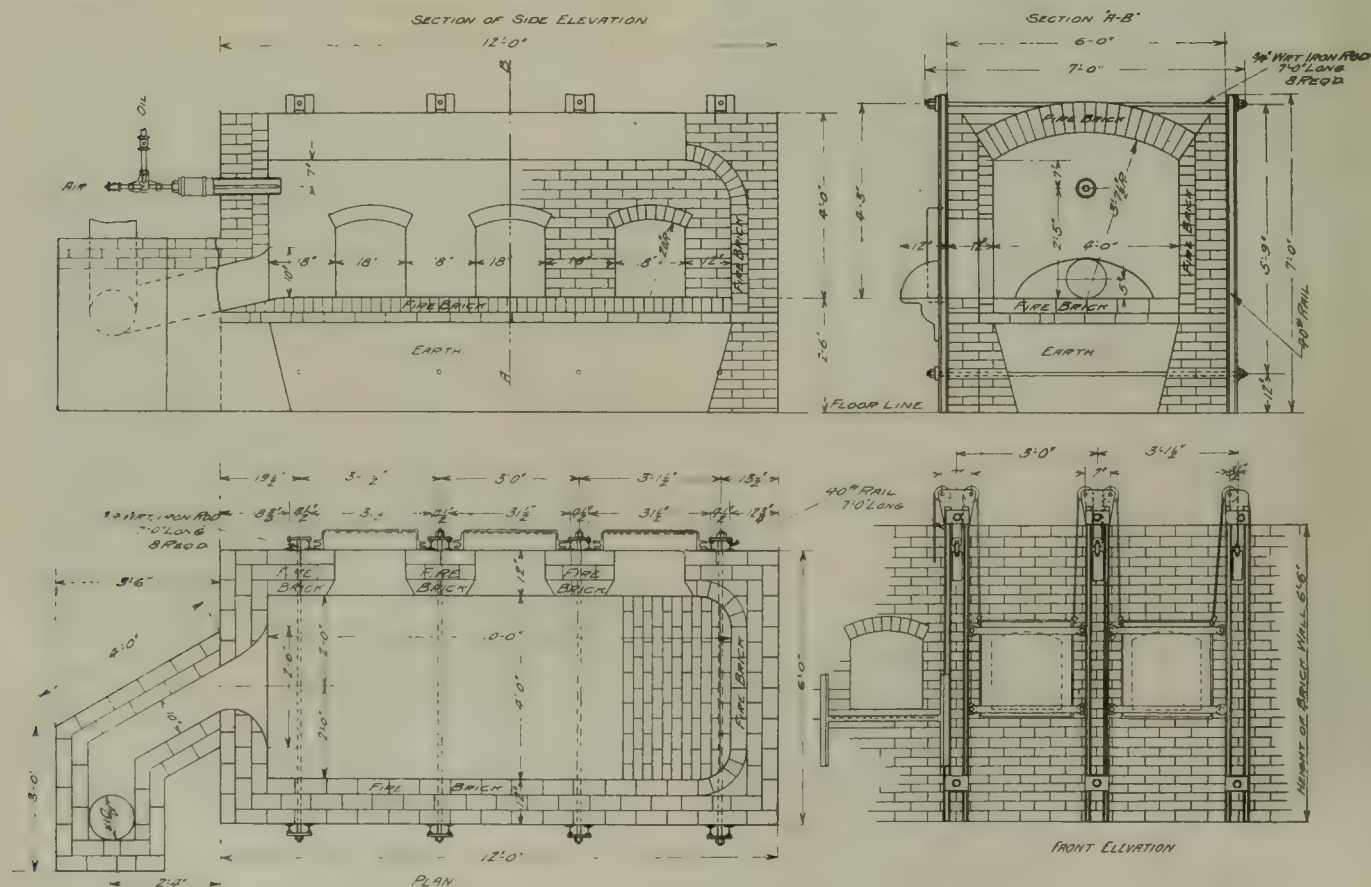
The chairman desires that it be impressed on the members of the committee and manufacturers' representatives that it is very desirable as quickly as possible to arrive at definite conclusions with regard to recommendations that can be incorporated in the report of the standardization committee to be presented at Atlantic City. The Manhattan hotel will be considered as headquarters and it is expected that those desiring accommodations at this hotel will communicate at once with the hotel management or with Professor Swenson, secretary of the association. It is expected that all the representatives of the manufacturers who were present at Cleveland will also

LARGE OIL FURNACE AT OAKLAND.

The large furnace shown in the accompanying illustration was designed and built in the Emeryville shops of the Oakland Traction Company, Oakland, Cal., where it is used



Oakland Traction Company—Front View of Oil Furnace in Blacksmith Shop.



Oakland Traction Company—Sectional Plans and Elevations of Oil Furnace.

attend the New York meeting, and in addition there will be representatives from the east who were unable to attend the Cleveland sessions.

The Public Service Corporation of New Jersey has decided to discontinue the use of open cars.

for heating large parts required in car construction. One of the illustrations exhibits the controlling dimensions of the various walls and openings. It should be noted that the oil burner is so placed with reference to the outlet for the gases that the flames are required to make two complete passes

of the length of the interior of the furnace. Owing to this special arrangement of the burner and the outlet a very even heat is obtained along the floor of the furnace.

The three doors which close the openings in the side of the furnace, through which a piece to be heated may be handled, are made of cast iron and are supported by chains with counterweights so that they may easily be moved by operating a handle placed far enough away from the doors so that the workmen may be free from the excessive heat thrown out while the doors are open.

The constructive materials of this furnace are fire brick, reinforced with steel rails and wrought-iron tie rods. The furnace is built in the blacksmith shop and stands close to the bulldozer and steam hammer which are used for working materials heated in the furnace. A jib crane, to be noted in the halftone illustration, affords an easy means for transferring work between the bulldozer or steam hammer and the furnace.

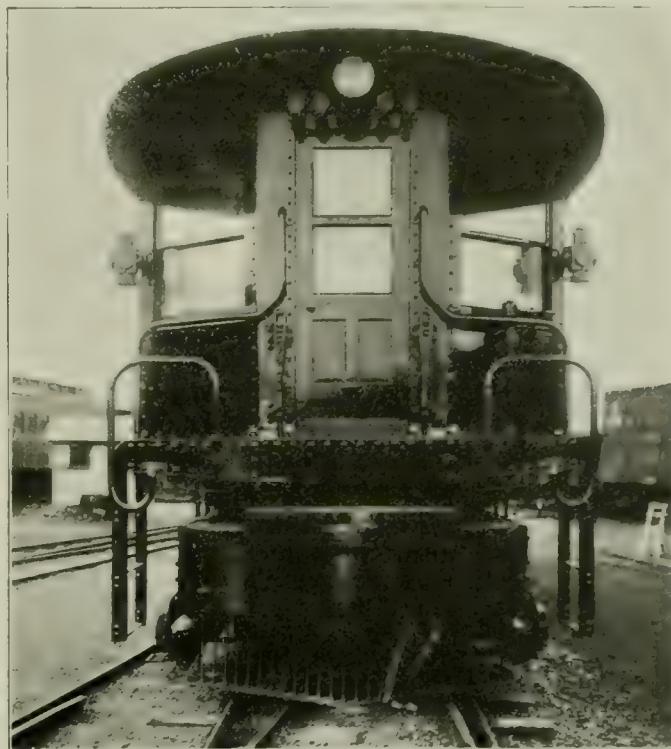
PENNSYLVANIA TEST LOCOMOTIVES.

Through experiments which are being conducted on its West Jersey & Seashore division and the Long Island Railroad, the Pennsylvania Railroad expects to secure electric locomotive operating data based on actual service that may be used in determining a type suitable for its New York terminals.

Of the two direct-current locomotives now undergoing tests, one is equipped with four 350-horsepower geared motors and the other with four gearless motors. The locomotive with gearless motors has one of its trucks equipped with two 320-horsepower motors, supported by springs from the main journals and wholly independent of the truck frame, while the other truck has two 300-horsepower motors rigidly fastened to the truck frame. This arrangement will demonstrate the advantages of the two methods of motor suspension under the same conditions of service.

In exterior appearance the two locomotives are almost identical. The trucks are of the 4-wheel type, having frames

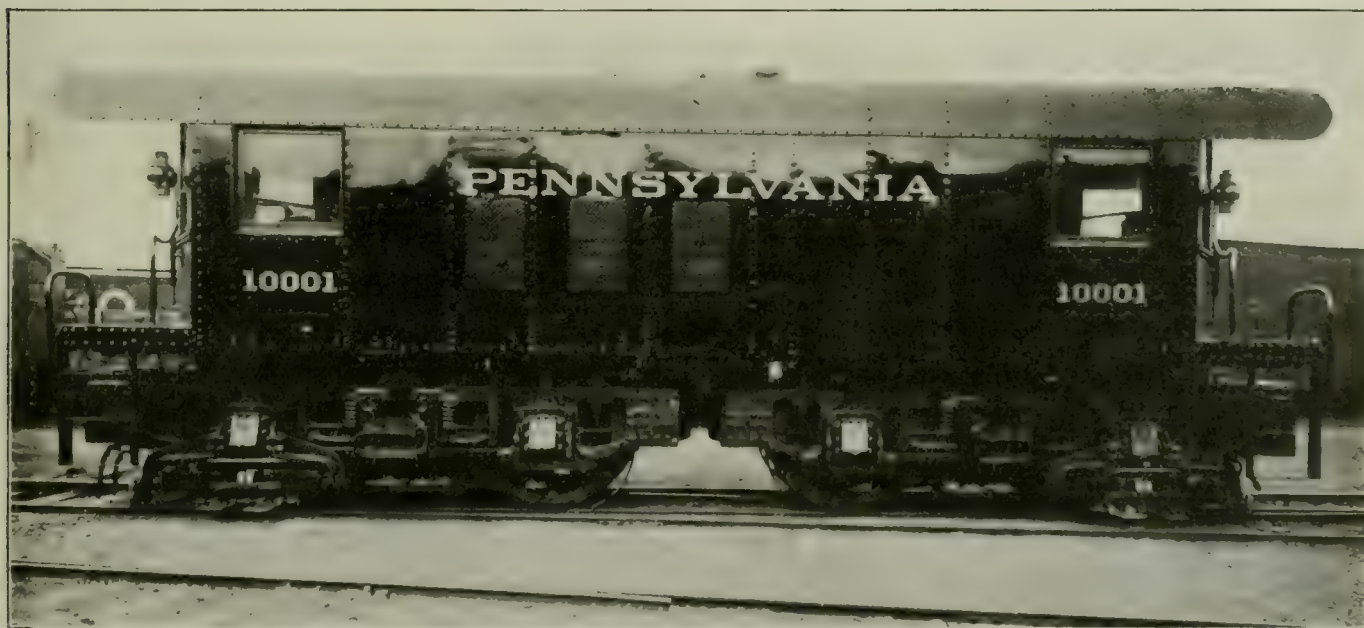
axle diminished, in proportion to the difference in axle loads. By this expedient the pulling power of the motor on the heavily loaded axle is increased and the power delivered on the motor on the lightly loaded axle diminished, in proportion



Pennsylvania Test Locomotive—End View.

to the difference in axle loads. By this expedient the pulling power of the locomotive is increased 25 per cent

The outer end casting of each truck carries the coupler,



Pennsylvania Test Locomotive—Side View.

placed outside the wheels, with pedestal boxes and adjustable wedges similar to those used in locomotive practice.

On account of their short wheel base, the trucks have a tendency to tilt in operation, and thereby shift a portion of the effective load from one pair of wheels to the other. By an ingenious automatic switching mechanism the power delivered by the motor on the heavily loaded axle is increased and the power delivered by the motor on the lightly loaded

draft spring and buffer arrangement, so that coupler strains are taken directly by the truck frames and do not come upon the underframe of the cab, except as they are transmitted between bolsters through the center sill.

The spring rigging is of the locomotive type, with semi-elliptical springs over the journal boxes and equalizers between the springs. The cab is entirely of metal, its underframe composed of a center sill, built of two 10-inch channels,

side sills of 7 by 3½ inch angles, plate bolsters and end sills. Within the cab the apparatus is distributed along the sides, leaving a passageway through the middle. The locomotive control mechanism is in duplicate and placed in diagonally opposite corners of the cab. These locomotives are equipped with hand, straight air, automatic and high-speed brakes.

Principal Dimensions for Both Locomotives.

Number of pairs of driving wheels.....	4
Diameter of driving wheels.....	56 inches
Axles, diameter	8 inches
Journals	6 by 11 inches
Length inside couplers.....	37 feet 10½ inches
Length over platforms.....	35 feet 8 inches
Wheel base of trucks.....	8 feet 6 inches
Total wheel base of locomotive.....	26 feet 1 inch
Width, cab	10 feet 1¼ inches
Width, body	9 feet 11¾ inches
Height, rail to top platform.....	5 feet 5 inches
Height, rail to top roof.....	13 feet 4 inches
Height, rail to top bell (extreme).....	14 feet 5¾ inches
Weight—Locomotive No. 10001 (with geared motors)....	174,100 pounds
Weight—Locomotive No. 1001 (with geared motors).....	195,000 pounds

THE INTERURBAN ACCIDENT AT CHARLESTON, ILL.

A serious accident occurred on Friday morning, August 30, on the line of the Central Illinois Traction Company, a single-track road about 12 miles long, between Mattoon and Charleston, Ill., about half a mile west of the Clover Leaf Railroad crossing. A motor car and trailer, crowded with passengers on their way to the county fair at Charleston, collided head-on with an empty express car while rounding a sharp curve, both cars running at a high speed. Fifteen persons were killed and about 50 injured. The motor car and the express car were both telescoped and almost completely wrecked. Neither motorman could see the other car until too late to stop the cars or even to slow down to any extent by applying the brakes. Owing to the fact that the telephones on the cars were wrecked there was some delay in securing medical assistance from Charleston.

At the investigation by the coroner's jury on August 31 it was brought out that there is no train dispatcher on the road and that the schedules are printed on cards, changes from schedule being given verbally by the superintendent. The express car ran without a fixed schedule. On the day of the accident the headway had been changed to 30 minutes instead of 45 minutes, because of the crowds going to the fair. The superintendent of the road testified that the motorman of the express car had been advised of the change and was expected to regulate his running time accordingly. The motorman, on the other hand, testified that he knew nothing of the change in schedule. The coroner's jury returned a verdict censuring the company for not employing a train dispatcher, the motorman of the express car for leaving without knowing where the other car was, and the motorman of the passenger cars for not having his car under control in rounding the curve. Both motormen were arrested but were released on bail.

Commissioner Willoughby and Secretary Kilpatrick of the state board of railroad commissioners conducted an investigation for the commission and reported that the accident was primarily caused by the absence of a train dispatching system. The commission thereupon adopted a resolution instructing the secretary to at once notify all the interurban roads now operating in Illinois to furnish the commission with such rules and regulations for the operation of cars and trains on their respective systems as they have in force.

The Central Illinois Traction Company, which is leased to the Mattoon City Railway, has been operated for about three years, and in that time has had three serious accidents, one in August, 1905, in which about a dozen persons were injured, and one on September 2, 1906, in which about 15 persons were injured.

Following the wreck, the Central Illinois Traction Com-

pany, the Mattoon Heat Light & Power Company and the Mattoon City Railway were placed in the hands of W. T. Avey, cashier of the Mattoon State Savings Bank, as receiver. The bill asking for the appointment of a receiver was based on a debt of \$5,500 due the Colonial Trust and Savings Bank of Chicago. It stated that "the corporation—the companies being in matter of fact one in obligation—is unable to meet its debts."

E. A. Potter, president of the Central Illinois Traction Company, made the following statement in Mattoon:

"No attempt will be made to evade the payment of damages to the heirs of those who were killed and to the injured in the wreck last Friday.

"At a meeting of the directors in Chicago on Monday plans were set on foot whereby we believe we can effect satisfactory settlements with everybody. I do not care to give a statement of the assets and liabilities at this time. I hope the liabilities are not much greater than the assets, however. The companies have done a good business from the start and the liabilities should not be very heavy. We have no intention whatever of selling out. It is our plan to continue operations and take care of the debts as rapidly as possible."

COMMISSION TO ORDER INCREASED SERVICE.

The New York public service commission on August 29 passed resolutions fixing the dates of five public hearings, to be held on September 16, 17, 18, 19 and 20, to inquire whether it is just and reasonable to order increased service and other operating changes on the lines of the Interborough Rapid Transit Company, the New York City Railway and the Brooklyn Rapid Transit Company. The first and most important order fixes a hearing for September 19, "to inquire whether the service provided by the Interborough Rapid Transit Company is unjust, unreasonable, improper or inadequate, and if found so to be, to determine whether it would be just and reasonable to require the company to increase its service through the subways and over the elevated railroads by 20 per cent in excess of its present operating schedules, for a period of one hour and a half both before and after the operation of the prevailing fullest schedule each day, except Sundays and holidays, and to increase its service on Sundays and holidays so as adequately to accommodate the traveling public. All to the end that the commission may make such order or orders in the premises as shall be just and reasonable."

In its general form this resolution is identical with the others, each of which, however, mentions a particular case where congested conditions now prevail.

The public service law requires that no orders for changes in service may be given without a public hearing, of which 10 days' notice must be given, in order that the companies may have an opportunity to show cause why such order should not be made. It is stated that, in view of the facts brought out at the recent investigation of the companies' operating conditions, the hearings will be mainly a formality, and that the commission will proceed to order substantial increases in the number of cars operated.

The Interborough Rapid Transit tunnels which are being constructed from the Battery, New York, to Brooklyn have developed such weakness as to require reinforcing. It is stated that the pressure from the outside of the tubes is so great that the calking will not stay in the seams between the segments and it will be necessary to insert a concrete lining of about three inches thickness in the interior of the tube. An important consideration in this connection is that the clearance between the corners of the cars and the interior of the tubes will be reduced to four inches. It is, however, declared that it is a physical impossibility to have the tunnels in operation by October 30 of the present year.

PIPING AND POWER STATION SYSTEMS—LII.

BY W. L. MORRIS, M. E.

Exhaust and live steam purifiers are troublesome devices to operate and are generally of such small dimensions that the water flows through them at a relatively high rate and therefore does not permit the suspended material to be completely settled. Though live steam purifiers may liberate the gas which holds the salts in solution, they have not sufficient volume to permit so complete a separation of the suspended material as is obtained in two 20-foot tanks.

Live steam purifiers are really only continuous heaters, and as insufficient time is allowed for settling, it is necessary to use a filter in conjunction with them, the same as for the high-pressure closed continuous chemical treatment system. Precipitation, however, will remove impurities more effectively than is possible by any other means. Water and oil will pass through a filter bed of the finest material without any sign of one being separated from the other, and this is likewise true of water carrying an impalpable powder in suspension, since the latter will pass through any filter or screen through which water will pass.

A filter is merely a screen which removes the larger particles and permits the smaller ones to pass. Precipitation, however, separates the heavier from the lighter material, regardless of its ability to pass through a mesh of a certain gauge. The separation in this case is due to the difference in the specific gravities of the water and suspended materials. Oil and water will quickly separate if permitted to precipitate, though a filter would have no effect whatever. If sufficient time is allowed material suspended in water will precipitate regardless of how finely it may be divided, but if sufficient time is not given for precipitation, then there is no means for separating it from the water other than by filtration or by attraction. The latter means of separation is the one principally used in live steam purifiers.

A steam purifier of the tray type is shown in Figure 312 (N 2-1). These trays are so arranged that they can be drawn from the purifier lengthwise, thus permitting the scale which has been deposited on them to be easily removed. Each tray is supported the same as a drawer, by two guides. The water flows into the top tray and overflows at the edges. Instead of dripping over the edge, it runs along the bottom and drips into the next lower tray, and thus discharges from one to another. A part of the soluble salts is precipitated in the

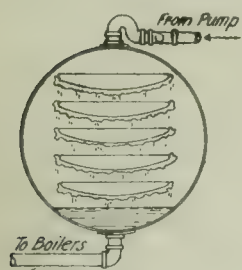


Figure 312 (N 2-1).

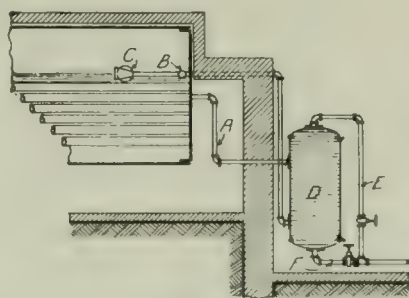


Figure 313 (N 3-1).

trays, though the largest amount of precipitate is found at A, just under the edges of the trays. That which is caught is dried and baked onto the pan, the same as boiler scale forms in a boiler, only it is deposited in a far less uniform manner. The scale which forms on the under side of the tray is caught neither by precipitation nor by filtration, but simply by attraction, there evidently being a strong affinity between the scale which has formed and that suspended in the water. The temperature in the purifier is generally much greater than that at which the sulphates remain in solution, i. e., 270 degrees F., the result being that the scale which collects is very solid.

Water Treatment After Reaching the Boiler—Class N 3.

There are numerous forms of boiler water purifiers, most of which are of the general type shown in Figure 313 (N 3-1). The water is taken from the boiler and discharged into a small settling tank and returned to the boiler, the circulation being maintained by running a hot pipe inside the furnace, as shown at A.

There are various forms of pipe connections used, in all of which are arranged cold and hot legs, thus making one column of water heavier than the other. There is a swivel at B, and float, C, to move the skimmer up and down as the water level changes. The skimmer serves to remove some of the lighter impurities that are on the surface of the water. These impurities generally make the thickest scale, but the scale formed by them is soft and spongy and easily broken. By removing this material and leaving the heavier sulphates the scale that forms on the boiler is extremely hard. It frequently requires more time to remove this hard scale than it would to remove the heavier scale which would have formed had the lighter material not been removed.

Not only does it require more time to remove the hard scale, but the wear and tear on the tube cleaners is of serious importance. Water which does not contain the sulphates which form hard scale is rarely found, but water which contains little else than carbonate of lime and magnesia may be greatly improved by the use of such devices. The fine impurities which are constantly being carried around by the circulation of the water are not removed by surface skimmers, the only method of removing these being to permit the water to come to absolute rest and give it sufficient time to settle.

The tank, D, is designed for this purpose and its efficiency is dependent wholly upon its size. The blow-off, E, is intended to discharge the scum or light impurities and the precipitate is drawn off through the valve, F. The principle involved in the operation of this device shown in Figure 313 is identical with the action taking place in all boilers. The circulation of a small portion of the water is retarded and this permits a partial separation to take place.

Where the circulation is thus retarded the greatest amount of scale is formed in the boiler. These settling places or mud drums are practically the same as the tank shown in Figure 313. They are far too small to insure any appreciable good. A 500-horsepower boiler would be provided with a tank about 2 feet in diameter and 5 feet high, thus holding about 1,000 pounds of water, the latter being equal to that which is evaporated in four minutes. To permit these fine impurities to precipitate, the flow through the tank, D, should be very slow, the most satisfactory result being obtained when there is no flow whatever. Chemical treating plants are able to show good results because of this fact alone, and as the velocity is increased the amount of impurities which are precipitated decreases and thus a filter bed becomes necessary.

If the system shown in Figure 313 were carried out on a sufficiently large scale to accomplish the desired result of removing a sufficient amount of scale-forming impurities, it would be a far superior arrangement to any which is in use. It would then accomplish the desired results without the addition of any chemicals to the water in the boiler.

In Figure 314 (N 3-2) a precipitating tank is shown placed beneath the boiler. Water is taken from the surface of the boiler. This removes the impurities carried by the water which is in circulation. The feedwater drives the circulator and thus causes all the water in the boiler to circulate through the settling tank and back to the boiler. For each gallon of water fed into the boiler an equal amount of water from the boiler circulates through the tank. The enlarged detail shows how the blow-off is taken from along the entire length of the tank bottom. As considerable scale will form where the feedwater enters, a cap, C, closes the end of the brass distribution pipe and facilitates the removal of scale.

If the boiler pressure is 140 pounds, the temperature of the water in the boiler is 350 degrees, and if the temperature

of the incoming feedwater is 200 degrees the temperature of the feedwater will be raised to 280 degrees. This is sufficient to throw down the sulphates. The latter calculation is based on the assumption that for each gallon of water fed to the boiler one gallon of the water in the boiler is circulated through the treating tank.

It should be remembered that the smaller the amount of boiler water which is circulated, the more efficient the filter bed becomes. The circulating device shown would not be fitted with stuffing boxes. It would deliver its water under a slightly greater head than its suction. The parts of this device would be fitted loosely and its service would be very light. Manholes should be fitted in the outside end of the tank and a valve, D, provided to shut off the water to the under side of the filter bed. Hence by opening the blow-off valve, E, the deposit in the filter bed would be easily dis-

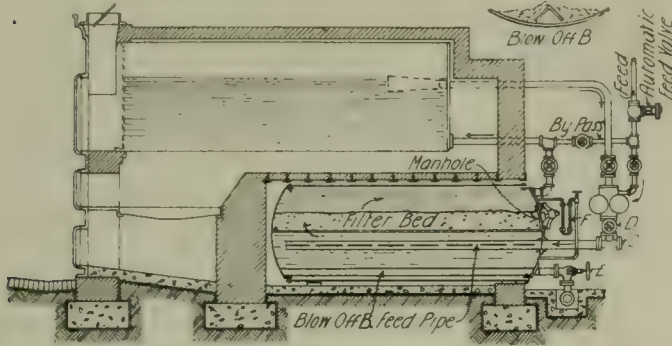


Figure 314 (N 3-2).

charged into the sewer. The gauge, F, shows a difference in pressure above and below the filter bed and thus as the filter bed becomes fouled the pressure gauge enables the operator to know definitely when it is necessary to blow it out. As little or no heat is applied to the tank there will be no tendency to form scale, the impurities settling in the form of mud.

The covering over the tank should be supported either on an arch or on T-bars, as shown in Figure 314. When the tank extends to the back wall the wall should have the form of an arch about an inch distant from the tank. The space between the tank and the wall should be closed with asbestos to prevent any air leaking into the furnace. The tank shown in Figure 314 has fully ten times the capacity of that shown in Figure 313, and in addition it also has a filter across its widest section where the velocity of the water is the least.

To apply such a purifier to a Babcock & Wilcox type of boiler, it may be necessary to place it transversely instead of longitudinally as shown, or it may be placed outside of the setting. The only object in placing it inside the setting is to reduce the radiation from it. The purifier shown is a part of the boiler, being out of service whenever the boiler is not being used, and there would thus be ample opportunity at such times to examine or clean the purifier. This precipitation tank would require frequent blowing out, but the time required for this operation would be very slight. It does not become a repository for scale as in the case of live steam purifier.

(To be continued.)

In 1902 the total length of street railway track in the United Kingdom was 2,336 miles. In the United States there were 22,328 miles of track. The urban population over there was 12,476 per mile of track, compared with 1,516 here. In 1902 British tramways carried 1,394,452,983 passengers, compared with 5,521,509,521 carried on the street railways of the United States. The average American car carried 93,585 passengers per year, as compared with 182,463 carried by each British car.

News of the Week

Hearing in Chicago Reorganization.

Objections to the decree of Judge Grosscup ordering the lease of the Chicago Union Traction Company properties to the Chicago Railways Company were heard on Thursday and Friday of this week by Justice Brewer of the United States supreme court and Judges Baker and Seaman of the United States circuit court, sitting as the court of appeals. Attorneys were present representing individual holders of underlying stocks and bonds, trustees under deeds securing bond issues, the New York interests, and the city of Chicago. It was stated by those who oppose the decree of Judge Grosscup that he exceeded his powers in ordering the transfer of control of the property without consent of the bondholders.

Recent Accidents.

Six persons were injured on August 30 in a rear-end collision between two cars on the Birmingham Railway Light & Power Company's lines near Fairview, Ala. The accident occurred at a junction where both cars run in on a single track. The cars were very close together and the motorman of the second car was unable to stop in time to avoid a collision.

The last car of a 3-car train on the South Side Elevated Railroad, Chicago, Ill., was derailed on a switch on September 4, causing a panic among the passengers in which several were injured. The first two cars had passed the switch safely but the rear truck split the switch and the car swung diagonally across the main track. A fire broke out under the car and traffic was delayed for nearly two hours.

Passengers on a Halsted street car of the Chicago City Railway were thrown in a panic by the breaking of a trolley wire on September 5. Eight people were injured in the scramble to the street.

Detroit Franchise Ordinance.

Alderman E. J. Korte of the Detroit city council on August 27 presented to the council an ordinance intended to settle the franchise controversy between the city and the Detroit United Railway by giving the company a franchise running from November 14, 1909, the date on which the more important of the present franchises expire, to December 4, 1924, with the following principal conditions:

Eight tickets for a quarter shall be sold for use between the hours of 5:15 a. m. and 12 midnight, with a single transfer for every fare. Between midnight and 5:15 a. m. the rate is fixed at 5 cents.

The company shall pay taxes on its real estate on an ad valorem basis; in addition it shall pay 2 per cent on the first \$3,000,000 of its gross receipts, and one-half of 1 per cent on each additional \$500,000, but it is not to pay more than 5 per cent on its gross receipts.

The company is to build the foundation and pave all extensions and double-tracking, the city to resurface all lines.

The city shall have the right to purchase the system at the expiration of the franchise.

Chicago Mayor Asks Publicity for Work of Rehabilitation.

Mayor Busse of Chicago on September 4 addressed a letter to the local transportation committee of the city council asking the co-operation of that body in expediting as much as possible and in keeping the public informed of the character and progress of the work now being done on the rehabilitation of the street railway lines under the provisions of the city ordinance approved at the April election. A large amount of the Chicago City Railway's track has been relaid with 129-pound grooved rails and the work is being pushed as rapidly as possible. Although the Chicago Railways Company, which is to effect a reorganization of the Chicago Union Traction Company's properties, has not yet accepted the ordinance, the work of reconstruction is going forward in anticipation. The mayor believes that under the new plan by which the city is to a great extent a partner with the street railway companies the people should take an especial interest in the work and steps should be taken to inform them of exactly what is being done to carry out the provisions of the ordinance, under which millions of dollars are to be expended. The work of the board of supervising engineers has been more far-reaching than the public appreciates, as it has been necessary to do a large amount of preliminary work in the way of preparing plans, estimates, etc.

The Cleveland Traction Situation.

The Cleveland Electric Railway on August 28 filed in the common pleas court a mandamus suit to compel the city council to change its records pertaining to the passage on August 3

of the curative ordinance granting franchises to the Forest City Railway. The suit was directed against the city clerk and the 32 members of the council and charges that the minutes of the meeting were incorrect and falsified, in that they stated that the ordinance had been read, whereas it had been read by title only. The Cleveland Electric is seeking to prove that the ordinance in question is invalid, and had previously filed injunction suits asking that it be so declared by the courts. With the records changed to show that the ordinance was not legally read three times, the attorneys hope to be able to secure an injunction restraining the operation of the ordinance.

Papers were served late that night and the case was called the following morning before Judge Estep, when the unique spectacle was witnessed of the city clerk and the entire city council of a large municipality being summoned before a court of justice at one time. Testimony was taken all day and the case was continued. Two councilmen were selected to represent the body and they and City Clerk Peter Witt testified that it was the usual practice to read ordinances by title only.

President Andrews of the Cleveland Electric has furnished figures to show that the company's gross earnings fell off \$148,261.42, as compared with the previous year, during the test of seven-for-a-quarter tickets during the first three months of this year, in spite of the large number of passengers carried.

Chicago Council to Investigate Electrification.

Mayor F. A. Busse of Chicago, Ill., on September 3 sent to the city council a message requesting that the committee on local transportation take up and report on the question of electrifying the steam railroads entering the city. The council instructed the committee accordingly.

The mayor stated in his message that his attention had been called to the fact that the New York Central and New York New Haven & Hartford railroads had substituted electricity for steam power in their New York terminals, thereby doing away with a large amount of smoke, and it had occurred to him that if electricity could be adopted in Chicago a large part of the smoke nuisance problem could be solved. Consequently he and a number of other city officials had visited New York on August 24 and had inspected the New York Central terminals in company with W. J. Wilgus, vice-president. These observations, while satisfying the Chicago officials as to the general advisability of adopting electricity as a motive power, of course had no bearing on the difficulties to be surmounted and the practical details. Therefore the mayor recommended that the committee on local transportation take up the whole subject, "with power to employ such assistance, make such investigations and prepare such reports as may be necessary to advise the council fully as to the possibility of installing the necessary electrical equipment for use on the railway terminals of Chicago to do away with the steam engines and eliminate the smoke nuisance from that source."

Mr. Busse has announced that he expects to engage the services of Mr. Wilgus, whose resignation as vice-president of the New York Central becomes effective on October 1, to investigate the local situation, with a view to demonstrating the feasibility of electrification.

Car Clearance Problem in Chicago.

The Chicago board of supervising engineers, in charge of the rehabilitation of the street railways of the city, which is now in progress, on September 3 voted to abide by its decision of July 30 that 9 feet 8½ inches be adopted as the standard distance between track centers, giving a clearance of 8½ inches between the present type of cars, which are 9 feet wide. It was decided at the meeting on July 30 that it was impracticable to provide for a clearance sufficient to make it safe for a person to stand between the cars and that it would be better to adopt a uniform clearance and have it understood that it was unsafe to get between the cars.

The question was reopened at the request of Bion J. Arnold, chairman of the board, who, after an investigation of conditions in Chicago and New York, had decided that it would be practicable to increase the distance between track centers to 10 feet 2 inches and reduce the width of the cars to 8 feet 6 inches, which would give a clearance of 20 inches. Mr. Arnold stated that when he concurred in the decision at the former meeting he was under the impression that it was not practicable to allow sufficient width between cars to insure any degree of safety to such persons as might accidentally get caught between cars and that therefore the lesser of two evils must be chosen and the cars placed as close together as it was practicable to operate them without interference with each other, as it was impracticable to reduce the space between the tracks and the curb, because of the space required for teams. He found, however, that in New York, with a distance between track centers of 10 feet 2 inches, there is a clearance between cars of about two feet.

He believed therefore that argument for the wider car was not sufficient to outweigh the argument in favor of safety.

H. B. Fleming, the Chicago City Railway's representative on the board, said that if it is desired to provide safe room between cars the distance should not be less than 30 to 42 inches. As this would be impracticable he believed fewer accidents would result from adhering to the present standards and operating cars with a minimum clearance.

Charles V. Weston, the city's representative, was in favor of a width between cars so narrow that nobody would attempt to stand between cars.

John Z. Murphy, representing the Chicago Union Traction Company, agreed with Mr. Arnold, but as his company has not yet accepted the ordinance under which the board is acting, his vote was not counted and the wider clearance plan was defeated by a 2 to 1 vote.

In 1905, when the Chicago City Railway adopted the present type of 9-foot cars, described in the Street Railway Review of September 15, 1905, page 591, the clearance was reduced from 9 to 5 inches, after an investigation of the standard clearances on a number of large systems. These were found to be as follows: Cleveland Electric Railway, 7 inches; United Railways of St. Louis, 13 inches; Philadelphia Rapid Transit Company, 6½ inches; International Railway of Buffalo, 3 inches; Brooklyn Rapid Transit Company, 24 inches; Chicago Union Traction Company, 5½ inches.

Equipping Cars with Air Brakes and Fenders.—The Knoxville (Tenn.) Railway & Light Company is equipping its cars with air brakes and fenders.

Testing Automatic Switches.—The Twin City Rapid Transit Company is making a number of tests of automatic electric switches on its lines in St. Paul, Minn.

Must Carry Policemen and Firemen.—An ordinance requiring the El Paso Electric Railway Company to transport policemen and firemen free of charge has been passed by the El Paso city council.

Universal Transfer Ordinance.—The city council of Terre Haute, Ind., has passed an ordinance requiring any company operating cars in Terre Haute to issue transfers to any line under penalty of a fine of from \$10 to \$200.

Feed Wires to be Placed Underground.—The United Railroads of San Francisco has begun the work of placing its feed wires in underground conduits and it is stated that this improvement will be applied to the entire system.

Seeks to Compel Transfers.—The city attorney of Jeffersonville, Ind., is conducting an investigation for the purpose of compelling the Louisville & Southern Indiana Traction Company to give transfers between the local cars and the New Albany interurban cars.

Smoking on Cars Forbidden.—Superintendent F. A. Bou-telle of the Tacoma Railway & Power Company has issued an order that smoking will no longer be permitted on the company's cars. Heretofore smoking has been allowed on the rear platform.

Will Adopt Fenders.—The Mahoning & Shenango Railway & Light Company of New Castle, Pa., is preparing to equip all its cars operating in Youngstown, O., with fenders, in accordance with a recent city ordinance. The interurban cars will be provided with pilots.

Must Pay for Grade Crossing Elimination.—The city council of Columbus, O., has passed an ordinance which requires the Columbus Railway to pay half the city's share of the cost of grade crossing elimination where the company's tracks cross those of steam railroads.

Central California Line Opened.—The Central California Traction Company of Stockton, Cal., on September 1 began operating on a 2-hour headway over its new line from Stockton to Lodi, 14 miles. As soon as the auxiliary power plant at Barmer Island, Stockton, is completed a half-hour service will be given.

No More Whistles on Chicago City Railway Cars.—President T. E. Mitten of the Chicago City Railway has issued an order to conductors to discontinue the use of whistles as signals to the motormen and to rely in the future on the bell cord. The whistles have been a source of annoyance to passengers and have also been confused with the whistles used by crossing policemen in regulating traffic.

Metropolitan Books Burned.—In the course of the examination by the public service commission of New York into the affairs of the Interborough-Metropolitan Company, D. C. Moorehead, secretary and treasurer, testified that the books of the old Metropolitan Street Railway Company, prior to 1902, were sold for junk at his order, with the understanding

that they were to be destroyed. No complete transcript of the books was made. Copies of numerous records had been made and were in the company's office at present. It was designed to ascertain from these records the various consolidations by which the capital of the system had been increased from \$8,200,000 of stock and \$3,500,000 of bonds to \$52,000,000 of stock and \$40,000,000 of bonds.

Hudson Companies' Stations.—The Hudson Companies, owners of the tunnels under construction beneath the North river, have announced that in addition to the station at Exchange place, Jersey City, adjoining the Pennsylvania station, there will be two other stations in Jersey City, one at Henderson street and one at Pavonia avenue. There will also be stations beneath the Erie Railroad station and the Lackawanna station in Hoboken.

Sacramento-Marysville Line Opened.—The first car was operated over the new line of the Northern Electric Company from Sacramento to Marysville, Cal., 41 miles, on August 25. The trip was made in 1 hour and 20 minutes. The car was the first one built in the Chico shops. It is planned to give a service of eight trains each way daily. The system of the Northern Electric Company was described in the Electric Railway Review of June 8, 1907, page 738.

Mayor Fails to Settle San Francisco Strike.—Mayor Taylor of San Francisco last week attempted to arrange for a conference with President Patrick Calhoun of the United Railroads and A. J. Gallagher, president of the San Francisco labor council, with a view to settling the carmen's strike, which has been in progress, nominally at least, since May 5. President Calhoun expressed his willingness to confer with the mayor, or to treat with any of the men individually, but absolutely declined to treat with the union.

Wells, Fargo & Co. May Take Over Express Business of the Illinois Traction System.—It is stated that negotiations are now pending for the purchase by Wells, Fargo & Co. of the express business on the Illinois Traction System. The express traffic on the traction lines in Indiana and Ohio with which the Wells-Fargo company has agreements has proven satisfactory and if a favorable agreement is reached in the present negotiations regular express messengers and agents will be appointed for the transaction of the business on these lines.

Brooklyn & Coney Island Will Obey Commission.—In response to a summons by the public service commission of New York for the Brooklyn & Coney Island Company to show cause why it should not provide new combination cars and 50-horsepower and other equipment for its cars, the company announced that it would comply with the orders of the commission, looking to the betterment of its service, particularly on the line on which it has a large amount of business, between Brooklyn bridge and Coney Island. It was stated that in consideration of improvements to cost \$1,000,000 the stockholders of the company had agreed to forego dividends for the next two years.

The Metropolitan Securities Company Ordered to Show Books.—The public service commission of New York has ordered that the books of the Metropolitan Securities Company, the majority of whose stock is owned by the Interborough-Metropolitan Company, be opened to the inspection of a special accountant of the commission. It is also ordered that access be afforded to the accounts, records and memoranda for a period of six months from the present date. The corporation is required to notify the commission within five days from the date of service whether this order is accepted. A similar order issued to the Interborough-Metropolitan had not been accepted on the morning of September 5, which was the date of the expiration of the five days' interval, and if this order is refused, it is presumable that the Metropolitan Securities Company will follow the same course.

Hampered by City Authorities, Orders Extensions Stopped.—H. E. Huntington, president, has issued orders to discontinue all preparations for further extension work on the Pacific Electric and Los Angeles Interurban Railway systems, because he believes he has been hampered by the city authorities. His order took effect on August 31, and many men were dropped from the payrolls, 25 from the engineering department alone. Traffic Manager McMillan has explained Mr. Huntington's attitude as follows: "It appears to be the policy of the present administration to make it as difficult as possible for us to operate our lines. We are made to pay for franchises, and these are taxed, and all the improvements made are assessed at exorbitant rates, and then we are compelled to use fenders which cannot be operated safely on our large, swift cars. The Pacific Electric and Interurban have not paid operating expenses for the last three years. Huntington has had to dig up funds from other sources to make good these losses, and he is tired of it."

Construction News

FRANCHISES.

Alameda, Cal.—With a view to the electrification and extension of its Alameda lines, the Southern Pacific Railroad has applied for an electric railway franchise, covering its present broad and narrow gauge lines, and, in addition, several feeder lines in streets as yet not served by railroads. The application is for an overhead trolley system for a period of 50 years, work to be commenced within four months from the granting of the franchise and completed within three years. The franchise covers two applications, one made by the Central Pacific with its broad-gauge or north shore line, and the other the South Pacific Coast, with its narrow-gauge line along the south shore. The projected lines are to be standard gauge. Franchises later will be asked for in Oakland.

Dallas, Tex.—The city council has granted the Dallas Interurban Electric Railway an extension of time within which to begin work under its franchise. Construction must begin by April 1, 1908, and 60 miles of the line are to be completed within a year from that time. The company proposes to build about 30 miles in Dallas and lines to Greenville and Sherman.

East Alton, Ill.—William Rudisill, representing capitalists who are back of a proposed electric line from Bunker Hill to Upper Alton, Ill., has applied for a 50-year franchise in East Alton. The line is to be 25 miles long and will go by way of Bethalto to East Alton, thence to Benbow and on to Upper Alton. The names of those interested are not disclosed, but it is announced that the headquarters of the company will be in Bunker Hill.

Grand Forks, N. D.—A franchise has been applied for by the Northwestern Interurban Railway Company, for the construction and operation of a street railway in this city. The company also proposes to build an interurban line from Grand Forks to Carrington.

Los Angeles, Cal.—The city council has advertised for bids for the sale of a street railway franchise in Hill and Sixteenth streets, covering the line over which the Los Angeles-Pacific Company is endeavoring to lay a third rail, and regarding which litigation is now pending between the city and the Los Angeles-Pacific Company. This action was taken after the reading of the mayor's message suggesting a compromise with the railway company in the matter of allowing it to lay a third rail. The council may reject any and all bids for the franchise, and, in case the successful bidder does not appear to act in good faith, may require such a bond as to insure that the best interests of the city will be served.

Louisville, Ky.—The ordinance granting a franchise to the Louisville & Northern Railway & Lighting Company by which it may connect its tracks from a point on the Kentucky bridge with those of the Louisville Railway, is being considered a second time by the railroad committee of the city council. The committee reported favorably on the ordinance at first, but on account of protests from a delegation of property owners who objected to having the tracks laid in Twenty-ninth street, a second consideration was accorded by the general council.

Marysville, Cal.—The city council has granted a franchise to the Northern Electric Company.

Norwich, N. Y.—The Utica Southern Railway and the Otselic-Norwich Railroad have applied for franchises to operate their interurban lines in Norwich, each traversing a different section of the country and each entering the village from a different direction. Action will be taken at the next meeting of the village board. The Utica Southern Railway was represented in the application by T. F. McBride of Clinton, Edwin H. Risley, Utica, F. G. Mott, Hamilton, and Mr. Paxter of Utica, civil engineer. B. F. Gladding, South Otselic, H. C. Stratton, Oxford, and Joel J. Bixby, Norwich, N. Y., represented the Otselic-Norwich company.

Salem, O.—The city council has granted to the Salem Street Railway, which furnishes an entrance to Salem for the Youngstown & Ohio River Railroad, a franchise enabling the company to build its tracks across East Main street, along Chestnut to East Green street, and then on Ellsworth avenue to a connection with the tracks of the Stark Electric Railroad.

San Francisco, Cal.—The Sunset Improvement Club has applied to the board of supervisors for a street railway from Nineteenth avenue and H street south to a connection with the United Railroads at Ingleside.

RECENT INCORPORATIONS.

City & Suburban Railway, Brunswick, Ga.—Incorporated in Georgia to build an electric railway four miles long in Brunswick. Incorporators: F. D. M. Strachan, Frank D. Aiken, E. F. Coney, C. Downing and A. Fendig of Brunswick and George P. Walker, George F. Armstrong and Harry D. Strachan of Savannah, and Ernest L. Simpson and Lewis H. Spence of New York.

Covington & Wabash Valley Railway, Covington, Ky.—Incorporated in Kentucky to build a line from Covington to Silverwood. Capital stock, \$50,000. Incorporators: William G. Ruhl, Chicago; Charles W. Leinbach, W. F. Bonebrake and W. G. Miles of Covington.

East St. Louis & Eastern Railway, East St. Louis, Ill.—This company has been incorporated to build an interurban railway between East St. Louis and Belleville, Ill., connecting at Belleville with the old Day (coal) Line, controlled by the East St. Louis & Suburban Railway, which, it is stated, is interested in the new organization. The East St. Louis & Eastern Railway will run in an easterly direction by way of Freeburg, to a large tract of coal land, comprising several hundred acres, which it recently acquired in the southeastern part of St. Clair county. Capital stock, \$2,500. Incorporators: L. C. Haynes, T. W. Gregory, G. C. Pierce, F. H. Thomas and F. H. Kruger.

Everett & Cherry Valley Traction Company, Everett, Wash.—Incorporated in Washington to build and operate electric railway, telegraph and telephone lines from near Snohomish to Fall City, Wash. Capital stock, \$1,500,000. Board of trustees for the current year: J. T. McChesney, E. C. Mony, L. S. Duryea and J. A. Coleman.

Northwestern Interurban Railway, Jersey City, N. J.—Incorporated in New Jersey with a capital stock of \$1,500,000. Incorporators: H. O. Coughlan, S. A. Anderson and L. A. Turner of Jersey City.

St. Joseph Excelsior Springs & Lexington Railway, Excelsior Springs, Mo.—Incorporated in Missouri to construct and operate a standard-gauge electric line from Excelsior Springs to Vibbard, about six miles. Capital stock, \$200,000. Incorporators: Dr. G. B. Lingelfelter, Charles Dyer, Denver, Colo.; S. S. McIntire, C. D. Wale, A. M. Bates, Excelsior Springs; J. W. Bates, Vibbard; David C. Finley, Kansas City, Mo.

TRACK AND ROADWAY.

Algiers (La.) Railway & Light Company.—This company has completed its line from Algiers to Gretna, La., five miles, and is planning for a further extension. R. S. Stearns, general manager.

Alton Jacksonville & Peoria Railway, Jerseyville, Ill.—This company's interurban line was formally opened last week from Alton to Godfrey. Work on the remainder of the line will be continued and it is believed that by the first of the year it will be completed and in operation to Jerseyville. Eighty-five-pound rails are used and the roadbed is well ballasted. About 13,000 acres of valuable land along the Mississippi and Illinois rivers has been reclaimed and work on a levee is to be started at once. As soon as the road reaches Jerseyville a spur will be built from this point to the levee district, thus insuring considerable freight tonnage through Jerseyville and Alton. The matter of transferring passengers to the Alton traction lines is now under consideration. A. O. Auten, president, Jerseyville, Ill.

Asheville & Hendersonville Railroad, Asheville, N. C.—Announcement is made that this company will begin the construction of its 20-mile interurban line some time this month. Permanent surveys have been completed and sufficient right of way secured to insure the building of the road. The estimated cost of construction, including equipment and water power, is about \$300,000. Franchises have been secured in Hendersonville for a term of years and it is stated that the line later may be extended to Flat Rock. The company is capitalized at \$750,000 and is being promoted by C. F. White of Skyland. C. E. Van Bibber, New York City, will superintend the construction of the line.

Billings, Mont.—A special election will be held on September 14 for the purpose of submitting to the voters the question of granting a franchise to Yegen Brothers for the construction of a local street railway.

Bloomington & Normal Railway & Light Company, Bloomington, Ill.—This company has received about a mile of new 80-pound rails, which will be used to relay the tracks from School street to Park street.

Boston Waltham & Western Electric Railroad, Waltham,

Mass.—This company, which proposes to build 23 miles of electric railway connecting Waltham, Weston, Wayland, Sudbury and Maynard with Marlboro, Mass., has applied to the Massachusetts railroad commission for a certificate of public necessity and convenience. The first section to be built is from South Sudbury to Maynard. Charles E. Stevens is the promoter.

Brookings & Sioux Falls Electric Railway, Brookings, S. D.—It is announced that engineers will be on the ground within the next few days to make final surveys for this proposed road and that by September 15 work on the grading will have been started. The line, if built, will pass through the heart of the Sioux valley to Sioux Falls, 60 miles distant, thus affording a southern outlet for the territory tributary to Brookings. The H. J. Folts Company of Minneapolis is said to have disposed of the entire \$50,000 of stock, \$15,000 of which was taken in Brookings and the balance by farmers along the line between Brookings and Flandreau, about 30 miles.

Canandaigua Southern Electric Railroad.—The New York railroad commission has granted this company permission to issue a \$2,000,000 mortgage. The company plans to build from Canandaigua to Atlanta, N. Y., and has also filed certificates of extension from Atlanta to Wayland, 6½ miles; from Atlanta to Lake Salubria, 21½ miles; and from Canandaigua to Palmyra, 14 miles.

Carrizo Springs, Tex.—It is reported that D. J. Woodward of San Antonio, Tex., is interested in a proposition to build an electric railway from Cotulla to Carrizo Springs.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The first cars on this company's extension from Racine to Milwaukee were run on August 28 from a point two miles south of the southern city limits of Milwaukee to National avenue. This service will be continued until the completion of the entire line, which it is expected will be in operation by November 1. A feature of the construction work is a long foot bridge over the Root river at Horlick, Wis.

Chicago & Oak Park Elevated Railroad, Chicago, Ill.—This company has applied to the commissioner of public works for permission to elevate the tracks and structure from the Chicago river west to Union street. This action is taken for the purpose of allowing the Chicago & Northwestern Railway Company ample room to construct its proposed passenger station. The steam road will defray all the expense of the work to be done by the elevated company in addition to building a new station for the latter at Clinton and Lake streets, conveniently located to serve the traffic to and from the Northwestern's new terminals.

Chicago-New York Electric Air Line Railroad, Chicago, Ill.—Frank Gavitt, who recently secured a franchise for a street railway line in Gary, under the name of the Gary & Interurban Railway, has transferred the franchise to this company. J. D. Price, president of the Co-operative Construction Company, which is doing the construction work for the Air Line, states that the Gary line will be built within the next six months.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—This company, which is building a line between South Bend and Laporte, Ind., has awarded a contract to J. Young of Elkhart for regrading an old Lake Shore right of way between Laporte and Rolling Prairie, 3½ miles.

Conestoga Traction Company, Lancaster, Pa.—Engineers of this company began surveying on September 3 for an extension of its line from Gap, in Lancaster county, to Parkersburg, Chester county. When completed connection with an existing line to Philadelphia, by way of West Chester, will be afforded. Announcement also is made that the Philadelphia Western is preparing to extend its present line through to Parkersburg. If this is done the proposed Gap-Parkersburg line will have connection with it also.

Davenport & Manchester Interurban Railway, Davenport, Ia.—W. H. Kimball last week started the preliminary surveys for the line from Manchester to Davenport, Ia., 98 miles. George T. Baker of Davenport is the president.

Delaware Mt. Gilead & Mansfield Railroad.—This company is a reorganization of the Galion Mt. Gilead & Delaware Railway, which proposed to build from Galion to Delaware, O. New officers have been elected as follows: President, John A. Shoemaker, Delaware; vice-president, S. P. Gage, Mt. Gilead; secretary, A. H. Breece, Mt. Gilead; treasurer, Lewis Slack, Delaware.

Donora & Eldora Street Railway.—The contract for grading this line between Donora and Eldora, Pa., is to be let within a few days and work probably will be started this month. The line will be about 3½ miles long and will give electric service to the important steel manufacturing points

in this district. At Eldora it will connect with the Pittsburg Railways Company's Charleroi line. Among those interested are: Dr. B. M. Hanna, Charles A. Richter, Pittsburg, James A. Rabe, Donora; George W. Moore, Philadelphia.

Ensley (Ala.) Street Railway.—The first spike in the construction of this line to South Highlands was driven on August 27 by J. J. Walker, the president of the company. Work is to be pushed as rapidly as possible and the road put in operation between Ensley and South Highlands as soon as tracklaying is completed. An extension to Dolomite also is contemplated. It is stated that the option on a tract of land for the opening of an amusement park has been secured by the company.

Eugene (Ore.) Street Railway.—Tracklaying on this company's line in this city has been completed from the Southern Pacific depot to Eleventh street, on Willamette, and from this point east toward the University of Oregon to Mill street. The poles are in place and the work of stringing the wires was started last week. It is stated that cars will be in operation within 30 days. The contract for the construction of a temporary wooden bridge over the Willamette river, between Eugene and Springfield, will soon be awarded and it is stated that the interurban line between these two points will be in operation by the first of the year.

Everett, Wash.—J. T. McChesney has confirmed the announcement that he and his associates of the Everett Improvement Company will soon commence the construction of the proposed interurban line between Snohomish and Fall City, by way of Monroe. Surveys are completed between Snohomish and Monroe and as soon as the right of way has been secured work on its construction will be started. The line will be about 35 miles long and will serve the Cherry Valley district in the basin of the Snoqualmie river, which the line will practically parallel from Monroe to Fall City. It is hoped that arrangements will have been made by January 1 next, so that work can be started on that date.

Excelsior Springs, Mo.—Dr. G. P. Lingenfelter of Denver, Colo., and associates are said to have organized for the purpose of building an electric line from Excelsior Springs to Vibbard, six miles.

Ft. Dodge Emmetsburg & Spirit Lake Railway, Emmetsburg, Ia.—This company, recently incorporated, has commenced the surveys from Ft. Dodge to Spirit Lake, Ia.

Genesee & Orleans Railway, Batavia, N. Y.—Announcement is made that this company, incorporated in March, 1901, to build an electric railway from Batavia to Oak Orchard Harbor by way of Elba, Barre and Albion, will be taken over by New York and California capitalists, who have secured a two months' option on the property. This company was granted a certificate of public necessity and convenience, but the line has never been built. The length of the road as originally laid out was 27 miles and it is proposed by those who have taken the option to build the road as originally planned with various extensions, one of which would extend from Batavia to Perry, Mt. Morris and Dansville, connecting at Mt. Morris with the Lackawanna and Pennsylvania railroads. From Perry it would extend to Pike, where it would connect with a trolley line which is to be built from Salamanca to that point. By connecting with this proposed trolley line which the Genesee & Orleans eventually may absorb, a through electric line from the coal fields around Bradford, Pa., to the Lake Ontario shore for direct transportation of coal and lumber, would be afforded. George W. Mische and W. G. Albertson, Rochester, N. Y., are representing the capitalists back of the project. Charles E. Hart, Albion, N. Y., is president of the Genesee & Orleans Railway Company, which was capitalized at \$50,000 six years ago.

Girard (Kan.) Electric Railway.—It is reported that the work of tracklaying on this line from Girard to Frontenac, Kan., was started on August 22. Edward Stinhoff of Pittsburg, Kan., has the contract.

High Point, N. C.—Dee Allen, who is promoting an electric railway connecting High Point, Thomasville, Greensboro and Winston, announces that work on the construction of the road is being pushed and it is planned to have it in operation within six or eight months. The old roadbed is now being straightened and laid with 70-pound rails. A belt line around the city is planned with a spur to the factories. It is also announced that at the junction of this line with two other connecting lines, 7 miles from High Point, 8 miles from Greensboro and 14 miles from Winston-Salem, 300 acres of land have been purchased for the establishment of a park and country club.

Indianapolis & Louisville Traction Company, Louisville, Ky.—The first car was operated last week over this new line from Seymour, Ind., to Louisville, Ky. The Indianapolis &

Louisville line extends to Sellersburg and from there to Louisville the tracks of the Louisville & Northern Railway & Lighting company are used. When the extension of the Indianapolis Columbus & Southern Traction Company from Columbus to Seymour is completed through service will be given from Indianapolis to Louisville. The line is operated by direct current at 1,200 volts from the power house at Scottsburg. James Bryan of Pittsburg is consulting engineer and A. A. Anderson of Columbus, Ind., is general manager.

Indianapolis & Western Railway, Indianapolis, Ind.—Seventy-five men are now engaged in grading this company's line, which is under construction from Greencastle to Brazil and Terre Haute, and it is stated that within six weeks the work of tracklaying will be started, much of the material now being on the ground. It is announced that English capital is being enlisted for the completion of the road. C. C. Reynolds, manager, Indianapolis.

Iowa-Missouri Traction & Power Company, Fairfield, Ia.—Arrangements for the financial backing of this interurban line, which will connect Fairfield, Ia., and Memphis, Mo., have been completed by Daniel Fitzgerald of New York City, and its construction within a year is now said to be practically assured. The details of the arrangements will be made public later.

Johnstown Ebensburg & Northern Railway, Johnstown, Pa.—Construction work has been started on this line from Johnstown to Ebensburg, Pa. C. R. Frederick is vice-president and general manager.

Knoxville (Tenn.) Railway & Light Company.—A large force of men is engaged in rebuilding this company's line in Main avenue, west of Ninth street, to the tracks of the Southern Railway at Third creek. When this is completed a continuous suburban line from the end of the present line down Kingston pike to one of the best residence sections of the city will be afforded. At the crossing of the Louisville & Nashville Railroad, between Fifteenth street and the Southern Railway, the street grade is being lowered to permit the passing of the street cars under the steam railroad crossing at Main avenue. By these and other changes now contemplated a direct line down Main avenue to the end of the line will be afforded and the loop track on Fifteenth street, between Main and Yale avenues, will be abandoned.

Lake Erie & Youngstown Electric Railway, Youngstown, O.—This company, incorporated to build an electric line from Conneaut, O., south to Youngstown, about 60 miles, has all the rights of way secured and will shortly begin the work. Plans have been made for the entrance of the line into Youngstown, where connection is to be made with the Youngstown & Southern, which has been built to Columbiana, and is to be extended to East Liverpool, on the Ohio river, 100 miles from Conneaut.

Mannington (W. Va.) Light & Power Company.—Albert M. Schenk of Wheeling, W. Va., who has been largely interested in a number of traction properties throughout the state, is at the head of the new company, which is to operate in Wheeling and adjoining counties. He has already secured control of the Mannington, W. Va., street railway interests. This line will be a link in the proposed interurban road, which will connect Moundsville and Clarksburg. At present a line is in operation between Clarksburg and Fairmont and an extension to this system is being built toward Mannington. The last gap between Moundsville and Mannington is small. The Mannington company is known as the Mannington Light & Power Company, and holds municipal contracts in that city.

Marquette City & Presque Isle Railway, Marquette, Mich.—This company is engaged in rebuilding about one mile of its track in Marquette, and will also replace several of its switches and curves. F. A. Gallagher, general manager, Marquette.

Marysville, Cal.—Announcement is made that an electric line connecting Marysville and Oakland, by way of the Yuba pass, is being promoted by Richard Phelan, Downieville, Cal. A power plant, which is to be constructed at Denton on the Feather river, is to furnish the power.

Medina Batavia & Ontario Railway, Olcott, N. Y.—Active work on this line was begun on August 28, with the intention, it is stated, of having it completed and in operation by late fall. There will be two divisions to the system: one from Olcott to Somerset, along the lake shore and through the fruit belt of Niagara county; the other from Olcott to Medina and thence to Batavia. It is estimated that the cost of building the road will be about \$1,250,000. The identity of the promoters is not disclosed, but it is stated that the Carnegie Trust Company of Pittsburg is financing its construction.

Michigan United Railways, Lansing, Mich.—The Northern

Construction Company, which is building the line from Lansing to Jackson, has placed an order with the Carnegie Steel Company for 1,800 tons of rails. Delivery is to begin October 1. Theron W. Atwood is president of the construction company.—E. D. Nellis, who has the contract for building the cement bridges on the Jackson-Lansing line, has started work on the first bridge, about two miles from Mason.

Midcontinent Traction Company, Tulsa, I. T.—We are officially advised that this company, recently incorporated, proposes to build an electric railway from Tulsa to Sapulpa, I. T., 21 miles. Surveys are now in progress and one-half completed. Six miles of old grade has been acquired. The power house will be located at Red Fork. Contracts are to be let for grading and tracklaying. A. L. Smark, president, Kansas City, Mo.; J. Robert Burnham, chief engineer, Tulsa, I. T.

Minneapolis Kansas City & Gulf Electric Railway, Minneapolis, Minn.—O. C. St. Clair, secretary, states that a contract has been closed for a preliminary survey from Minneapolis to Des Moines, Ia. C. B. Holmes, president.

Minneapolis Rochester & Dubuque Traction Company, Minneapolis, Minn.—L. D. Mathes of the Union Electric Company, Dubuque, Ia., has written to President M. W. Savage that the Union Electric Company is willing to co-operate with the Traction company with regard to furnishing an entrance to the city for the interurban cars and that no doubt a satisfactory contract for trackage rights can be arranged.

Nashville (Tenn.) Interurban Railway.—Ninety-eight per cent of the right of way for this line has been secured and several miles of grading has been completed out of Franklin, Tenn. Construction work is in progress between Nashville and Mt. Pleasant and it is stated that the road may be in operation by February or March of next year. The cars will probably enter Nashville over the Spruce street line and use the transfer station of the Nashville Railway & Light Company as a depot.

New Jersey & Pennsylvania Traction Company, Trenton, N. J.—Theodore K. Kitchin is now making surveys for an extension of the Trenton Lawrenceville & Princeton Railroad, which is owned by this company, from Princeton to Somerville, and it is stated that the line will be still further extended from Somerville to Mendham and to Morristown, with a possible extension to Lake Hopatcong. Charles Serfass of Yardley, Pa., is chief engineer.

New Orleans, La.—Announcement is made that the promoters of the proposed electric railway between Mandeville and Covington, La., by way of Chinchuba, will take steps at once toward completing arrangements for the construction of the line. As Mandeville is favorably situated for a summer resort it is believed that the building of the electric line will develop this business. It is stated that a shell beach will be perfected and a large hotel erected at that point.

Northwestern Elevated Railroad, Chicago, Ill.—The officials have announced that the work of connecting this company's tracks with those of the Chicago Milwaukee & St. Paul Railway, which are to be electrified as far as Evanston, will be started at once, and that the present stringency in the financial market will not affect the plans, as the necessary funds have been provided for. The company has applied for a permit to begin construction.—The commission of public works has granted this company a permit to proceed with the extension from Graceland avenue to the city limits and it is stated that work will begin next week.

Pacific Traction Company, Tacoma, Wash.—This company has recently filed a mortgage for \$2,000,000, covering its property in King, Pierce and Thurston counties, the funds thus secured to be devoted to building new electric lines in and around Tacoma. The company at present operates a 14-mile interurban line from Tacoma to American Lake and a partial survey from American Lake to Olympia has been made, as well as numerous surveys for city lines. It is stated that it is the intention of the company to construct a system of interurban lines connecting the principal cities of the sound region. B. J. Felt, vice-president, Tacoma.

Paducah Southern Electric Railroad, Paducah, Ky.—The American Engineering Company of Indianapolis, Ind., has been engaged to make the preliminary survey for the first section of the line, from Paducah to Mayfield, Ky.

Paris, Tex.—A committee has been appointed to secure estimates of the cost and to investigate the feasibility of building an electric railway from Paris to Blossom, Tex.

Port Arthur, Tex.—Announcement is made that financial backing has been secured for the construction of an interurban electric line between this point and Beaumont, Tex. J. Van Tyen of this city, who has just returned from an extended trip to Germany and Holland, is stated to have inter-

ested German and Dutch capital in the enterprise, the details of which will be announced later. It is said that this line has no connection with the Beaumont and Port Arthur interests which recently secured a franchise from the county commissioners.

Presidio & Ferries Railroad, San Francisco, Cal.—This company has modified its plans with a view to dispensing with the use of cables, which it was supposed would be required to transport cars over the Union street hill, as it has just been found that it is possible to surmount grades of 14 per cent. At one point where the grade amounts to 18½ per cent it is proposed to install a counterweight to draw the cars up the incline. The company's tracks are now completed for 34 blocks and 24 blocks are yet to be laid.

Rochester-Corning-Elmira Traction Company, Rochester, N. Y.—W. C. Gray, chief engineer, writes that the Rochester & Southern Construction Company proposes to build an electric line from Rochester to Elmira and Hornell, N. Y., 138 miles, of which 120 miles will be double-tracked. The route includes Lakeville, Danville, Wayland, Bath, Corning, Horseheads, Elmira and Arkport. Grading was started on August 4 and is now in progress between Conesus Lake and Groveland, a distance of nine miles. The Rochester & Southern Construction Company has the general contract, subcontracts having been let to A. J. McCoombs for 43 miles of grading, and to Summers, McDonald & Winters for 18 miles of grading. The overhead construction will be single-phase catenary. The entire line has been surveyed and the maximum grade is 3 per cent, with a maximum curvature of 3 degrees 20 minutes. The track will be laid with 70-pound rails of 60-foot lengths. Twenty-three bridges will be required. The equipment will consist of 100 motor cars and trailers, 5 electric locomotives and 50 express cars. The officers of the Rochester & Southern Construction Company are: President, Otto F. Leiders, Wayland, N. Y.; George A. Engert, general manager; and S. Feuerstein, electrical and mechanical engineer.

Sacramento & Lake Tahoe Railway, Sacramento, Cal.—This company has filed notices of location in Placer county for water rights, dam and reservoir sites, etc., on the American river, to be used for the generation of power for its proposed interurban line from Sacramento to Lake Tahoe. It is stated that by another year the road will be in operation to the lake.

St. Louis Lakewood & Grant Park Railway, St. Louis, Mo.—This company is stated to have completed about two miles of grading near Grant Park, Mo. The company will place contracts next month for about six miles of additional track.

San Angelo, Tex.—It is stated the company headed by Col. J. H. Ransome, which recently secured a franchise for the operation of an electric railway in this city, will incorporate at once with officers as follows: J. H. Ransome, president; W. T. Noblett, San Angelo, vice-president; J. A. Williams, San Angelo, secretary and treasurer.

San Joaquin Valley Western Railroad.—This company, recently incorporated to build an extension of the Ocean Shore Railway from Watsonville to Fresno, Cal., is reported to have located the line and secured the right of way for 100 miles. J. B. Rogers of San Francisco is chief engineer.

Shore Line Electric Railway.—A certificate of public convenience and necessity has been granted by Judge William S.

Snohomish Valley Railway, Snohomish, Wash.—A contract has been let to the Continental Engineering Company for building the first 55 miles of this company's line in the Snohomish valley. A subcontract has been let to the Snohomish Construction Company. E. Colburn of Snohomish is vice-president and chief engineer.

Sonoma & Lake County Railway, Lakeport, Cal.—This company proposes to build an electric railway from Cloverdale to Lakeport, Cal., with a branch to Kelseyville. The main line will be 27 miles long, with a maximum grade of 3 per cent. Profiles and maps have been made and it is the intention to begin construction soon. A. C. Dickinson is president; J. F. Fulton, vice-president and general manager; and D. F. McIntyre is chief engineer.

Southern Pacific Railroad.—Announcement is made of the intention of this company to electrify its Alameda lines, franchises for which have been applied for in Alameda. The work will be started on the Alameda line and the narrow-gauge line in Oakland and it is stated that the officials of the road intend to push the work of changing the road for electrical operation as speedily as possible.

Southern Wisconsin Railway, Madison, Wis.—This company has applied to the Wisconsin railroad commission for

permission to build a line from Madison to Stoughton, Wis., and to issue \$300,000 bonds. F. W. Montgomery of New York is the promoter.

Springfield (Ill.) Belt Line Railway.—Construction work on this line, which will form a part of the Illinois Traction system, has been started and as soon as the overhead work has been completed, which it is stated will be in a short time, tracklaying will be commenced. The coal-shipping industry of the McKinley company's business has become so important a factor that the belt line was projected with the idea of handling this traffic from the mines to eastern and southern points without passing through the corporation limits of Springfield. The line will begin at a point near the Sangamon Coal Company's shaft in the eastern portion of the city, from whence it will proceed southward and then westward to a point about one mile south of Iles Junction at Spring and Cedar streets.

Texas Traction Company, Dallas, Tex.—The Crouch-Saigling Company, McKinney, Tex., has been awarded the contract for the iron and metal work for this company's inter-urban line between Dallas and Sherman, Tex. J. F. Strickland, president, Dallas, Tex.

Tidewater Development Company, Birmingham, Ala.—This company, which has surveyed a line from Gadsden to Case of the superior court, permitting the construction of a street railway in Westbrook, Old Saybrook and Essex, Conn. Tuscaloosa, Ala., and has secured several franchises, is reported to have acquired the Tuscaloosa Belt Railway, which connects Tuscaloosa and Holt. The capital stock of the company was recently increased from \$100,000 to \$150,000. J. M. Dewberry is president.

Wagner Lake Shore & Armour Traction Company.—We are officially advised that this company proposes to begin construction on a line from Wagner to Mitchell, S. D., a distance of 65 miles, in the spring of 1908. The route includes Lake Shore, Armour and Hillside. The company already has a power plant at Wagner and a plant at Armour nearly completed. Work is now being delayed pending the grant of a franchise to enter the city of Mitchell. John Absher, president, Wagner, S. D.

POWER HOUSES AND SUBSTATIONS.

Abilene (Tex.) Street Railway.—This company, which is now building a street railway line in Abilene, has contracted with the General Electric Company for three 50-horsepower engines, with equipments, one 100-kilowatt rotary converter and a switchboard.

Athens (Ga.) Electric Railway.—This company is about to place contracts for a 500-kilowatt or 750-kilowatt steam turbine, with an additional battery of boilers, auxiliary apparatus, piping, etc., and will also enlarge its present steam station. J. Y. Carithers, president, Athens, Ga.

Houghton County Street Railway, Hancock, Mich.—This company is erecting an addition to its power station and is installing a 1,000-kilowatt Curtis turbine.

Huntsville (Ala.) Railway Light & Power Company.—It is reported that this company's power plant will be doubled at a cost of about \$35,000.

Illinois Traction Company, Champaign, Ill.—H. C. Hoagland, electrical and mechanical engineer, writes that this company is now installing 800 horsepower additional Babcock & Wilcox boilers in the power house at Riverton, Ill., and is extending the building to provide for 800 horsepower more. A contract has been placed with the General Electric Company for one 3,000-kilowatt Curtis turbine to be installed in the power house in the early spring. A temporary substation has been installed at Buffalo and a new one is contemplated for the near future. Permanent substations will also be built at Emery and Heyworth, and a combination substation, freight house and passenger waiting room at Clinton. These buildings will all be of brick. Three brick substations are just being completed on the St. Louis Decatur & Champaign line at Oakley, Bement and White Heath. These will be in service within the next 60 days.

Northern Texas Traction Company, Ft. Worth, Tex.—Officials of this company state that the power house at Handley, Tex., will be enlarged to double its present capacity and that about \$150,000 will be expended for additional machinery.

Oklahoma City Street Railway.—This company has started excavation work for its \$180,000 power plant in the Belle Isle addition. The building will be 40 by 100 feet, of brick and granite on a concrete foundation. Three engines of 1,300 horsepower will be installed.

Personal Mention

Mr. L. H. McCray, formerly with the Winnebago Traction Company, Oshkosh, Wis., has been appointed superintendent of the Sterling Dixon & Eastern Electric Railway, Dixon, Ill.

Mr. William L. Neal, formerly chief inspector of the Illinois Traction System, with headquarters at Decatur, Ill., has been appointed superintendent of the Champaign-Decatur line.

Mr. Clement C. Smith, president of the Columbia Construction Company of Milwaukee, Wis., has been elected vice-president of the Sterling Dixon & Eastern Electric Railway of Dixon, Ill.

Mr. George E. Morine of the Electrical Installation Company of Chicago has been appointed general superintendent of the Indianapolis Crawfordsville & Western Traction Company of Crawfordsville, Ind.

Mr. William G. Young, heretofore assistant superintendent of the New York & Stamford Railway at Port Chester, N. Y., has been appointed superintendent of the company, succeeding Mr. George W. Pierce, resigned.

Mr. J. T. Porter has resigned as superintendent and master mechanic of the Shreveport (La.) Traction Company to engage in the electrical construction business. Mr. H. H. Lunsford has been appointed superintendent to succeed him and Mr. D. G. Rushing has been appointed master mechanic.

Mr. David Fox, who since March, 1902, has been general manager of the Rutland (Vt.) Railway Light & Power Company, has resigned to go to Mexico, where he has business interests. He will be succeeded by Mr. George S. Haley, heretofore superintendent of the Rutland City Electric Company.

Mr. Charles Stanton, formerly engineer in charge of the power station of the Oneonta & Mohawk Valley Railroad at Hartwick, N. Y., has been appointed electrical engineer, succeeding Mr. C. J. Huffman, resigned. Mr. M. J. Bogardus, purchasing agent, will be temporarily in charge of the mechanical department.

Mr. Wallace Lawrence has been appointed superintendent of the Fifty-ninth and the Seventy-fourth street power stations of the Interborough Rapid Transit Company, New York City. Mr. Thomas Alcop, who was formerly in charge of the Fifty-ninth street station, has resigned to accept a position with the New York Edison Company.

Mr. William E. Mitchell has been appointed electrical engineer of the Bahia (Brazil) Tramway Light & Power Company. This company has recently taken over the Siemens & Halske electric railway and will make some extensive improvements on the system. Mr. Mitchell formerly was with the Sao Paulo Tramway Light & Power Company.

Prof. E. R. Dewsnap has been appointed professor of railway administration and management at the University of Illinois, Urbana, Ill. Professor Dewsnap was educated at the University of Manchester (England) and at the Royal Technical College of Manchester, and for the past three years he has been in charge of the railway courses at the University of Chicago.

Mr. H. H. De Pew has resigned his position as superintendent of the Penn Yan Keuka Park & Branchport Electric Railway on account of ill health. Mr. De Pew has held this position for several years past. Until a permanent successor has been appointed Mr. William Tylee, who has been connected with the company for the past 10 years, will be acting superintendent.

Mr. George A. Stanley has resigned as purchasing agent of the Cleveland Electric Railway to become more actively associated with his interests in the New York & North Shore Railway on Long Island, N. Y. Mr. Stanley is a brother of J. J. Stanley, vice-president and general manager of the Cleveland Electric Railway, and has been identified with that company for 20 years.

Mr. William Darbee, who recently resigned as general manager of the Albany & Hudson Railroad, Albany, N. Y., to become assistant general manager of the Consolidated Gas Electric Light & Power Company of Baltimore, Md., was presented just before his departure for Baltimore with a handsome diamond pin and a traveling bag as a token of esteem from the employees and officials of the company. As previously announced in the Electric Railway Review, Mr. Darbee will be succeeded by Mr. R. H. Smith, formerly gen-

eral superintendent of the Connecticut Railway & Lighting Company, Bridgeport, Conn.

Mr. George R. Folds has resigned as general manager of the South Chicago City Railway, and the Hammond Whiting & East Chicago Electric Railway, with office at South Chicago, Ill., to become general manager of the West Penn Railways, with office at Connellsville, Pa. The management of the South Chicago and Hammond Whiting and East Chicago properties has been taken over by A. L. Drum & Co., engineers, of Chicago.

Mr. Charles T. Mordock, for a number of years manager of the Terre Haute Traction & Light Company at Terre Haute, Ind., one of the Stone & Webster properties, has been appointed a member of the board of expert engineers of the Stone & Webster Engineering Corporation, with headquarters at Boston, Mass. Mr. Mordock's experience in this line of work should add materially to the efficiency of the board of engineers, which, on account of the activity in the construction work of large electric railway, lighting and power systems in the west and middle west, demands the services of experts in this line.

Mr. Albert Eastman, for the past four years superintendent of employment of the Public Service Corporation of New Jersey, has resigned to take up the work of developing the freight and express business on the traction lines in New York controlled by the Andrews-Vanderbilt syndicate, including the electrified division of the West Shore Railroad between Syracuse and Utica. Before entering the electric railway field Mr. Eastman served for nine years in various capacities on the Grand Trunk and Michigan Central railways. In 1901 he became traveling express and passenger agent of the Detroit United Railway and in December, 1902, was appointed general express agent of the Utica & Mohawk Valley Railway. In May, 1903, he again became connected with the Detroit United as division superintendent, and in November of that year resigned to take charge of the employment department of the Public Service Corporation of New Jersey, where he has remained until his present appointment. Mr. W. J. Ramsey will succeed Mr. Eastman as superintendent of the employment department.

Mr. P. P. Crafts, general manager of the Iowa & Illinois Railway of Clinton, Ia., has been appointed general manager also of the Joplin & Pittsburg Railway of Joplin, Mo., and Pittsburg, Kan., succeeding Mr. Fred H. Fitch. He will retain the management of the Iowa & Illinois and will divide his time between the two properties. The Joplin & Pittsburg Railway has recently acquired the properties of the Pittsburg Railway & Light Company, comprising about 32 miles of road, radiating from Pittsburg, Kan., and of the Joplin & Pittsburg Street Railroad, which operates urban lines in Joplin, Mo., and construction work is now in progress to connect these properties by a high-speed road. Mr. Crafts has been connected with street and interurban railways in the middle west for the past six years, having spent a part of that time at Saginaw, Mich., and the remainder with the Iowa & Illinois Railway. Previous to coming west he was connected with Stone & Webster of Boston, Mass., in various positions connected with the engineering and management of their properties. Mr. Crafts is also vice-president of the Iowa Street and Interurban Railway Association.

Mr. L. C. Bradley has been appointed general manager of the Eastern Pennsylvania Railways Company, the Pottsville Union Traction Company, Edison Electric Illuminating Company, the Palo Alto Electric Street Railway Company, the Tamaqua Edison Electric Illuminating Company and the Citizens' Gas Company of Pottsville, Pa., succeeding Mr. W. E. Harrington, resigned. As previously reported in the Electric Railway Review Mr. Bradley resigned as superintendent of the Scioto Valley Traction Company of Columbus, O., on May 25, 1907, after three years' service, to become associated with

J. G. White & Co. of New York. In June Mr. Bradley was appointed general superintendent of the Eastern Pennsylvania Railways Company and its various subsidiary companies, which are all controlled by J. G. White & Co. His appointment as general manager took effect on September 1. Mr. Bradley was connected for a number of years with Stone & Webster of Boston, Mass., serving in an engineering capacity on some of the most important western properties of that company, and for several years previous to May, 1904, when he resigned to go to the Scioto Valley Traction Company, he was superintendent of the Puget Sound Electric Railway, formerly the Seattle-Tacoma Interurban Railway.

Mr. W. E. Harrington, president and general manager of the Pottsville Union Traction Company and its several subsidiary lighting and electric railway properties, now owned and operated by the Eastern Pennsylvania Railways Company, Pottsville, Pa., has retired from the active management of the properties, effective on September 1. He was born in Wilkes-barre, Pa., in 1866, and graduated with the degree of B. S. from the University of Pennsylvania in 1887. Since Mr. Harrington's entry into the electric railway business he has made a successful record as a street railway manager and engineer. In 1896 he was appointed general manager and vice-president of the Camden & Suburban Railway, where he remained until 1904, when this company was leased by the Public Service Corporation of New Jersey. Mr. Harrington then occupied for a short time the position of manager of the New York-Philadelphia Railway and its allied properties, but in July, 1905, accepted the position of operating manager of the electric railway, lighting and gas properties of J. G. White & Co. of New York City. In this capacity he has been instrumental in developing the properties of this company in Pennsylvania, which include the Edison Illuminating Company of Pottsville and Tamaqua, the Minersville Electric Lighting Company, the Citizens' Gas Light Company of Tamaqua, the Pottsville Union Traction Company and the several subsidiary traction companies owned or leased by the White interests. In 1904-1905 he was a member of the executive committee of the American Street Railway Association and for a number of years served on the standing rules committee and the committee on the promotion of traffic of that body and its successor, the American Street and Interurban Railway Association. He also was one of the organizers of the Temporary Street Railway Association of Pennsylvania and made several addresses before the legislative committees at Harrisburg on the electric railway reform measures recently passed by the legislature of that state. Mr. Harrington is a member of the New York Railroad Club, the American Institute of Electrical Engineers of New York and other prominent clubs and associations. He will be succeeded as general manager of the properties from which he has resigned by Mr. L. C. Bradley, whose appointment as general superintendent of the Eastern Pennsylvania Railways was announced in the Electric Railway Review for June 29, 1907. Mr. Harrington will retain the presidency and directorship of the several companies with which he has been associated.



W. E. Harrington.



P. P. Crafts.

Obituary.

David Putnam West, who organized the first street railway in Montgomery, Ala., died at his home in Montgomery on September 1.

Andrew H. Zihlman, auditor of the Citizens' Railway & Light Company, Ft. Worth, Tex., died early Thursday morning, August 28, from an attack of typhoid fever.

The recent electrification of a French incline cable railway has resulted in a stated saving of 50 per cent in power expense over that when operated by steam. A buffer battery on the 500-volt direct-current line assists in maintaining an even voltage when starting and accelerating trains.

Financial News

Interborough-Metropolitan Company, New York.—Directors of this company decided on September 5 to pass the dividend due on the preferred stock on October 1. The amount of preferred stock authorized was \$55,000,000 and there was \$45,380,300 outstanding. The dividend requirements on the preferred stock, at 5 per cent, were \$2,269,015 a year. It has been announced officially that the talk of receivership for any company controlled by the Interborough-Metropolitan Company is without foundation.

New Orleans (La.) Railway & Light Company.—John W. Barr, Jr., George A. Hero and A. Britton have resigned as directors and have been succeeded by Charles Godchaux, John J. Gannon and Lynn H. Dinkins. Joseph McCloskey was also elected a director to fill the vacancy occasioned by the temporary absence of R. M. Walmsley.

Puget Sound International Railway.—This company, controlled by Stone & Webster, has purchased control of the Everett (Wash.) Railway Light & Water Company.

Sterling Dixon & Eastern Electric Railway, Sterling, Ill.—At the annual meeting of stockholders the following directors were elected: John I. Beggs, Clement C. Smith, Robert Camp, Edwin B. Kirk, H. C. Higgins, John H. Lawrence and F. A. Watson. John I. Beggs was elected president; Clement C. Smith, vice-president; Robert Camp, secretary and treasurer; and Edwin B. Kirk, manager.

Youngstown & Ohio River Railroad, Youngstown, O.—This company has given a trust deed to the Citizens' Savings & Trust Company of Cleveland, as trustee, to secure an issue of \$2,500,000 of 20-year 5 per cent bonds. The bonds are dated June 1, 1907, and are due on June 1, 1927, but are subject to call on any interest date at 101 and interest. Of the authorized amount \$1,500,000 bonds are outstanding and \$1,000,000 bonds are reserved for extensions, improvements and additions.

ELECTRIC RAILWAY EARNINGS.

Twin City Rapid Transit Company.

July—	1907.	1906.
Total earnings	\$571,985.58	\$522,949.80
Total operating expenses	271,236.47	236,117.65
Net earnings	300,749.11	286,832.15
Deductions	115,141.67	114,619.46
Net income	185,607.44	172,212.69
January 1 to July 31—	1907.	1906.
Total earnings	\$3,420,599.82	\$3,077,558.45
Total operating expenses	1,668,378.35	1,450,499.94
Net earnings	1,752,221.47	1,627,058.51
Deductions	806,458.33	774,636.14
Net income	945,763.14	852,422.37

Detroit United Railway.

July—	1907.	1906.
Gross earnings	\$663,915	\$598,575
Expenses and taxes	383,624	337,576
Net earnings	280,291	260,999
Other income	4,636	4,607
Total income	284,927	265,606
Charges	117,009	105,463
Surplus	107,918	160,143
January 1 to July 31—	1907.	1906.
Gross earnings	\$3,759,279	\$3,354,729
Expenses and taxes	2,329,767	2,015,646
Net earnings	1,429,512	1,339,083
Other income	31,975	26,332
Total income	1,461,487	1,365,415
Charges	796,012	710,206
Surplus	665,475	655,209

Figures include Rapid Railway System, Sandwich Windsor & Amherstburg Railway and Detroit Toledo & Monroe Short Line.

Dividends Declared.

Savannah (Ga.) Electric Company, preferred, semi-annual, 3 per cent.

Seattle (Wash.) Electric Company, semi-annual, preferred, 3 per cent.

South Side Elevated Railroad, Chicago, quarterly, 1 per cent.

Twin City Rapid Transit Company, Minneapolis, preferred, quarterly, 1½ per cent.

Manufactures and Supplies

ROLLING STOCK.

Peninsula Railroad, San Jose, Cal., is reported to be in the market for three interurban cars.

Calumet Electric Street Railway, Chicago, Ill., has bought two cars from the G. C. Kuhlman Car Company.

Twin City Rapid Transit Company, Minneapolis, Minn., will build 100 cars in its own shops at Minneapolis.

Wheeling Traction Company, Wheeling, W. Va., has placed an order with the G. C. Kuhlman Car Company for one 28-foot semi-convertible car.

Northwestern Elevated Railroad, Chicago, Ill., is preparing specifications for a number of new cars, which it will buy in two or three months.

Topeka Railway, Topeka, Kan., which was reported to be in the market for cars, in the Electric Railway Review of May 4, has placed the order for eight single-end cars with the American Car Company.

Northern Electric Company, Chico, Cal., which was reported in the Electric Railway Review of August 24 to be in the market for cars, officially advises us that it has placed a contract with the St. Louis Car Company for three cars for city service.

Easton Transit Company, Easton, Pa., as reported in the Electric Railway Review of August 31, has placed an order with The J. G. Brill Company for six semi-convertible cars. This order was placed on June 27, 1907, and delivery is to be made on November 1, 1907. The specifications call for the following details:

Seating capacity	32	Width, inside	7 ft. 11½ in.
Weight	15,000 lb.	Over all	8 ft. 2 in.
Wheel base	7 ft. 6 in.	Height, track to trolley base	11 ft. 1 in.
Length, of body	20 ft. 8 in.	Body	Wood
Over all	30 ft. 1 in.		
Underframe	Wood		

Special Equipment.

Brake rigging	Brill	Interior finish .....	.....
Couplers	Hovey drawbar	.....	Cherry, birch ceiling
Curtain fixtures	Keeler	Journal bearings	Brill
Curtain material	Pantasote	Motors	2 GE-67
Destination signs	Hunter	Sanders	De Witt
Door fastenings	Brill	Springs	Brill
Fenders	Providence	Trolley poles and attachments	United States
Gongs	Brill Dedenda	Trucks	Brill
Hand brakes	Peacock	Door fixtures	Wallace
Heating system	Consolidated	Track scrapers	Root
Headlights	Neal		

Boston & Worcester Street Railway, Boston, Mass., as reported in the Electric Railway Review of August 10, has ordered four double-truck express cars from the Danville Car Company. The order was placed July 25 and delivery is to be made about October 1. The specifications include the following details:

Weight	65,000 lb.	Width, inside	7 ft. 9½ in.
Wheel base	6 ft. 6 in.	Over all	8 ft. 2 in.
Length of body	35 ft.	Track to trolley base ..	.....
Over vestibule	41 ft. 5 in.	.....	11 ft. 11 in.
Over all	43 ft.	Body .....	.....
Height, inside	7 ft. 7½ in.	.....	Wood, with steel trussing
Sill to trolley base .....	.....	Underframe	Steel
.....	8 ft. 11 in.		

Special Equipment.

Air brakes .....	.....	Headlights .....	.....
Probably General Electric		.....	Incandescent and arc
Bolsters	Steel	Interior finish	Plain
Brakeshoes	Streeter	Journal bearings	Brass
Center bearings .....	.....	Journal boxes .....	.....
.....	Special oil retaining	Standard Motor Truck Co.	
Control system .....	.....	Motors	4 GE-73
.....	General Electric	Trucks .....	.....
Couplers	Tomlinson	Standard Motor Truck Co.	
Fenders	Pfingst		

SHOPS AND BUILDINGS.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—This company is preparing plans for a modern interurban station to be built at Mishawaka, Ind.

Eugene (Ore.) Street Railway.—A tract of land in the

Gross addition has been purchased and work on new car houses will be commenced at once.

Illinois Traction Company, Champaign, Ill.—A 100-year lease of the ground now occupied by the Springfield Consolidated Railway, Springfield, Ill., has been secured. Car houses and a passenger station will be erected on the property.

Kansas City (Mo.) Railway & Light Company.—It is reported that this company will build new car houses.

Springfield (Mass.) Street Railway.—The plans for the car houses to be built on the corner of Main and Hooker streets, as previously reported in the Electric Railway Review, are almost completed. The buildings will probably be one story high and of brick construction. The cost is estimated at \$200,000 to \$250,000.

TRADE NOTES.

Railway Paint Company, New York, N. Y., will build a plant to cost \$100,000 at Edmonton, Can.

American Stoker Company, Erie, Pa., announces the opening of offices in St. Paul, Minn., 317 and 318 American National Bank building. J. J. Dwyer is manager.

General Electric Company, Schenectady, N. Y., has removed its California branch from the Union Savings Bank building, Oakland, to the Union Trust building, San Francisco.

J. P. Johnston has resigned as manager of the water tube boiler department of the Atlas Engine Works, Indianapolis, Ind. Mr. Johnston's present address is care of the Engineers' Club, New York.

Berger Manufacturing Company, Canton, O., has appointed W. W. Wallace as publicity manager, to succeed J. K. Davis, who has resigned. Mr. Davis will become associated with a New York publication.

W. T. Clark, mechanical superintendent of the General Electric Company for the past seven years, has resigned to become general manager of the Fairbanks-Morse Manufacturing Company, Beloit, Wis.

C. M. Bunnell has resigned as assistant manager of the Birmingham (Ala.) office of the Southern States Electric Company to become connected with the Atlanta (Ga.) office of the Westinghouse Electric & Manufacturing Company.

Reagan Grate Bar Company, Philadelphia, Pa., has received an order from the Boston Elevated Railway for 17 large grates. This order is the result of a severe test of 25 Reagan grates which the railroad company had previously purchased.

Indiana Creosoting Company has put into operation its \$200,000 plant at Bloomington, Ind. It is said that the company has on hand at the present time 25,000 cross ties and many telegraph, telephone and trolley poles, which are to be treated.

Yetman Typewriter Transmitter Company, notice of the incorporation of which appeared in the Electric Railway Review of July 20, has purchased a factory building in North Adams, Mass., and will give employment to about 200 people. This company was organized with a capital stock of \$1,500,000 to manufacture typewriters, telegraph transmitters, automatic telegraph machines, etc.

Lewis Motor & Crane Company, 218 East Water street, Elmira, N. Y., notice of the incorporation of which appeared in the Electric Railway Review of June 29, advises that it has commenced operation, in a small way, at Horseheads, N. Y. A permanent location has not yet been decided upon, but the company has received several offers from various cities. Lewis Motor & Crane Company manufactures hoists, cranes, motors, dynamos, generator sets and portable air compressors.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., states that its business during July was considerably above the average and that the railway department alone booked approximately \$2,500,000. Among these orders were two of unusual importance. The Brooklyn Rapid Transit Company contracted for 400 electric railway motors, 200 of which, of 200 horsepower each, are for the elevated railroad cars; while the balance, of 60 horsepower each, will be surface car equipment. In connection with the elevated car equipment the company will also furnish the Westinghouse multiple-unit control. The other large order comes from the Schoepf interests of Cincinnati, O., which operate cars in eastern and central Ohio and southern Indiana. This order includes a complete equipment of electrical apparatus for 24 substations, consisting of rotary converters, transformers and switchboard appliances, as well as four Westinghouse turbo-generators, aggregating 26,000 horsepower.

American Locomotive Company, New York, N. Y., shows for the year ended June 30, 1907, gross earnings of \$49,515,486, an increase of \$6,967,610 over the previous year. The statement, with a comparison, follows:

	1907.	1906.
Gross earnings	\$49,515,486.33	\$42,547,876.40
Manufacturing, maintenance and administrative expenses.....	42,744,381.30	36,085,370.74
Net earnings	\$ 6,771,105.03	\$ 6,462,505.66
Interest, etc., on bonds of constituent companies, bills payable, etc.	412,898.10	281,812.19
Profit	\$ 6,358,206.93	\$ 6,180,693.47
Dividend on preferred stock, at 7 per cent	1,750,000.00	1,750,000.00
Dividend on common stock, at 5 per cent	1,250,000.00	312,500.00
Surplus	\$ 3,358,206.93	\$ 4,118,193.47
Expended during the year for additions and betterment of plants *		1,001,564.66
	\$ 3,358,206.93	\$ 3,116,628.81
Extraordinary additions and betterment fund	2,000,000.00	2,000,000.00
Net credit to profit and loss..	\$ 1,358,206.93	\$ 1,116,628.81

*\$1,692,858.82 expended for additions to property and charged against the fund of \$2,000,000 created June 30, 1906.

In his statement to stockholders the president, W. H. Marshall, says:

"The gross earnings include the revenue from the manufacture and sale of steam and electric locomotives, as well as extra boilers, tanks, cylinders, frames and other locomotive parts; also the manufacture and sale of steam shovels, dredges, trucks for electric service, rotary snowplows, etc.; the overhauling and general repair of old locomotives, and income from investments and other sources. Included in expenses are all direct and indirect charges against manufacturing, maintenance and administration; also depreciation upon all property and equipment, and the adjustment of the book values of the material and stock on hand, the latter being confirmed by physical inventories taken June 30, 1907. In addition to liberal disbursements for the upkeep and replacement of the plants, included in expenses, there has been expended for improvements and additional property the sum of \$1,692,858.82, which has been paid for out of the fund of \$2,000,000 created June 30, 1906. The interest on the bonds of the several constituent companies, the short-term debenture notes of the American Locomotive Company and other outstanding loans, together with minor miscellaneous interest and discount charges, amounted to \$412,898.10. In the fiscal year just closed the company has secured the largest output and transacted the heaviest volume of business in its history. Moreover, its capacity for handling future business has been substantially increased by the erection of new shop buildings, power plants, machinery, equipment, etc., principally at Schenectady, Dunkirk, Richmond and Montreal. To still further increase the capacity and efficiency of the plants there has again been created an extraordinary additions and betterment fund of \$2,000,000. During the year the outstanding 'bills payable,' amounting to \$3,300,000, have been paid off, and in their stead the company has issued a series of short-term gold coupon notes aggregating \$5,000,000, bearing interest at the rate of 5 per cent and maturing annually in sums of \$1,000,000, on October 1, from 1907 to 1911; thus providing an additional cash capital of \$1,700,000, which was urgently needed, notwithstanding the large increase in working capital which has accumulated since the formation of the company in 1901. In April, 1907, the structural steel department, established at Montreal, was sold to the Structural Steel Company, Limited. As a necessary feature of the agreement of sale, the structural shop buildings and equipment at Montreal were leased to the new company for the term of two years, with an option for one additional year. The Montreal company will, therefore, devote its attention hereafter exclusively to the business of producing and selling locomotives, steam shovels and rotary snowplows, for all of which the rapid development of transportation and industrial enterprises in Canada offers a field of exceptional promise."

Atlanta Bolt Company, Atlanta, Ga., has been incorporated by Stanley Wimbish and A. E. Euberg, to deal in nuts, bolts and track supplies. Capital stock, \$6,000.

Cowing Engineering Company, Cleveland, O., has increased its capital stock from \$100,000 to \$1,250,000, of which \$500,000 is 7 per cent preferred.

ADVERTISING LITERATURE.

Watson-Stillman Company, New York, N. Y.—Catalogue No. 71, containing 140 pages, 6 by 9 inches, is devoted entirely to hydraulic pumps and accessories. It is profusely illustrated with the many different types of Watson-Stillman hydraulic pumps and the descriptions given are clear and concise. A halftone engraving of the company's works at Aldene, N. J., serves as a frontispiece.

Baumruk Fountain Brush Company, 602 West Twenty-sixth Street, Chicago, Ill.—A small folder describing the Baumruk fountain brush comes from this company.

Ohio Brass Company, Mansfield, O.—The Monthly Bulletin is made unusually interesting through the devotion of several pages to information about the Atlantic City conventions.

H. W. Johns-Manville Company, 100 William Street, New York, N. Y.—Two leaflets have just been issued, one of which is devoted to Vanda sheet packing and the other to Transite asbestos lining for railway controllers.

American Blower Company, Detroit, Mich.—A circular under the caption, "Foundry Output Curtailed by Hot Weather," presents arguments for this company's system of heating and ventilating, and a flattering letter from one of its users.

General Fireproofing Company, Youngstown, O.—An unusual folder is being sent to the trade by this company. It contains a sample of the company's 3-inch mesh expanded metal, which is used for the reinforcement of concrete. The advantages of this expanded metal are also concisely stated.

Youngstown Car Manufacturing Company, Youngstown, O.—This company's new catalogue is well printed and attractive, containing 26 pages, 6 by 9½ inches in size. A few of the cars for industrial service which the Youngstown Car Manufacturing Company have built are illustrated and described.

Security Register & Manufacturing Company, 42 Broadway, New York, N. Y.—A booklet devoted to this company's products, the Security fare registers and Roth high-pressure jacks, has just been issued. The special features of the Security register are well brought out through illustrations of its component parts and samples of its work shown in the booklet. An interesting description of a United States navy yard test of Roth Universal high-pressure jacks is also given, together with a table of prices. The Roth jack was fully described and illustrated on page 30 of the Electric Railway Review of July 6, 1907.

Goheen Manufacturing Company, Canton, O.—This company is distributing a pamphlet containing much valuable comparative data on the spreading power of carbonizing coating, red lead and graphite. The data were prepared from tests made with paints at the Columbus shops of the Pennsylvania Railroad, under the direction of William T. Magruder, M. E., professor of mechanical engineering of Ohio State University. The tests, which were made on sand blasted, rusted and mill oxide plates, clearly show the spreading qualities of carbonizing coating. The pamphlet also contains two halftone engravings of bridges painted with the Goheen Manufacturing Company's carbonizing coating. One of these bridges was given its second coating in 1899 and is said to be today in remarkably good condition. The Goheen Manufacturing Company is able to refer to many bridges, the metal in which has been economically preserved by carbonizing coating for 15 or more years.

A NEW CAR-CLEANING COMPOUND.

The New York City Railway Company has adopted an improved and what appears to be an ideal method of cleaning its cars. The plan consists in using a liquid called Gillette Sanitary Spray, which is applied with a large atomizer. One man first goes through a car thoroughly spraying the woodwork, windows, seats or cushions, and is followed by one or two others with a broom and cloths. The result appears in that not a particle of dust is raised in brushing or sweeping and, in addition to keeping the paint, varnish and metal work as bright as new, they are said to be cleaned in half the usual time. Much time is also gained and better work accomplished in cleaning the windows with this spray, instead of with water.

Furthermore, it is claimed that this sanitary spray is a perfect deodorizer and disinfectant; that it positively destroys germs, insures perfect sanitary conditions, eliminates the dust and preserves the colors and varnish, so that they appear as bright as when new. It is also claimed that this sanitary

spray will not soil the most delicate fabric. It is therefore equally desirable for use in offices, particularly on carpets, rugs and upholstery, acting as a thorough dust preventive, deodorizer and germ destroyer. The compound is manufactured by the Gillette Chemical Company, 42 Broadway, New York, and is used extensively by a large number of companies in and around New York.

"ELECTROLESS" PIPE COVERING.

The subject of electrolysis is one that is continually causing trouble to the electric railway companies. Lead and wrought-iron pipes are particularly susceptible to electrolytic action. Where there are pipes buried in the ground near the track cases of bad bonding may go unnoticed for a long period of time until the failure of some water pipe shows the presence

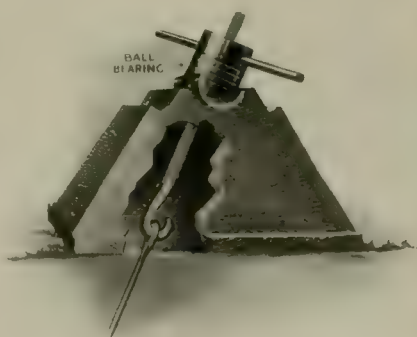


New Protective Covering.

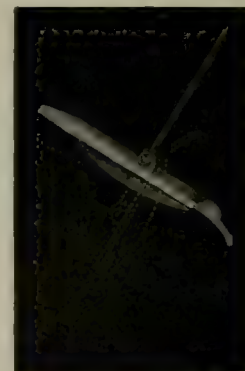
of leakage on the return circuit. To prevent the action of stray currents on water pipes, the H. W. Johns-Manville Company has developed an insulating pipe covering called "Electroless" to prevent electrolytic action on buried pipes. This covering is from ¼ to ¾ of an inch thick and comes in 3-foot lengths. Joints are covered by special shapes and sealed with insulating cement covered by protecting strips. This class of pipe covering is suitable for service pipes, hydrant connections and other pipes that come in close proximity to the rails of a street railway system.

THE ATLAS GUY ANCHOR.

To bring about the desirable condition in which the dirt disturbed in setting an anchor is reduced to a minimum the Atlas Anchor Company, Cleveland, O., has recently perfected an anchor that is said to afford from 75 to 85 per cent of its



Placer for Setting Anchors in Position.



Atlas Anchor in Holding Position.

surface to pull against undisturbed earth. The anchor is of the well-known folding type. The plate is made of flat steel and in sizes according to the strain they are intended to withstand. At the bottom of the plate are located two malleable iron ribs, projections on which extend through the plate and engage with ears welded to the end of the steel anchor rod leading to the surface of the ground. The parts of the anchor are easily dissembled when not under strain.

The hole in the ground in which the anchor is set is dug by the aid of a common post-hole digger, altered to enable the work to be done without disturbing the earth to a greater distance than the width of the anchor plate.

In addition to the anchor the same company has patented an anchor placer by the aid of which the anchor, after being set, is drawn up into position in solid earth. This placer consists of a frame of hardwood, having a height of 10 inches and on top of which frame rests a pivoted bearing through which passes a threaded bolt. At the lower end of this bolt is a hook, which engages into the eye of the anchor rod. At the upper end is a hand screw, provided with a thrust ball bearing to reduce the friction.

After an anchor has been set the placer is attached to

the rod and sufficient strain is applied by the aid of the hand power screw to draw the jaws of the plate securely into the solid earth at the sides of the hole in which it is located. When this is accomplished it is claimed the anchor will remain in its original position and not creep. The cost of the anchors and the anchor placers made by this company is said to be very small and according to tests made they are long lived.

EMPIRE BRIDGE COMPANY'S PLANT AT ELMIRA, N. Y.

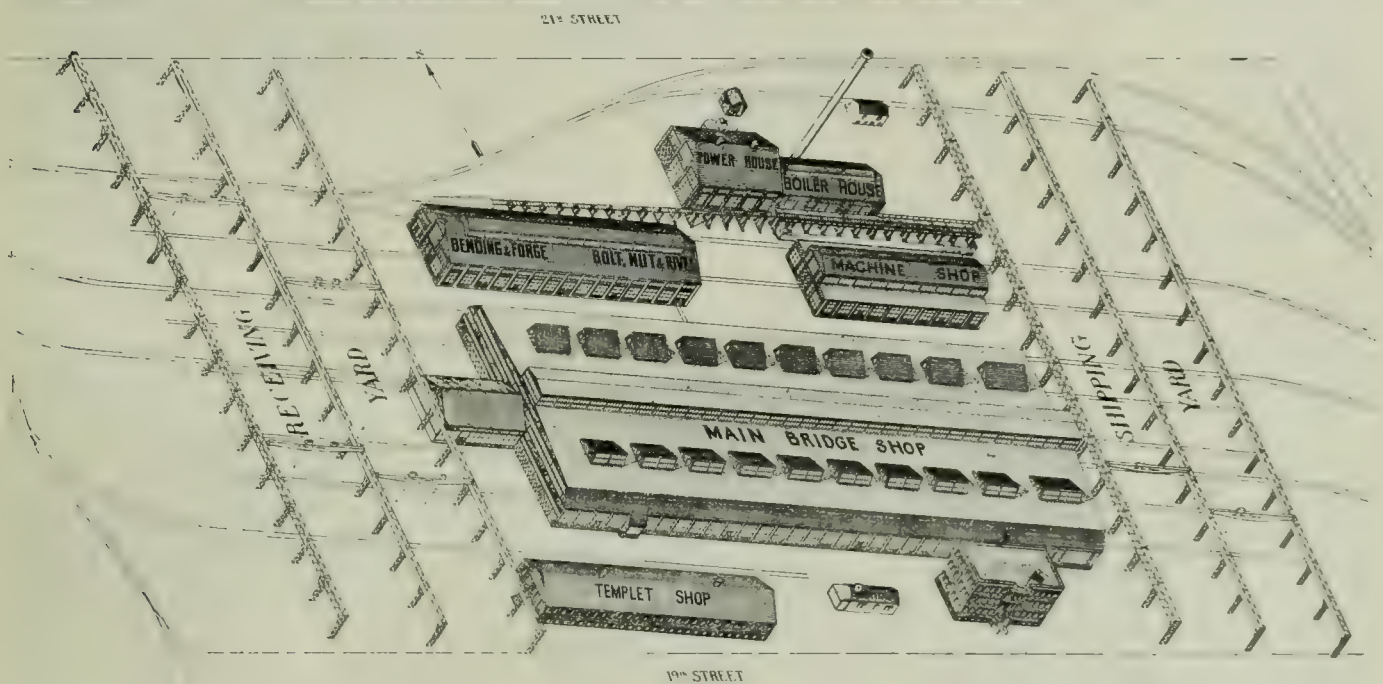
The Empire Bridge Company's extensive improvements to its plant at Elmira, N. Y., which have been in progress since early in 1907, are progressing rapidly, and it is anticipated that the enlarged plant will be in full operation before the end of the year. All of the buildings are now well under way, and most of the new machinery has been delivered and is being installed as fast as the progress of the buildings will admit.

This plant is located at Elmira Heights, and when completed will cover an area of about 15 acres, situated between Nineteenth and Twenty-first streets. It is served by the Erie, Delaware Lackawanna & Western and the Pennsylvania railroads. The property was formerly known as the north shop of the Elmira Bridge Company, Limited, by which it was

lamps for auxiliary and individual lighting, and the lighting equipment will be such as to admit of operations of the works with equal facility by night and by day.

Fire protection is afforded by a complete and independent system of piping supplied by a pump of high capacity, capable of maintaining six 1½-inch streams at a pressure of 125 pounds. The fire pump is automatic in its action and will be kept under steam and ready for immediate use at all times. A fire brigade will be organized among the workmen in the shop, who, by frequent drilling, are to be kept thoroughly proficient in the handling of the fire-fighting equipment. An emergency hospital in charge of a competent nurse and equipped with all necessary surgical appliances, will be maintained on the premises, for rendering "first aid" to injured employees.

The boiler house is 42 by 90 feet. The boiler plant consists of four 250-horsepower water-tube boilers, equipped with mechanical stokers, damper regulators and feedwater regulators, and fed by two compound duplex pumps, each of which is of sufficient capacity to supply all boilers. The power house portion of the same building, which is 80 by 60 feet in size, contains two 300-kilowatt generators, driven by horizontal tandem compound condensing engines, and one 100-kilowatt generator of the same type, driven by a vertical cross-



Empire Bridge Company's Plant at Elmira, N. Y.

built in 1895, and operated up to 1900, in connection with an older establishment of the same kind located in Elmira proper and known as the south shop.

Operations have heretofore been conducted in a single building, 90 feet wide by 400 feet long, while the enlarged plant contemplates not only an extension to the original building, known as the main bridge shop, making it 215 by 528 feet in size, but the construction of a boiler and power house, machine shop, templet shop and a forge shop. All buildings are of steel construction, column bearing, with brick curtain walls, concrete foundations and slate or slag roofs.

The present plant and equipment gives employment to about 250 men and has an output of about 15,000 tons of steel bridge and building work per annum. When the enlarged establishment is in full operation more than twice this number of men will be required, and, with the installation of new machinery, which is all of the most modern type, together with additional handling facilities for heavy material, the output will be quadrupled, thus making one of the largest and best equipped producers of structural work in the east and in this respect placing it well toward the top of the list of structural shops of the world.

Electric current at 220 volts, direct, will be used throughout the plant for the operation of machinery and for lighting purposes, each machine being equipped with an independent motor. Inclosed incandescent arc lamps of the long-flame type will be used for general lighting, with incandescent

compound condensing engine, two air compressors of total capacity of 3,600 cubic feet per minute, besides other minor engines.

The machine shop building is 60 by 240 feet. Planers, slotters, boring mills, heavy lathes and other machines for the execution of heavy work will be installed in the main aisle, which is 30 feet wide, and served by a 15-ton crane running the entire length of the shop, while machine tools for lighter work will occupy the 15-foot wings on either side, the entire area of which is covered by traveling jib cranes.

A forge shop, 60 by 240 feet, will be devoted in part to the manufacture of bolts, nuts and rivets, and the remainder of the building to bending, forging, tempering and the making of loop rods and light eye-bars.

The templet shop, 50 by 224 feet, will be fitted with saws, planers, boring machines and other woodworking machinery needed for templet and pattern making purposes, and the basement of the same building will be used as a storage room for plant supplies and miscellaneous material.

The main bridge shop is 215 by 528 feet. In this building will be placed punches, chord boring machines, drill presses, shears, rotary planers, plate shears, reamers, hydraulic riveters, and other machines necessary to the handling of main members of bridges and buildings of the heaviest type. There will be a system of 10 and 20 ton cranes overhead for general service, and in addition thereto all small machines will be served by special jib cranes for the handling of individual

pieces. An extension 55 by 80 feet at the west end of the main shop will provide space in which to take care of detail material.

The receiving yard, at one end of the main bridge shop for the storage and handling of raw material, and the shipping yard, at the other end of the same building for loading and shipping the finished product, are each served by two electric traveling cranes on separate runways 600 feet long. The combined storage area of these two yards is about 225,000 square feet, all of which is covered by skids to protect the material from rust by contact with the ground.

GASOLINE CARS ON THE AURORA-DE KALB LINE.

The G. C. Kuhlman Car Company, Cleveland, has recently furnished some semi-convertible cars to the Aurora De Kalb & Rockford Railway Company. These cars are driven by the gasoline engines built by P. H. Batten & Co., Harvey, Ill.

The cars are 8 feet 2 inches wide, 20 feet 8 inches over corner posts, and 36 feet over the vestibules. The smoking and baggage compartment is separated from the passenger compartment by a partition and swinging door at one side and cross seats against the partition cover the engine cylinders, which project above the floor level of the car about 14 inches.

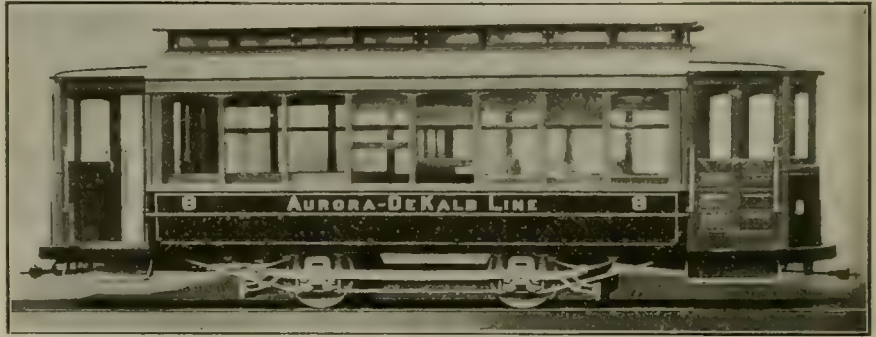
The seating capacity of each compartment is 16 people, making a total of 32 seats, which, considering that cross seats are used, is large for a car of this length. As will be seen from the illustration the cars are vestibuled and are arranged for double-end operation. The engine controlling handles may be used at either end of the car. Brill 21E standard trucks are used, with 33-inch cast-iron wheels.

The power is generated by a 4-cylinder 4-cycle engine, having cylinders 7 by 7 inches. This engine is mounted on

turn drives two Morse silent chains, one to each axle. There are 29 teeth on the transmission gear and 61 on the axle gear. At 35 miles per hour the piston speed of the engine is only about 700 feet per minute. To take up the stretch of the chain the journals are cast with a thick lip on one side; this, with a wedge, allows for $\frac{3}{4}$ inch of slack in the chain; when this point is reached, by taking out a link the original adjustment is again made.

Lubrication is by force feed pump and a splash system, which is giving good results. Cooling water from the cylinder jackets passes to radiators in the dash at each end of the car vestibule. The circulation of the air is such that the car is well heated from the vestibules.

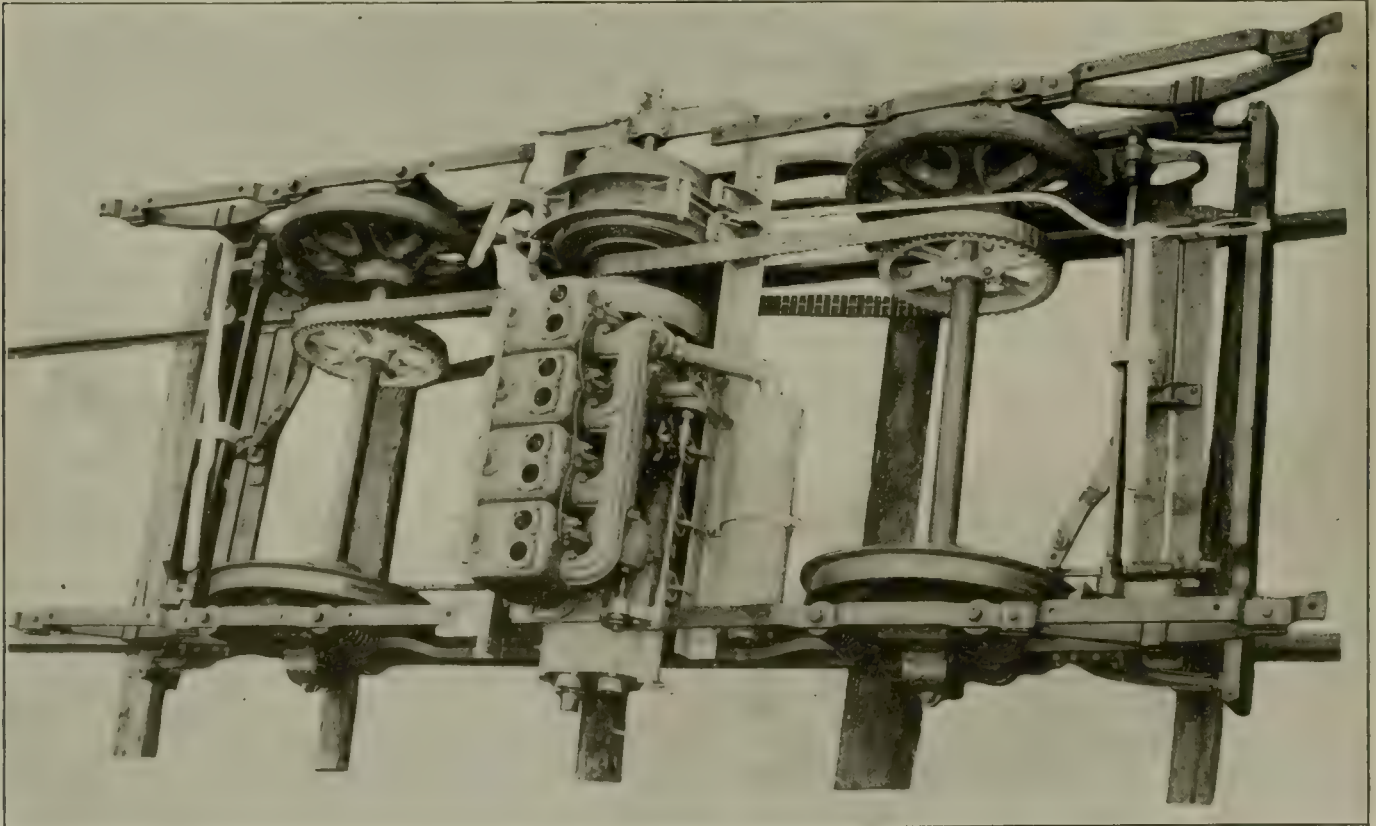
There are three controlling handles. On the controller are three points: slow, neutral and high speed. This handle is very similar to that on a hand brake. The other two levers



Aurora-De Kalb Gasoline Car—Exterior.

for throttle and advancing the spark are similar to air brake handles. All three handles are easily detached and can be used on either end of the car. The engine is reversible and works equally well in either direction.

The weight of the engine and transmission is 3,000



Aurora-De Kalb Gasoline Car—Engine and Truck.

the truck frame midway between and parallel to the axles, thereby getting the benefit of the coil springs on the truck. As the engine is fastened to the truck at only three points any twisting and bending strains are not transmitted from the truck to the engine.

The engine drives a planetary transmission, which in

pounds, and the completely equipped car weighs about 10 tons. The engine is rated at 60 horsepower and easily holds the schedule speed of 20 miles per hour, which necessitates a running speed of 30 miles per hour.

These cars are at present running 120 miles per day on about 20 gallons of ordinary stove gasoline.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 11

CHICAGO, SEPTEMBER 14, 1907

WHOLE No. 229

TABLE OF CONTENTS.

Editorial:

Chicago Traction Tangle.....	299
Three-Cent Fares are Confiscatory.....	299
Fare Question Raised in Philadelphia.....	299
Which Side of the Street?.....	300
Losses of Interurban Accidents.....	300
Power Transmission Loops.....	300
Car Wiring Tests in Service.....	300
Operating Expenses of the Twin City Rapid Transit Com- pany.....	301
Substations of the Los Angeles Railway (Illustrated).....	302
Standardization Committee Meeting.....	305
Meeting of New York State Association.....	305
Atlantic City Convention Programmes.....	306
Canadian Associations Meet.....	307
New Car House at Poughkeepsie (Illustrated).....	308
Cleveland Traction Situation.....	309
Trials of the Operating Man. By M. A. Sammett.....	310
High-Tension Insulators. By C. E. Delafield.....	311
Chicago Traction Decree Annulled and Time for Accepting Or- dinance Is Extended.....	312
Piping and Power Station Systems—LIII. By W. L. Morris. M. E. (Illustrated).....	314

News of the Week:

—Brooklyn Tunnel Safe.....	315
—More Steel in Car Frames.....	315
—New York Public Service Investigation.....	315
Construction News:	
—Franchises.....	316
—Recent Incorporations.....	316
—Track and Roadway.....	317
—Power Houses and Substations.....	319
Personal Mention.....	320
Financial News.....	320
—Electric Railway Earnings.....	321
Manufactures and Supplies:	
—Rolling Stock.....	321
—Shops and Buildings.....	321
—Trade Notes.....	322
—Advertising Literature.....	323
Heavy Trolley Hanger (Illustrated).....	323
The Baker Hot Water Heater (Illustrated).....	323
Track Improvements at Atlantic City (Illustrated).....	324
Graphite Lubrication.....	325
Accumulator Cars in Germany.....	325
Holmes & Allen Flexible Trolley Head (Illustrated).....	326

In the decision which has changed abruptly the arrangements for settling the long-lived Chicago traction tangle, the United States circuit court of appeals held that the settlement plan might have been wise and best for the bondholders, but if they did not accept it any action by the court to compel their acceptance is not justified by law. The new rehabilitation mortgage disturbed the contract rights and prior claims of bondholders, not displacing them slightly to provide for a small issue of receivers' certificates, but changing their position materially. The plan of reorganization which is thus overthrown was, of course, the logical result of the paternal form of receivership under which the court has directed the affairs of the Union Traction Company. The decision does not touch the acts of the court with respect to the receivership, but only as they concerned the reorganization. Extension of the time for acceptance of the ordinance has been granted by the city council and the bondholders have now a last chance to protect their investments.

In considering the "A B C of the Street Car Question" the Detroit (Mich.) News says that the people of that city know that they want three-cent fares. We assume that the people of Detroit are not different from the great majority of mankind. Some people pay full fares without regret because they believe the service justifies it; others promote the campaigns for reduced rates because they honestly believe fares are excessive. The facts concerning the gross revenues of street railway companies in Detroit are substantially the same as in every other large city of the country. With a franchise limited to, say, 15 or 20 years and three-cent fares, no new company could embark in Detroit today and furnish adequate street railway service, meet its operating expenses, taxes, fixed charges and pay a fair interest return on the actual cash capital invested; provided that constant, full provision were made in operating expenses or through income for depreciation of the plant, track and equipment and for amortization of the investment. The

Electric Railway Review has discussed heretofore the doubtful sufficiency of existing fares in large cities when regular provision is made for depreciation and amortization. Hoping for the success of movements for the maintenance of fares on an assured basis of profit, we deplore all agitation looking to reductions, except as it may tend to develop the truth of the statement that three-cent fares would be virtually confiscatory.

In the analysis of the new ordinance of the Philadelphia Rapid Transit Company, published in the Electric Railway Review of August 24, 1907, page 212, it was shown, among other things, that the existing rates of fare may be changed only with the consent of both the city and the company. It has now been proposed to

open the question of fares. The fact that the mere suggestion of a change has aroused opposition in the city illustrates the difficulty of securing readjustment through a movement which is initiated by representatives of the company. The company itself took no action in the matter and such movement as was started was inspired individually by directors. George H. Earle, Jr., a member of the board, made a statement in which he said: "The city will not get any of the company's earnings until the existing deficit has been made up. The sooner the loss is stopped the better it will be for the city. Lines have been extended by the company into outlying wards, and free transfers are being given to riders who get the worth of their money and more before they get to a transfer point. The number of transfer points have been increased until they run up into the hundreds. But it is the abuse of the free transfer that causes a big loss to the company. At Fifteenth and Market streets, where passengers are transferred to and from the subway, hundreds of transfers get into the hands of persons who have not paid a fare. At Fifty-second street junctions, particularly at Market street, free transfers fall into the hands of children who sell them to adults for two or three cents apiece. The same conditions exist at all other important transfer junctions. Something ought to be done to remedy this, but it is

Chicago Traction Tangle.

Three-Cent Fares are Confiscatory.

Fare Question Raised in Philadelphia.

up to the public. If the people are satisfied that the city should not derive any benefit from its agreement with the traction company it is their own business and not mine." Suggestions have been made that the sale of six tickets for 25 cents be abolished, or that transfer tickets or free transfers at certain important junctions be discontinued. The annual report of the company, which will be issued next week, will, it is believed, show the wisdom of a readjustment of the fare question. With the new ordinance the company should be in a position to remedy its troubles.

Whether cars shall be stopped on the near or far side of the street is a question that will not remain settled and there is always more or less agitation of the subject.

Which Side of the Street? If the question of custom is left out of the discussion, there appears to be but few reasons for the present practice of stopping on the far side. In a crowded city street

a car approaching a cross street always comes almost to a stop and often a full stop is required when intersecting tracks are to be crossed. After passing a street intersection a car usually has a free path for some distance ahead, but the present system requires a stop for discharging and loading passengers. In this way valuable time is lost, time that is valuable both to the company and the passengers. Another point that is a large factor in rush hours is that a car stopping on the far side of the street unloads and loads at the rear platform. If the conductor is inside the car taking up fares he cannot well guard the steps. Many accidents occur in this way. By stopping on the near side of the street most of the unloading and loading is done from the front platform in plain view of the motorman and, as a result, but few accidents occur to passengers leaving or boarding the cars. This also affords the conductor more time to collect fares if necessary. The saving in power by practically eliminating a large percentage of the stops in the crowded streets is also a considerable item. It would seem that the saving in time, freedom from accidents, better collection of fares and the saving in power would lead some of the large city systems to give the method, which our Canadian cousins find so satisfactory, a fair trial and under more favorable conditions than the one given in New York a few winters ago.

The risk of loss exists in every business; but when a wreck causing deaths and injuries is followed by a receivership it is important to show that conditions which

The Losses of Interurban Accidents. permit such appalling consequences are of rare occurrence with interurban electric railways. The successful operation and development of interurban systems call

for the adoption of automatic signal systems or a rigid enforcement of train dispatching rules. Without these necessary precautions inevitable accidents will make it impossible to interest capital in interurban electric railways. The interurban railway is a strong factor in the material progress of the country and a high standard of operation with safety should be preserved. Interurban wrecks are, and should be, infrequent. While they may unfortunately occur through a sudden break in the equipment of a car, no loophole should be left through which accidents can be traced to a failure to adopt and enforce adequate rules of operation. The possibility of some time preventing the loss of a life should be kept in mind. Aside from the duty of the company to protect its passengers, the danger of serious financial losses must not be forgotten. The penalty which the Mattoon-Charleston line pays for its recent collision is receivership. Any accident in which there are many casualties or grave injuries may impose financial hardships that will virtually absorb the profits of a short line for years. The truth of this statement should be impressed upon car men even where thorough systems of dispatching and signals are in force. Managers of

interurban railways ought to strive continually by careful training of employes to prevent accidents of every kind; and it should constantly be made plain to the traveling public that adequate precautions against disaster are observed.

There are various methods of insuring continuity of operation of the substations on a railway system. A method that has

Power	many features to commend it is that employed by the Los Angeles Railway, as described on another page of this issue.
Transmission	
Loops.	On this system what is known as a transmission loop circling the city is used. This loop is 18 miles long and under normal conditions supplies power from both directions. In case of a breakdown on the high-tension transmission line it is only necessary to cut out the crippled section and continue operation of the substations. As this can be done by the substation operators, the tie-up of a system should be only momentary, as the faulty section can be cut out and the stations again put in operation in less time than an emergency crew could be got on to the street. The ability to operate in spite of a breakdown in the transmission system is a feature that is usually secured only at the expense of a duplicate transmission line. With the loop system, substations for a city railway can be fed with a minimum outlay for copper and with maximum efficiency. The same certainty of operation would be difficult to obtain by other methods of power transmission.

CAR WIRING TESTS IN SERVICE.

It often occurs on a large electric railway system that mistakes in the assembly of the rolling stock are responsible for troubles on the road which are difficult to locate under ordinary methods of inspection. Flashing of the motors, pitting of commutators, with consequent roughening and recurrence of sparking, the overheating of resistances and the excessive blowing of fuses are sometimes found to be prevalent on a certain route or division, and while the fault may in general be assumed as due to bad adjustments, inadequate motor capacity, improper handling of controllers or defects in the car wiring, it is a difficult task in many instances to define the exact trouble and apply an effective remedy. In such cases an analysis of the motor performance by instrument readings during service runs is almost certain to be helpful, especially if the rapid variations in the current flow can be noted.

In a recent instance of this character the problem at issue was the repeated blowing of fuses and overheating of resistance grids on a hill traversed by a suburban line. The blowing of fuses occurred first, and for a time it was thought that the cars were improperly handled by the motormen. After a few days the motormen on the route found that the fuse troubles could be largely eliminated by dwelling longer than usual upon the resistance points of the controller. The natural result was that the resistance grids soon began to burn out, leaving the cars in a more crippled state than before.

It was decided by the engineers of the company to make a thorough study of the situation, and a recording ammeter was placed in series with the motors and curves of current variation were taken on cars ascending the hill, the motorman being instructed to hold his controller handle three seconds on each notch to give uniform conditions for step comparisons.

The analysis of the curves secured soon showed that on the series acceleration the current was unduly small per car and that on the multiple steps of the controller the current was too high. At full parallel the current per car reached 315 amperes, whereas the normal full load current of each of the two motors on its one-hour rating was about 60 amperes. Changes were then made in the connections at the banks of grids. The result was that the maximum accelerating cur-

rent per car was cut from 315 to 185 amperes, and the fuse and rheostat troubles ceased. For a time it was thought that the motors were too small for the service on this particular route, but the tests with the recording ammeter showed otherwise in a comparatively short time.

A comparatively unexplored field as yet in the analysis of car equipment performance, particularly in the case of multiple-unit control operation, lies open to the initiative of companies which can afford to purchase an oscillograph for experimental service. Although used largely in studies of alternating-current wave forms and in connection with delicate speed tests of prime movers, the oscillograph is capable of withstanding the shocks of car service on a good roadbed and of throwing considerable light upon instantaneous variations of direct-current potential which are too rapid to be indicated by an ordinary voltmeter.

In the case of one company which made oscillograph tests in connection with the problem of motor flashing in train operation, the results of the record analysis were helpful in identifying the conditions under which artificial flashing and surging took place, though the work was not carried far enough to enable the causes of flashes in service to be entirely avoided. Enough was shown, however, to prove the value of this kind of analysis in studying the behavior of motors and control under varying conditions, and it was made clear that here is a most interesting field for scientific research leading toward helpful results in practical train operation.

OPERATING EXPENSES OF THE TWIN CITY RAPID TRANSIT COMPANY.

During the seven months ended July 31 operating expenses of the Twin City Rapid Transit Company of Minneapolis required 48.77 per cent of gross earnings from all sources as compared with 47.13 per cent in the corresponding period of 1906. In the first seven months of 1907 gross earnings increased 11.15 per cent, but operating expenses were 15.02 per cent higher and the final gain for net earnings was 7.69 per cent. In these figures it is assumed that the operating expenses do not include an appropriation for renewals of roadway, equipment and plant. This allowance, in accordance with the custom of the company in the past, will doubtless be made as a deduction from income when the annual statement is rendered to stockholders. In the calendar year 1906 operating expenses absorbed 46.51 per cent of gross earnings. The foregoing figures do not include provision for taxes. That the expenditures for this year are progressing at a higher ratio than the expenses for a part and for the whole of 1906, is a natural result of the increased cost of labor and of materials of substantially every class.

Although the annual statements of the Twin-City company have the merit of uniformity, they do not give details by which the operations may be analyzed closely. Figures showing the changes in the operating accounts are, however, of value in indicating the variations in the principal items of expense during a period of years. The following table gives the percentage of gross earnings required in the fiscal and calendar years 1899, 1903, 1905 and 1906 for the operating expense primary accounts:

	1899.	1903.	1905.	1906.
Maintenance of way and structures..	1.34	2.89	3.02	3.45
Maintenance of equipment.....	6.55	5.2	4.28	4.26
Operation of power plant.....	5.85	8.15	8.48	8.28
Car service	23.89	20.31	19.87	20.69
General expenses	4.2	4.08	4.8	6.28
Legal expenses	0.87	0.57	0.48	*
Injuries and damages.....	2.89	4.	2.58	2.70
Insurance	0.27	1.01	1.02	0.85
Total operating expenses.....	45.86	46.21	44.53	46.51
Renewal funds			7.14	8.54
Total			51.67	55.05

*Included in general expenses.

In the expenditures for car service increased efficiency is shown by the fact that there was a saving in this item from 1899 to 1905 equal to 4.02 per cent of gross earnings. In 1906, owing undoubtedly to the increased wages of employes and to the higher cost of materials, this cost was larger than in 1905. The total expenditures in 1906 was equivalent to 20.69 per cent of the gross revenue.

It is presumed that the maintenance accounts are intended now to meet the expense of wear and tear of equipment, plant and roadway, leaving the cost of renewals to be provided from the renewal reserve funds. In 1903, after provision had been made for dividends from the balance available for distribution, the entire surplus of \$419,296 was appropriated for betterments and new construction. The policy thus indicated resulted in the creation of renewal funds in 1904. In that year there was appropriated \$206,268, while in the following year an appropriation for similar purposes, amounting to \$340,000, was made. In 1906 a total of \$482,000 was set aside for these funds. In the foregoing figures improvement is shown in the expenditures in 1905 for injuries and damages. The reduction in this expense during that year as compared with 1904 was \$42,052.69. This was the first time in the history of the company when a reduction was reported in a year when traffic increased. In 1904 the company properly determined to provide in its expenses for unadjusted and unrepresented claims for injuries and damages. Such claims had not previously been regarded as liabilities until definite claims were established. Another change in policy which was announced in the same year was the creation of an insurance fund, to which \$4,000 a month has been credited beginning with January, 1904. The balance in this fund at the close of 1906 amounted to \$65,072.

By the reduction of the totals of gross earnings, operating expenses (including renewals) and net earnings to the revenue passenger basis and to the revenue plus transfer passenger basis, it is possible to show other changes which have affected the company's earnings. These figures follow:

Per Revenue Passenger.

	1899.	1903.	1905.	1906.
Gross earnings	5.09	5.02	5.02	5.16
Oper. expenses (including renewals) ..	2.33	2.32	2.59	2.84
Net earnings	2.76	2.70	2.43	2.32

Per Revenue and Transfer Passenger.

	1899.	1903.	1905.	1906.
Gross earnings	4.03	4.01	3.92	4.00
Oper. expenses (including renewals) ..	1.85	1.85	2.03	2.20
Net earnings	2.18	2.16	1.89	1.80

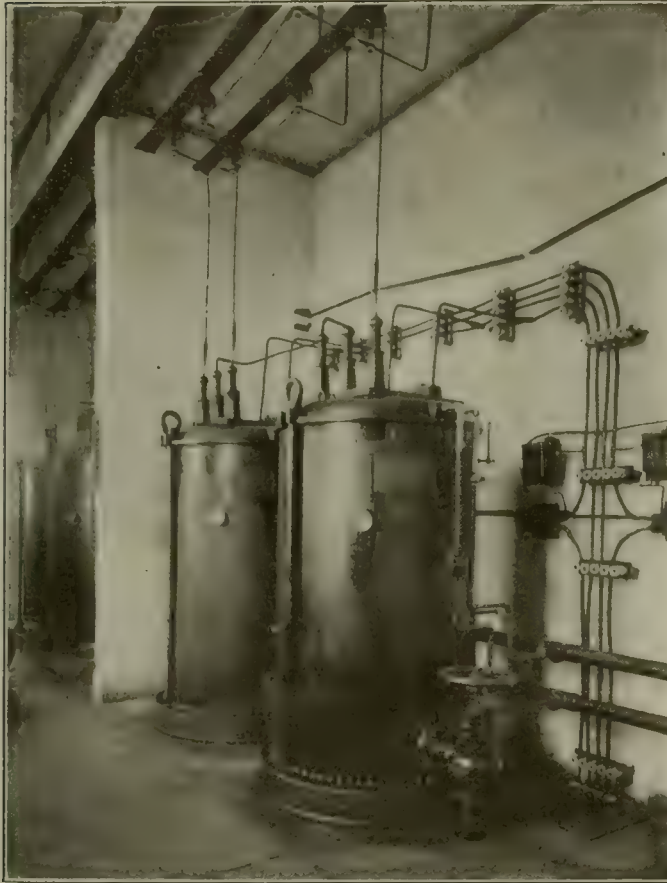
The significant feature of the first of these tables is the sharp increase in operating expenses per revenue passenger, reducing appreciably the balance available as net earnings. The larger gross return per revenue passenger in 1906 may be attributed to the growth of interurban business.

In the results on a per revenue plus transfer passenger basis it is shown that gross earnings per passenger carried declined from 4.03 cents in 1899 to 3.92 cents in 1905; but in 1906 there was an increase to an even 4 cents per passenger, due to the development of interurban business. Operating expenses increased in the same years from 1.85 cents to 2.20 cents per passenger, causing a decrease in net earnings from 2.18 cents in 1899 to 1.80 cents in 1906. The meaning of these figures may be expressed in another way by the statement that from 1899 to 1906 the revenue passenger traffic gain was 120 per cent, while the increase in transfer passenger traffic was 142 per cent.

The general results during the period under review may be indicated by the statement that gross earnings increased from \$2,522,793 in 1899 to \$5,644,988 in 1906, or 123 per cent, while operating expenses increased from \$1,156,972 to \$3,107,379, or 168 per cent, leaving an increase in net earnings from \$1,365,821 to \$2,537,608, or 86 per cent; thus operating expenses have been increased in much larger proportion than the gross earnings.

SUBSTATIONS OF THE LOS ANGELES RAILWAY.

The Los Angeles Railway Company, operating about 200 miles of track in Los Angeles, Cal., has a power equipment which includes six interesting substations located on its transmission loop encircling the city. The general arrangement of these substations and the Kern River substation of the Kern River Power Company, from which the Los Angeles Railway purchases power in varying amounts up to 10,000 horsepower, are shown on the accompanying map. It will be noted that this map also shows the sizes of the motor generator units in the various substations and the method of looping the three-phase lines in and out of the substations on the loop. Particular care has been taken in the laying out of this plant so that each substation may be fed from either direction. It will be noted that the interconnecting high-tension lines have such



Los Angeles Railway Substations—View of Transformers with High and Low Tension Wiring.

a path that, should it be desirable at any time to shut off the current between any two substations, it still is possible to operate the entire equipment. The transmission loop is fed not only with purchased power from the Kern River substation, but also from a generating equipment of 5,000 kilowatts capacity which is located in the same building with the Central substation and this steam equipment is used in connection with storage batteries at some of the substations to flatten the load curve.

Transmission Loop.

The length of the transmission loop about the city is 18 miles. The wires comprising the different lines are varied in size to suit the capacities of the various substations for the usual direction of feeding. It will be noted that the size of wire varies from No. 3 to No. 000 copper. These wires are carried on Brown glazed porcelain insulators suitable for the 15,000 volts difference of potential existing between the legs of the three-phase circuits. By reference to the map it will

be seen that the Huron street substation is not included in the loop about the city, but is fed with two independent transmission lines so that the same degree of freedom from transmission-line breakdowns is obtained.

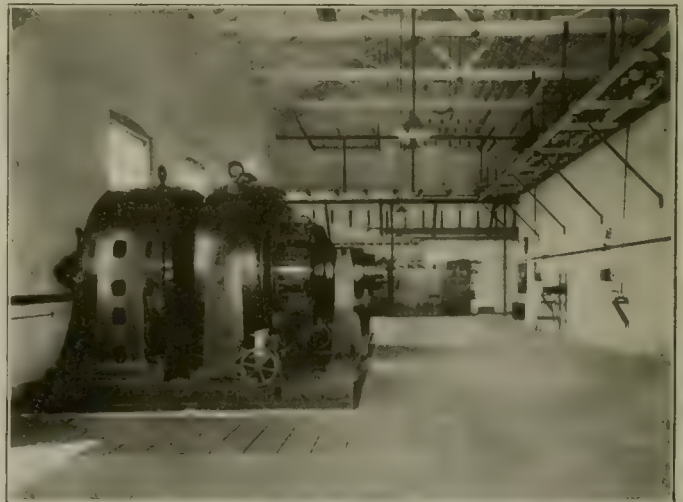
Plaza Substation.

The Plaza substation, which assists the Central station in feeding the downtown lines, recently has been rebuilt so that



Los Angeles Railway Substations—Open Wiring in Slauson Substation.

it conforms with the general standards which exist in the other five substations. This substation contains three 600-kilowatt motor generator sets, two of which have been replaced by two 1,000-kilowatt sets having the following characteristics: Type C-X constant-speed induction motors of 1,500 horsepower, 2,200-volt, 50-cycle, three-phase, driving 1,000-kilowatt, 600-volt Westinghouse railway generators at 294 revolutions per minute. As earlier stated, these generating sets operate in multiple with the Central station plant, which assists in regulating the load. The building capacity of this

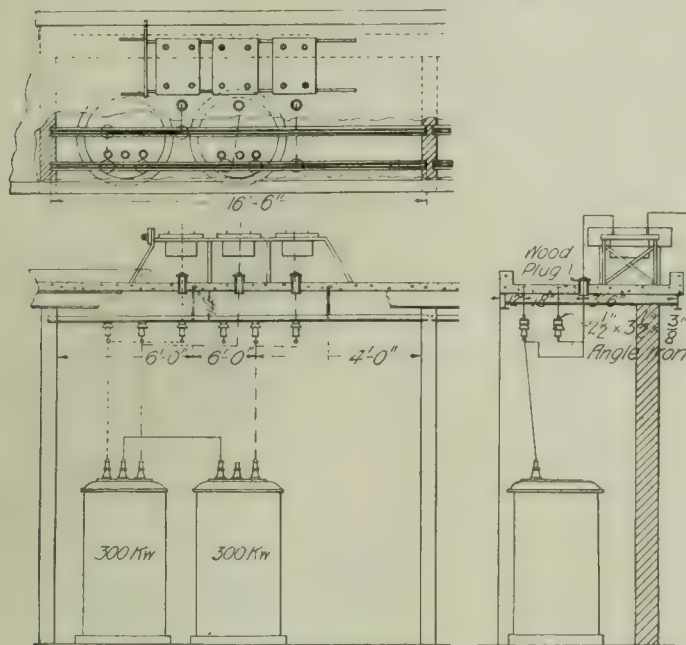


Los Angeles Railway Substations—Interior of Slauson Substation Showing Oil Switch Handles on Right.

substation is such that it ultimately may contain four 1,000-kilowatt units and one 600-kilowatt unit. Current for the operation of the motor-generator sets is taken from the 15,000-volt transmission loop through six 475-kilowatt capacity Westinghouse oil-insulated water-cooled transformers which step down the pressure to that for which the induction motors are designed. The low-tension side of the transformers is con-

transmission loop. The total amount of alternating current as it is taken from the transmission loop is measured by alternating-current wattmeters at the various substations.

As earlier stated the six transformers in this substation are oil-insulated and water-cooled. An accompanying sectional



Architectural cross-section drawing of a building. The left side shows a wooden structure with a gabled roof and horizontal slats. The right side shows a stone structure with a large arched opening. A dashed line indicates a 'C STERN' section.

F. Huron St. Substation
1 West 400 M 2 Phase induction M.G. Ser
1 - 600

D. West Lake Substation
2 Stanley 400 M 3 Phase Synchronous M.G. Ser
1 2 S.B. CTS 1000 Amp Hour Storage Battery
Type G.S.T. 254 Cells
1 G.E. Booster Ser Type M.P.

E. Central Station
1 West 400 M 3 Phase induction M.G. Ser
2 - 1000
1 G.E. Booster Ser Type M.P.
1 2 S.B. CTS 1000 Amp Hour Storage Battery
Type G.S.T. 254 Cells

G. University Substation
West 400 M 2 Phase induction M.G. Ser
2 - 1000
1 2 S.B. CTS 1000 Amp Hour Storage Battery
Type G.S.T. 254 Cells
1 G.E. Booster Ser Type M.P.

B. Sullivan Ave. Substation
1 West 600 M 2 Phase induction M.G. Ser
400

Key
A Phase ———
B Phase - - - - -
C Phase

11-1-60

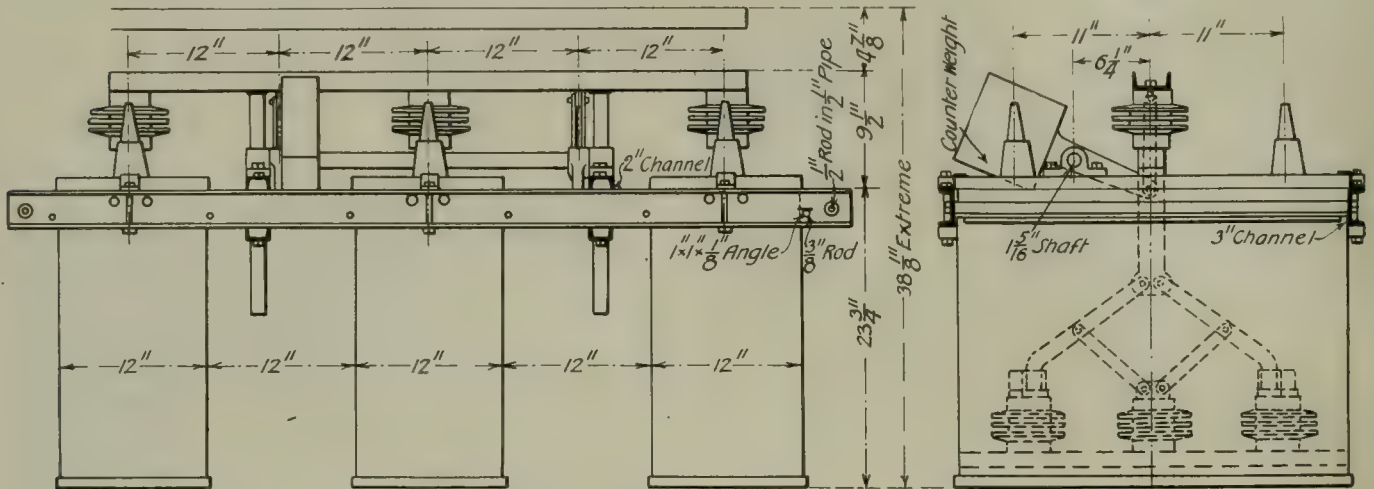
view through one side of the substation shows the relative arrangement of the transformers in their special compartment standing on the machine floor, and the water supply tank above with the cooler below, the latter two parts of the

water-cooling system being outside of the exterior wall of the substation. Essentially this water-cooling system comprises the coils of the usual type inside the transformer case, which are connected to headers running along the side wall of the transformer compartment. One of these headers supplies cool water from a wooden storage tank mounted outside the building and at an elevation about 12 feet above the base of the transformers. This elevated tank has a sufficient capacity to deliver water enough to the transformers to cool them during

over them from the top downward to a collecting trough in which the bottoms of all the screens hang. From this trough the water is led to the storage cistern earlier mentioned as being under the basement floor of the substation.

Storage Battery.

The storage battery operated in connection with the Plaza substation comprises 264 cells of the Electric Storage Battery Company's type G-57, which battery has a capacity of 2,000



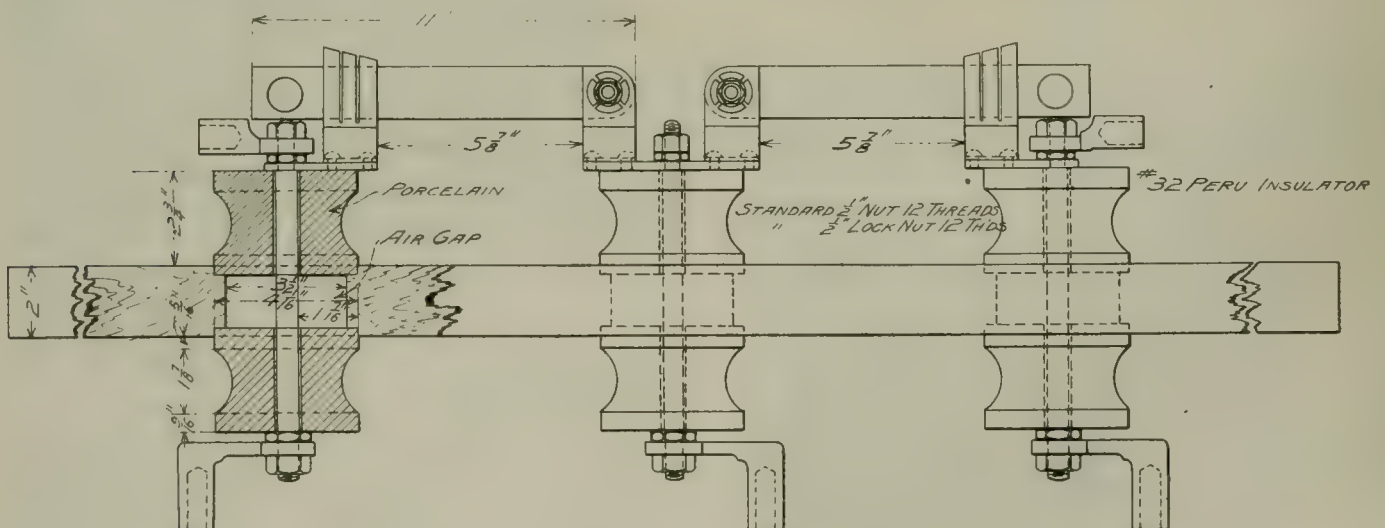
Los Angeles Railway Substations—Hand Operated Oil Switch.

10 hours' operating time. The water is fed to this supply tank from a concrete storage cistern 10 by 8 by 15 feet inside dimensions, located beneath the basement floor of the substation. A three-inch centrifugal pump belt-driven by a five-horsepower Westinghouse motor, serves to elevate the water. This motor is controlled electrically from the operating floor of the substation. The warm water taken from the upper coils in the transformer case is led to the water-cooling device shown in the accompanying sectional view. It will be noted

ampere-hours. It regulation is effected through a 230-horsepower booster set. The battery equipment includes a double-reading and recording wattmeter for measuring the input and output of the storage battery. The substation installation also includes a motor-compressor set for furnishing air under pressure with which to clean switchboards, machinery, etc.

Slauson Substation.

The Slauson substation, which is the most southerly one



Los Angeles Railway Substations—Detail of Hand-Throw Switch Connections in Loop Busses.

that the principle of this cooling device is similar to that of the usual type of cooling tower used in connection with power station condensing systems, except that exposure of the water to free air is obtained by means of allowing it to trickle down a number of baffles composed of 1/4-inch wire mesh. These wire screens or baffles, of which there are 16, hang from a pipe framework, from which, by means of spray openings in the supporting pipes, the water is allowed to flow

on the transmission loop of the Los Angeles Railway, includes one Westinghouse 600-kilowatt and one 400-kilowatt two-phase induction motor generating sets. Illustrations are presented herewith, showing the method in which the transmission lines and busbars are carried through the substation building, the transformer arrangement with regard to the oil switches and low-tension side connections, and a general view of the interior of the substation.

The high-tension wires enter this substation and are carried through it as bare copper leads mounted on standard line insulators supported on wooden racks hung from light frameworks, as shown in the illustration. The taps are made from these open buses direct to Kelman oil switches of the "pot" type standing on a concrete floor directly above the transformer compartments. These switches, which are on the high-tension side of the step-down transformers, are operated by geared shafts and cranks supported on the division wall of the substation, one opposite the induction motor which it controls. The relative arrangement of these oil-switch operating handles and the other apparatus in the substation may be noted in the general view of the interior of the substation and also in the general view of the open wiring. Two line drawings are also reproduced, showing the method of making the high-tension and low-tension transformer connections. It will be noted that the low-tension transformer leads are carried through tile ducts under the floor from the transformers to the machines.

Mention has been made of the method of interconnecting all the substations through a transmission loop, so that continuity of operation will exist should any one section of the loop be open. In order that the method of connecting the step-down transformers with the substation buses at the various stations might be carried out in a simple and yet permanent way, a system of knife switches mounted on porcelain supports has been arranged wherever it may be desired to connect a set of transformers with a transmission bus passing through the substation. A detailed drawing is reproduced herewith, showing the construction of one section of such a switch equipment.

L. O. Lieber, to whom we are indebted for the information on which this article is based, is electrical engineer of the Los Angeles Railway Company.

STANDARDIZATION COMMITTEE MEETING.

As previously announced the standardization committee of the American Street and Interurban Railway Engineering Association met in New York on Thursday and Friday of this week to continue the discussion of standards that were considered at the meeting in Cleveland on July 26 and 27 and to formulate the recommendations that will be incorporated in the report of the committee to be presented at the Atlantic City convention. The meeting was held in the office of the secretary-treasurer of the American Street and Interurban Railway Association in the Engineering Societies building, 29 West Thirty-ninth street. The attendance at the meeting was 40, including a large number of representatives of manufacturers, who have manifested great interest in the proceedings of the committee. W. H. Evans, master mechanic of the International Railway Company of Buffalo, and chairman of the committee, presided.

The first subject to be considered, as previously announced, was "Standard Axles, Journals, Journal Bearings and Journal Boxes." Six standard axles were considered, designated A, B, C, D, E and F, and having the following dimensions: Motor fit diameters, $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, $6\frac{1}{2}$ and 8 inches; journal bearings, $3\frac{3}{4}$ by 7, $4\frac{1}{4}$ by 8, $4\frac{1}{4}$ by 8, 5 by 9, 5 by 9 and $5\frac{1}{2}$ by 10 inches; distance between wheel hubs on A, B and C, 48 inches, and on D, E and F, 50 inches; gear seat length on all, $6\frac{1}{8}$ inches; maximum capacities from 15,000 to 38,000 pounds per axle; gear keys, 1 inch square by 5 inches long; axle fillets on motor sides, $\frac{5}{8}$ inch; gear faces for A, B and C, 5 inches, for D, E and F, $5\frac{1}{4}$ inches. All controlling dimensions of gear and wheel hubs were also considered.

Regarding journal boxes it was decided to recommend a width of $6\frac{1}{8}$ inches for A, B and C, and of $8\frac{1}{8}$ inches for D, E and F. For the distance between pedestal guides $4\frac{3}{4}$ inches was agreed upon as the standard for all boxes, the width of seat for equalizer bars to be $7\frac{1}{2}$ inches and the

diameter of seats for helical springs $6\frac{5}{8}$ and $7\frac{5}{8}$ inches.

The remaining subjects to be considered are:

2. Standard brakeshoes, brakeshoe heads and keys.
3. Standard section of tread and flange of wheels.
4. Discussion of standard rail section and special track work as directly affecting the wheel tread and flanges.

A full report of the preliminary discussion of these subjects at the Cleveland meeting was published in the Electric Railway Review of August 10, 1907, page 157. A report of the remainder of this week's meeting will be published in a later issue.

A partial list of those present follows:

H. H. Adams, United Railways & Electric Company.
 W. H. Blake, Street Railway Journal.
 C. B. Fairchild, Jr., Electric Traction Weekly.
 L. E. Gould, Electric Railway Review.
 Walter S. Adams, The J. G. Brill Company.
 Charles A. Clark, International Railway, Buffalo.
 J. N. Larned, Pittsburgh Railways Company.
 H. C. Page, Springfield (Mass.) Street Railway Company.
 H. A. Benedict, Capitol Railway, Albany, N. Y.
 William T. Dougan, New York City Railway Company.
 P. H. Griffin, chairman Wheel Manufacturers' committee.
 N. B. Trist, Schoen Steel Wheel Company.
 G. L. Schermerhorn, General Electric Company.
 J. E. Webster, Westinghouse Electric & Manufacturing Company.
 E. B. Entwisle, Lorain Steel Company.
 A. H. Weston, The T. H. Symington Company.
 Victor Angerer, William Wharton, Jr., & Co.
 E. L. Jones, G. M. Hoadley, H. S. Bradfield and F. W. Sargent, American Brake Shoe & Foundry Company.
 Gilbert S. Vickey and William C. Cuntz, Pennsylvania Steel Company.
 V. B. Lamb, Keystone Brake Shoe Company.
 F. W. Roth, Streeter Journal Bearing Company.
 W. L. Boyer, New York Car Truck Company.
 James D. Rhoades and J. H. Yawley, National Car Wheel Company.
 E. S. Lewis, Standard Steel Works.
 Warren Thorpe and J. R. Dickey, Baldwin Locomotive Works.
 William Wampler and H. A. Fritz, American Locomotive Company.

MEETING OF NEW YORK STATE ASSOCIATION.

The fifth quarterly meeting of the Street Railway Association of the state of New York will be held at Kingston, N. Y., on September 21, at 10 a. m. C. Gordon Reel, general manager of the Kingston Consolidated Railroad Company, is planning a number of unique features for the comfort and entertainment of the attendants. J. H. Pardee, secretary of the association, has issued the following programme of papers to be presented:

Morning Session, 10 a. m.

Subject, "Report of Committee on Interurban Rules," John E. Duffy, superintendent Syracuse Rapid Transit Company. Discussion—J. R. Harrigan, assistant general manager Buffalo & Lake Erie Traction Company; W. H. Collins, general superintendent Fonda Johnstown & Gloversville Railroad Company; F. J. Gerdon, superintendent Utica & Mohawk Valley Railway Company; W. R. W. Griffin, superintendent Rochester & Eastern Rapid Railway Company; J. H. Cain, division superintendent Hudson Valley Railroad Company.

Afternoon Session, 1:30 p. m.

Subject, "Collection and Registration of Interurban Fares," paper by B. A. Frankel, chief treasurer department Utica & Mohawk Valley Railway Company. Discussion—John G. Phillips, assistant general manager Hudson Valley Railroad Company; H. M. Beardsley, secretary and treasurer Elmira Water Light & Railroad Company; N. P. Baker, division superintendent International Railway Company.

Subject, "Express Rates and Service," paper by Frank Walsh, general manager Electric Express Company, Schenectady, N. Y. Discussion—C. H. Armatage, traffic manager United Traction Company; B. E. Wilson, general passenger and freight agent Rochester Railway Company; F. C. Nugent, general superintendent Oneonta & Mohawk Valley Railroad Company.

According to an announcement made by J. B. Crawford, superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company, through service will be established between Ft. Wayne and Lafayette, Ind., on October 1.

ATLANTIC CITY CONVENTION PROGRAMMES.

Bernard V. Swenson, secretary of the American Street and Interurban Railway Association, 29 West Thirty-ninth street, New York, has issued the programmes for the meetings of the American and affiliated associations at Atlantic City, N. J., October 14 to 18. These programmes are, however, subject to revision.

AMERICAN ASSOCIATION.

(Steel Pier.)

Wednesday, October 16, 1907—9:30 a. m.

Convention called to order.
Address of welcome.
President's address.
Report of executive committee.
Report of secretary and treasurer.
Addresses by presidents of affiliated and allied associations.

Announcements.
New business.
Reports of Committees—(a) Membership. (b) Compensation for carrying mail. (c) Subjects. (d) Car wiring. (e) Standardization of equipment.

Paper—"The Technically Trained Man and the Electric Railway Profession," by Prof. H. H. Norris, Cornell University, Ithaca, N. Y.

Paper—"The National Fire Protection Association and Its Work in the Street and Interurban Railway Field," by Ralph Sweetland, Boston, Mass.

Paper—"The Influence of the Design of Railway Structures on Economy of Operation," by H. J. Campion and William McClellan, consulting engineers, New York, N. Y.

Thursday, October 17, 1907—9:30 a. m.

Appointment of nominating committee.
Reports of Committees—Promotion of traffic. Rules. Heavy electric traction.

Paper—"Package Express Business," by P. P. Crafts, general manager Iowa & Illinois Railway Company Clinton, Ia.
Paper—"Freight Interchange with Steam Railroads," by H. H. Polk, president Inter-Urban Railway Company, Des Moines, Ia.

Paper—"A Department of Publicity," by J. Harvey White, advertising manager Boston Elevated Railway Company, Boston, Mass.

Paper—"Advertising from the Street Railway Standpoint," by A. W. Warnock, general passenger agent Twin City Rapid Transit Company, Minneapolis, Minn.

Paper—"The Problems of a Small Road," by H. S. Cooper, manager Galveston Electric Company, Galveston, Tex.

Paper—"The Use of T-Rail in Cities," by C. Gordon Reel, vice-president Kingston Consolidated Railway Company, Kingston, N. Y.

Friday, October 18, 1907—9:30 a. m.

Reports of Committees—(a) Insurance. (b) Rules for the construction of modern car houses. (c) Municipal ownership. (d) Public Relations.

Paper—"Public Policies of the Past and Future," by C. Loomis Allen, vice-president Utica & Mohawk Valley Railway Company, Utica, N. Y.

Paper—"Interurban Railway Fares," by Theodore Stebbins, J. G. White & Co., New York, N. Y.

Discussion—"Reduced Fare Agitation."

Discussion—"Depreciation from the Financial and Managerial Standpoints."

Report of nominating committee.

Election of officers.

Resolutions.

Unfinished business.

Adjournment.

ENGINEERING ASSOCIATION.

(Steel Pier.)

Monday, October 14, 1907—9:30 a. m.

Registration at Steel Pier.

Monday, October 14, 1907—2 p. m. to 5 p. m.

Convention called to order.
Address—John I. Beggs, president American Street and Interurban Railway Association.

Reading of the minutes of the last meeting.

Address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees.

Reports of special committees.

Report of committee on "Control Apparatus."

Report of committee on "Maintenance and Inspection of Electrical Equipment."

Tuesday, October 15, 1907—9:30 a. m.

Report of committee on way matters.

Paper—"Care of Electric Railway Tracks," by George L. Wilson, engineer Twin City Rapid Transit Company, Minneapolis, Minn.

Paper—"Rails and Joints as Affected by Traffic in New York City," by W. Boardman Reed, engineer, New York City.

Report of way committee on "Rail Corrugation Investigation."

Report of way committee on "Concrete Tie Investigation."

Report of subcommittee on "Rail and Rail Matters."

Tuesday, October 15, 1907—2 p. m.

Report of committee on "Standardization."

Report of committee on "Open Versus Closed Terminals for Car Storage."

Report of committee on "Operating and Storage Car House Designs."

Question box.

Wednesday, October 16, 1907—9:30 a. m.

Joint meeting of American association and allied associations.

Wednesday, October 16, 1907—2:30 p. m.

Paper—"Gas Engines," by Paul Winsor, chief engineer motive power and rolling stock Boston Elevated Railway Company, Boston, Mass.

Paper—"Gas Engine Operation," by W. W. Cole, general manager Elmira Water Light & Railway Company, Elmira, N. Y.

Paper—"Steam Turbines," by St. John Chilton, engineer Allis-Chalmers Company, Milwaukee, Wis.

Paper—"Steam Turbines," by August H. Kreusi, engineer General Electric Company, Schenectady, N. Y.

Paper—"Double-Flow Turbine," by J. R. Bibbins, engineer Westinghouse Machine Company, East Pittsburg, Pa.

General business.

Election of officers.

ACCOUNTANTS' ASSOCIATION.

(Chalfonte Hotel.)

Tuesday, October 15, 1907—10 a. m.

Convention called to order.

Address—John I. Beggs, president American Street and Interurban Railway Association.

Annual address of president.

Annual report of executive committee.

Annual report of secretary-treasurer.

Paper—"Park Accounting," by Frank J. Pryor, Jr., comptroller the American Railways Company, Philadelphia, Pa.

Question Box—Edited by Frank R. Henry, auditor United Railways Company of St. Louis, St. Louis, Mo.

Appointment of convention committees.

New business.

Tuesday, October 15, 1907—2 p. m.

Lunch and social afternoon.

Wednesday, October 16, 1907—9:30 a. m.

Joint meeting with American association (on Steel Pier).

Wednesday, October 16, 1907—3 p. m.

Paper—"Mechanical Devices for Office Use," by F. E. Smith, auditor Chicago Union Traction Company, Chicago, Ill.

Report of committee on "Standard Classification of Accounts and Form of Report."

Report of committee on "International Standard Form of Report."

Thursday, October 17, 1907—10 a. m.

Paper—"Where Maintenance Ends and Depreciation Begins," by J. H. Neal, auditor of disbursements Boston Elevated Railway Company, Boston, Mass.

Reports of convention committees.

Election of officers.

Installation of officers.

CLAIM AGENTS' ASSOCIATION.

(St. Charles Hotel.)

Monday, October 14, 1907—10 a. m.

Registration and badges (at Steel Pier).

Secretary Davis at St. Charles hotel.

Monday, October 14, 1907—2 p. m.

Convention called to order.

Address—John I. Beggs, president American Street and Interurban Railway Association.

Minutes of last meeting.

Address of acting president.

Annual report of executive committee.

Annual report of secretary-treasurer.

Appointment of convention committees.

Tuesday, October 15, 1907—10 a. m.

Paper—"The Policy of the Claim Department to the Injured Employee," by R. H. Schoenen, claim agent Lehigh Valley Transit Company, Allentown, Pa.

Paper—"The Claim Agent of Today and His Work," by H. H. Bennett, claim agent Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.

Paper—"How I Manage Bad Cases," by Harry P. Vories, claim attorney Pueblo & Suburban Traction & Lighting Company, Pueblo, Colo.

Tuesday, October 15, 1907—2 p. m.

Paper—"The Selecting and Training of Investigators and Adjusters for the Claim Department," by Ellis C. Carpenter, claim adjuster Indiana Union Traction Company, Anderson, Ind.

Question Box—(Three minutes allowed to each member to discuss a question).

Wednesday, October 16, 1907—9:30 a. m.

Joint meeting with American association (at Steel Pier).

Wednesday, October 16, 1907—2:30 p. m.

Paper—"The Claim Department and What Should be Done to Make It Effective," by C. B. Hardin, claim agent United Railways Company of St. Louis, St. Louis, Mo.

Paper—"Instructions of Employees in the Work of Preventing Accidents," by F. W. Johnson, assistant claim agent Philadelphia Rapid Transit Company, Philadelphia, Pa.

General business.

Election of officers.

Hotel Arrangements.

It has been decided by the official representatives of the various associations that each association shall have its own headquarters hotel. The following selections have been made:

American association, Marlborough-Blenheim; Accountants' association, Chalfonte; Engineering association, Dennis; Claim Agents' association, St. Charles; Manufacturers' association, Marlborough-Blenheim.

Arrangements for hotel accommodations, if not already concluded, should be made directly with the hotels at once. It will aid greatly in avoiding mistakes if the members when writing will indicate that their reservations are made in connection with the convention. In making reservations explicit statements should be made concerning the kind of room desired and the dates of arrival and departure from the hotel. Special rates have been made with the understanding that the charges of the hotel will be for the full time of reservation.

Entertainment Features.

General direction is in the hands of Charles C. Peirce, member of the Manufacturers' association executive committee, and A. L. Whipple, chairman of the entertainment committee. Arrangements have been made for a pleasing variety of entertainment, which are, of course, subject to change. The Daily Electric Railway Review will publish corrected programmes each morning.

The entertainment committee has made arrangements whereby all delegates and guests of the convention may have the free use of rolling chairs between the hours of 9 a. m. and 6 p. m. from Monday until Friday, inclusive.

If the weather is warm enough for bathing, special arrangements will be made for bathing facilities.

Since the opening of the state fair at Indianapolis, on September 9, the Indiana interurban lines have been handling an enormous traffic and, although many of the roads that usually maintain an hourly service have been running cars every 30 minutes, the capacity of all the lines has been taxed. It is stated that only about 10 per cent of the passengers going to the fair travel by steam trains.

CANADIAN ASSOCIATIONS MEET.

On Wednesday, Thursday and Friday of this week the Canadian Street Railway Association and the Canadian Electrical Association held interesting sessions at Montreal, Can. An additional attraction for delegates was an elaborate electrical exhibition, similar to those held annually in Chicago and New York. The electric railways of all Canada were well represented, there being about 50 delegates registering and a large number of manufacturers' representatives. The Windsor hotel was headquarters.

An abstract of the programme of the railway association follows, the subjects being considered by general discussion rather than by assignment for papers on special topics:

Track Construction and Maintenance of Way.

The best system of track construction for paved streets, using (1) girder rails, (2) T-rails.

The best system of track bonding. The lowest cost, with efficiency for light traffic, to be kept in view.

The keeping of grass and weeds from off the track and right of way.

Motive Power and Overhead Equipment.

The value of storage accumulators in connection with rotary converter street railway generating stations.

The best system of measuring the output of a power station where the load fluctuations are heavy.

The average cost per kilowatt power generated by steam.

The advantages and disadvantages of the adoption of a frequency of 15 cycles per second for heavy railway service.

Rolling Stock.

Insert versus gray iron brakeshoes.

The question of trolley stands, harps and wheels for interurban work.

In the case of chilled wheels, does it pay to true-up flat wheels, or, where one wheel is good, to remove the flat wheel and press on the new one?

Operation.

Transportation for officials.

Different colored versus uniform colored street car signs.

Smooth versus rough cloth for uniforms.

Traffic.

The carrying of baggage.

The best method of collection of fares by conductors.

The best fare box in use.

Methods of checking conductors' returns.

Transfers.

The carrying of freight.

Are electric railways successful competitors of parallel steam lines, so far as local traffic is concerned?

Accounting.

Is the system of accounting, as called for by the Ontario railway and municipal board, adopted by the various electric railway companies under its jurisdiction?

The average cost of operating interurban and urban electric railways per car-mile, exclusive of interest and sinking fund.

The average ratio of operating expenses to gross income for interurban and urban electric railways.

The sessions were not open to the public, but at a later date an abstract of the discussions of these pertinent topics will appear.

The programme of the Electrical association included papers of interest to electric railway men. Among these were: "Trials of the Operating Man," by M. A. Sammett, Montreal Light Heat & Power Company; and "High Tension Insulators from an Engineering and Commercial Standpoint," by C. E. Delafield. These two papers appear elsewhere in this issue.

Charles Murdock of Lafayette, Ind., vice-president of the Ft. Wayne & Wabash Valley Traction Company, has gone to Philadelphia to attend a meeting of the officials, where a contract will be closed with one or more of the competing express companies for the handling of express between Ft. Wayne and Lafayette. The United States Express Company is now operating on the line under a temporary contract, but the permanent contract will be awarded to the company bidding the highest and which is likely to give the best service.

NEW CAR HOUSE AT POUGHKEEPSIE.

The Poughkeepsie City & Wappingers Falls Electric Railway has recently built in the business district of Poughkeepsie, N. Y., a reinforced concrete car house, with offices and reading rooms and with machine shop, paint shop and line department accommodations, to take the place of an old building destroyed by fire. The new building is 226 feet long

structure are merely curtain walls. The girders, beams, etc., are reinforced with Johnson corrugated bars and the track floors and pits with three-inch expanded metal. The track girders were designed to carry a 40-ton car.

The construction of the pits is shown in an accompanying cross section, from which it will be seen that the rails rest on 6 by 8 inch wooden stringers, supported by reinforced concrete girders and held by bolts embedded in the concrete.



Poughkeepsie Car House—Interior View.



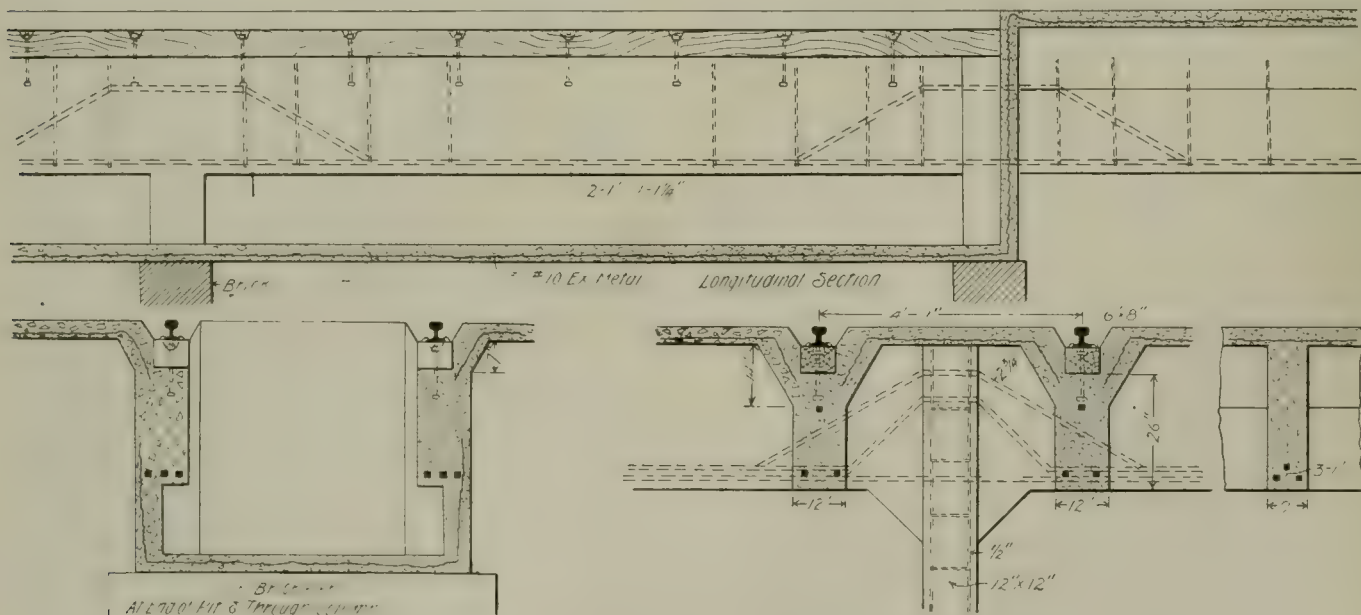
Poughkeepsie Car House—Sand Drier.

and 60 feet wide, providing storage and pit accommodations for 23 cars, of which 11 is the average number in operation.

As indicated in the accompanying floor plan, there are four main tracks entering the building from the street, two

The pit floors rest on brick piers 16 inches thick, the columns being carried up through to support the track girders.

The weight of the roof is carried by reinforced concrete beams 21 inches deep, supported by a central row of concrete



Poughkeepsie Car House—Detail of Pit and Track Supporting Columns.

from each direction, the two center tracks crossing each other. These four tracks run the entire length of the building, while a fifth track occupies the space back of the office section. Three of the tracks have pits 79 feet long and a 40-foot pit is also located in front of the paint shop.

The weight of the car house is carried by reinforced concrete girders resting on reinforced concrete piers 16 inches square and the brick side walls left standing from the old

columns 12 inches square. The roof beams support a concrete slab 4½ inches thick, intercepted by a sufficient number of skylights to afford good lighting, and protected by a pitch and slag covering. The parapet of the building is 20 feet above the street tracks and the building is two stories high in front, the upper floor being devoted to private offices and a reading room.

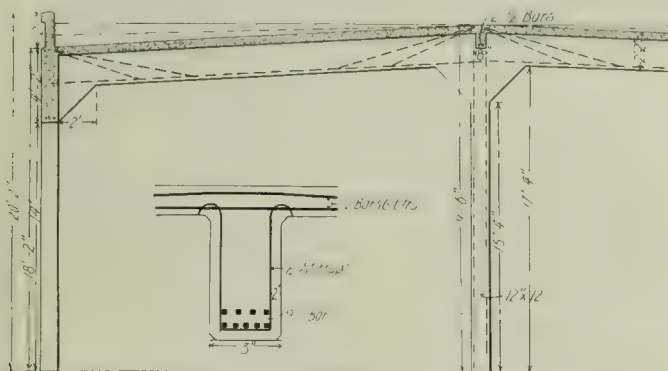
In windows adjacent to other buildings and in the sky-

lights hollow metal fire windows, made by the Voigtmann Company, Chicago, are used.

The building is supplied with four fire hydrants: two in the basement, one in the paint shop and one in the car house proper. All interior openings are equipped with tin-clad fire doors, while the front doors of the building are double steel rolling doors installed by the James G. Wilson Manufacturing Company, New York. To provide light on dark days and at night Cooper-Hewitt lights are suspended from the skylights.

The office section is a 12-foot strip along one side of the building for a distance of 64 feet from the front, as shown in the plan. At the front is a waiting room and the space back of that is divided into an office, swing room, lavatory and storeroom.

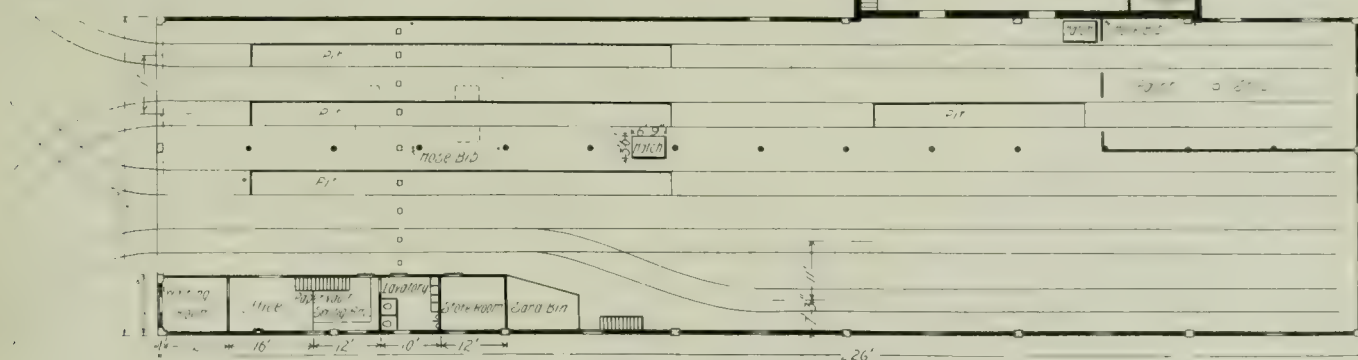
Back of the storeroom is the sand-drying apparatus, which is illustrated. This consists of a wooden box with a sieve



Poughkeepsie Car House—Details of Roof Girders and Columns.

bottom hung over a bank of steam pipes. The sand box above the heating pipes is kept full and as the sand dries it falls through a sieve to the floor below, where it is stored ready for use. Steam for the sand coil, as well as for heating the building, is supplied by a small boiler in the basement.

The equipment of the machine shop, which is an L, 65 by 40 feet in floor area, consists of a forge, emery wheel, air compressor, armature-winding machine and wheel press. Power to drive the machines is furnished by a three-horsepower



Poughkeepsie Car House—General Plan.

motor. In one corner of the shop is a small brick bake oven with a sheet iron door, which is raised from the floor to admit a two-wheeled buggy carrying an armature. Heat is supplied by two 550-volt Consolidated heaters.

The paint shop in the rear of the car barn is long enough to take in one car on each track. The basement is used by the line department and is entered at the ground level from a roadway in the rear. Next to the room devoted to the line department are the stables and then the boiler plant, sand and coal bins and general space in which line and track material is stored.

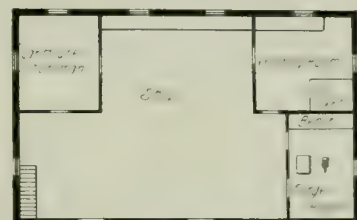
The architect for the structure was Ellis L. Phillips, New

York City, and the building was built by the Concrete-Steel Company, engineers and contractors, Cincinnati, O., and New York City. The president and general manager of the railway company is J. W. Hinkley, Jr., Poughkeepsie, N. Y.

CLEVELAND TRACTION SITUATION.

During the course of the hearing before Judge Lawrence of the common pleas court last week in the suit of the Cleveland Electric Railway Company, in which it seeks to have the curative ordinance regranteeing the franchises of the Forest City Railway declared void, considerable testimony was introduced showing that Mayor Johnson had furnished the Municipal Traction Company with large sums of money at various times. Fred C. Alber, secretary, testified that the entire capital stock of the company had been issued in his name, but that much of the stock had been subscribed for by and delivered to other parties and the money turned over to the company. He said that on various occasions when money was desired he asked Mayor Johnson for it and the money was promptly sent by messenger. He then made indorsed certificates in blank, generally to M. T. Cable of Rock Island, Ill., or to C. M. Bates of Yardley, Pa. He said that from \$60,000 to \$80,000 had been received in this way. He also testified that Mayor Johnson had guaranteed payment on many of the company's contracts.

In the course of the hearing on September 10 Judge Lawrence ruled that certain corroborative testimony to show that Mayor Johnson had aided the Forest City Railway Company in numerous ways was not competent, in view of the fact that testimony had already been offered showing that the mayor had incurred financial obligations to aid the company. In giving the ruling the judge stated that it was perfectly right for the mayor to aid the company with his advice and judgment; that it was entirely in his province to do so and a praiseworthy action on his part if he believed three-cent fares



to be a benefit to the city. He said it was not in the discretion of the court to supervise the actions of the mayor until the question of the mayor's financial obligation was raised. In view of this ruling it is claimed in Cleveland that to gain its point the Cleveland Electric must prove that the mayor is in the position of an actual cash beneficiary of the company.

The Central Indiana Lighting Company, which recently purchased a controlling interest in the Columbus (Ind.) Street Railway & Light Company system, has discontinued the use of street car tickets and will now accept only a straight five-cent fare. Under the old management tickets could be purchased in amounts of \$5.00 or more for three cents each.

TRIALS OF THE OPERATING MAN.*

BY M. A. SAMMETT, MONTREAL LIGHT HEAT & POWER COMPANY.

The difficulties in operating alternating-current systems may be subdivided into two main groups: (1) Difficulties beyond control. (2) Controllable difficulties.

Under the difficulties beyond control are to be included those met with every summer. Lightning still engages the attention of the best men of the engineering profession. We shall not enter into the discussion of the existing protective apparatus. The subject has for some years past been most prominent in convention discussions.

The subject matter that will be considered is that of troubles that are controllable; trials that may be overcome by the operating man, provided he were given a plant of a certain amount of flexibility, and that he were provided with information which naturally belongs to him.

Taking up the various items, we will consider first the questions of liberality in the design of the plant. What is essential is that the apparatus should be capable, under emergency conditions, of carrying 25 per cent or 50 per cent overload for a specified interval. Higher temperatures will be allowed under these unusual conditions as long as the temperatures are not detrimental to the life of the machine.

Second in importance, under emergency conditions, will come regulation. What could be suffered under emergency conditions may not be tolerated under normal operating conditions, yet provision should be made for the service to be maintained with a fair degree of voltage regulation.

Bearing these in mind, the design of the power house, substations and the transmission circuits must be such as to provide for the temporary disability of a part of the plant and be in a position, at the same time, to handle the load without any serious interruption.

The operating man should know the behavior of his machines under overloading. It takes a certain length of time before the dangerous temperature is reached, and it is essential that the curve of temperatures at overloads be known and should be used as a gauge when emergency cases arise.

Many a station man has a tale of woe as a result of indiscriminate use of transformers, and strange to say, sometimes using transformers of same make and type, but built at different times by the same manufacturer, guaranteed for successful parallel operation with transformers previously supplied. With transformers the question of proper parallel operation must be verified, and if they will not divide the load proportionally to their capacities, corrective reactances must be added to the transformers to equalize them in this particular respect.

Air Blast Transformers.

Of the various types of transformers the natural draft transformer is obsolete in this country, whether in large or small sizes. The smaller sizes are almost altogether of the oil-insulated type, while in the larger sizes they are provided with forced ventilation, such as air blast or oil-insulated water-cooled. Let us consider the two types, air blast and oil-insulated water-cooled transformers, as to the difficulty in connection with their operation.

Air blast transformers are open to criticism on account of the ease with which they accumulate dust. This is objectionable, especially so in transformers of moderate voltages, between 15,000 and 22,000 volts. In this type of transformers it is frequently found that the temperature of the upper portion of the coils is much in excess of the average winding temperature.

Whenever transformer coils are connected on top, the air passages are frequently blocked, and the temperatures reach a dangerous point, at which it will be unsafe to continue operation. To the above-mentioned objections must be added another, that of the danger of using compressed air for blowing out the dust. Unless the air is perfectly free from moisture, the use of it may result in the damage of the insulation and cause a burn-out. If extreme precaution is not exercised disastrous results will follow. To all these trials must be added another, that of the ease with which the flames are carried from one transformer to the other through the air chamber.

Oil-Insulated Transformers.

With the oil-insulated water-cooled transformer, many of the above enumerated defects will be overcome. With oil-insulated transformers a smaller amount of insulation wrapping the coils is necessary, hence the uniform ducts of larger magnitude are possible. The temperature of the coils with such construction of ample oil circulation will be more uniform.

The principal argument in favor of oil-insulated water-cooled transformers is their ability to withstand excessive

overloads, and their immunity from breaking down at temperatures even as high as 200 degrees C.

A great advantage of the oil-insulated transformer is the higher effectiveness of insulation to resist induced high voltages, either through switching or through lightning disturbances. The fear of oil in the transformer as a fire risk is a matter of the past. Instances of stations destroyed by fire when oil-insulated apparatus, such as transformers and regulators, were the only machines saved, show the fallacy of the opponents of oil-insulated apparatus. Oil will extinguish the arc resulting from a short circuit in the transformer, and prevent the burning of the insulating fabrics, thus doing away with the smoke filling the station, as is always the case with air blast apparatus. The temperature of the oil-insulated apparatus is more uniform throughout than those of the air blast type.

As to the oil syphoning through the leads and case joints, there is no reason why, with the proper construction and necessary precautions, the oil syphoning and leaks should not be done away with.

While it has many advantages the oil-insulated water-cooled transformer has two main drawbacks: 1. Possibility of water getting at the winding. 2. Breaking up of the oil, forming a thick non-conducting mass. A defective water coil or a coil allowed to have the water when the transformer is not in use during winter months will damage the transformer.

A water coil capable of withstanding 200 pounds hydrostatic pressure and proper connection of the coil to outside piping will guard against the former difficulty, while care exercised to remove the water from the coils by an air pump or by filling it with oil under pressure will guard against trials of water freezing in the pipes.

The breaking up of the oil takes place only at high temperatures, and if transformer temperatures are kept low no difficulty should be anticipated. A sample of oil subjected to a temperature of 90 degrees C. formed a heavy deposit in two weeks. Further tests could not be continued due to lack of time, but it is safe to conclude, however, that it is not advisable to allow transformers to reach a temperature in excess of 70 degrees C.

It happens sometimes that through no explainable reason the temperatures of transformers begin to rise. The cause may be due to either the iron aging, which would result in a higher iron loss, or to breaking up of the oil, or, again, to clogging of the water-cooling coils. In one instance noted, where water was carried to the brass cooling coils through an iron pipe, the asidulated water passing through the iron pipe attacked the iron and then going through the brass tubes deposited the iron in the form of a sediment which reduced the coil opening to one-third its normal size, hence the consequent rise in temperature.

Transmission Line.

The connecting link between the generating and distributing ends is the transmission circuit. The trials here are caused by the insulators. Insulators should receive as much consideration as the power house and substation machinery. They must have a liberal margin of safety. They must possess the requisite mechanical as well as electrical strength. While the dielectric strength is of great importance in selecting a suitable insulator, the surface leakage of the insulator should be such as to have, under conditions of rainstorm, a factor of safety of three times normal voltage for moderate voltage transmission. For voltages of 60,000 volts and above, this requirement will have to be modified and a smaller factor of safety will have to be adopted, since the insulator will otherwise prove too costly on account of size.

In selecting the kind of insulator attention must be paid to local conditions. The peculiarities of the country the line passes must be taken into consideration and proper allowance made for local atmospheric and climatic conditions, for the effect of close-by chemical works, railway lines, with the unavoidable fumes, smoke, etc.

Rigid requirements of an insulator possessing a factor of safety of four times for arcing over under a breakdown test will justify the expenditure for a more costly insulator by minimizing breakdowns and insuring reliability and continuity of service.

Aging.

We will take up as the last point the question of aging. Aging of iron laminations has all these years been carefully studied by manufacturing companies, and at the present time the "eternal vigilance" has not ceased. Unless carefully guarded against inadequate iron, grievous results will follow. Poor iron affects the efficiency of the apparatus; it also influences the temperature of the machine. Sometimes the defect may not be evident at the outset, but will develop with time, and the aged iron, resulting in increased hysteresis loss, may cause the heating up of the iron to a dangerous temperature.

*Abstract of paper presented at the annual convention of the Canadian Electrical Association, Montreal, September 11-13, 1907.

To keep track of the change in the iron it is well, wherever circumstances permit, that tests be made to verify the condition.

The aging of iron in many instances will explain abnormal rises of temperature with practically the same load. With artificial cooling the difficulty is easily overcome by increased ventilation. It is well, however, to have full information with regard to the apparatus in use.

The phenomena of aging applies to all electrical apparatus and affects largely the central station companies on account of the extensive use of transformers. Inasmuch as aging increases with higher operating temperatures, it is preferable to purchase apparatus that will give the lowest temperatures.

To sum up, then:

Plants should be laid out with liberal provision for emergencies.

The performance of the apparatus under normal as well as emergency conditions should be thoroughly understood.

Small service transformers should be of the core type.

To insure proper parallel operation of transformers, records of transformers' impedance voltage should be kept.

HIGH-TENSION INSULATORS, FROM AN ENGINEERING AND COMMERCIAL STANDPOINT.*

BY C. E. DELAFIELD.

The science of properly and safely insulating line voltages of high potential has not kept pace with the demands of transmission engineers, and today we are face to face with the problem of successfully transmitting potentials in excess of 100,000 volts. In California power is transmitted at 60,000 volts more than 200 miles but great line losses are suffered and the investment in copper is heavy. An increase in voltage from 60,000 to 150,000 would make it possible to deliver this power with reasonable losses and in much greater quantity. As an illustration of the possibilities of delivering power at 150,000 volts, it would be possible to deliver the power generated at Niagara Falls economically to Boston, New York or Philadelphia, and, apparently, the principal hindrance to this consummation at the present time is in the fact that there is not on the market what might be termed a successful insulator for this enormous voltage, although the merits of a number of different types of insulators are at the present time being advocated for this purpose.

Fundamental Principles.

The design of an insulator for high voltages—quoting the words of Gerry—should involve a consideration of all of the effects of electrical tension on the dielectrics in the vicinity of the conductors. In the case of a line insulator, air is always a dielectric in combination with wood, porcelain, glass or other materials, and, wherever there is a difference of electrical potential, there exists in the surrounding media a certain state of strain called an electrostatic field. This state of strain is the result of electrical stress applied to the insulating material. It frequently happens, when several dielectric materials are subjected to the same electrostatic field, that one or more of the materials will be strained beyond the limit and fail, although the others will stand the electrical tension. Air adjacent to powerful dielectrics frequently fails in this manner, thus giving rise to the well-known brush discharge. The structural failure of air from an engineering standpoint has been studied by a number of investigators, including Dr. C. P. Steinmetz, Dr. F. A. C. Perrine, Prof. Harris J. Ryan, M. H. Gerry and others, and, as the result of their published investigations, it is well known that air at the ordinary pressures and temperatures has a much lower dielectric value and strength than the common insulating materials. Air in thin films, adjacent to solid bodies, has greater strength than in bulk and is still inferior to such substances as glass and porcelain. The dielectric strength of air is affected by its physical condition and varies directly as the pressure and inversely as the absolute temperature. Under uniform conditions dielectrics rupture at definite applied tensions, Professor Ryan having shown that there exists for each dielectric material a certain strength of electrostatic field, which will cause a rupture. These being the fundamental rules by which designing engineers formulate their plans for the manufacture of insulators for varying potentials, it can well be seen that the various forms of insulators on the market today are the results of working out these rules by different individuals looking at the same thing from a different standpoint. That is to say, climatic and geographical conditions exert considerable influence in the design of an insulator. Insulators suitable for dry atmospheric conditions would not be suitable for a condition where sea fogs and dust exist, and there is no ques-

tion but that a correct solution will soon be forthcoming for a standard insulator for voltages of 75,000 and upward. In fact, as noted before, the different manufacturers are now experimenting toward that end.

Looking over the history of high-tension transmission, it is only about 15 years since we looked with wonder on the Lauffen transmission line of 30,000 volts over 100 miles. Today there are thousands of miles of long-distance transmission at voltages ranging from 11,000 to 65,000 volts, and great credit is due the engineers who have designed and carried out this work in the face of almost insurmountable obstacles. The progress of high-tension transmission has been very rapid, and in all of the various branches, with the exception of the line insulators, it is now possible to handle voltages in excess of 75,000 volts, there being no difficulty whatever in the designing and manufacturing of successful transformers and switch-board apparatus for these high potentials. It should be taken into consideration, in the future designing and laying out of transmission lines, the possibility of increasing the present voltage to the voltage that may be possible a year or more from now, so that large quantities of power may be economically distributed over long distances.

Types of Insulators.

It has been demonstrated by practice that very large generating units can be successfully operated and that both steam turbine and hydro-electric plants can be operated successfully, and the one question to be decided is, how can large powers that are so successfully generated be distributed over long distances economically, taking into consideration the high price of copper and aluminum. The answer to this question is, by high voltages only. Up to the present time the commonly accepted form of insulator is what is known as the pin type, meaning by that an insulator having for its resting place a pin embedded in, or fastened to, a crossarm; this pin being of wood or metal. Present practice has demonstrated that wood can be safely accepted for insulator pins up to 25,000 or 30,000 volts. Beyond that it is advisable, for mechanical reasons, to use malleable iron, but the so-called pin type of insulator has reached such dimensions, in the endeavor to meet the requirements for higher voltages, that it seems to be the consensus of opinion of the leading high-tension engineers that this type of insulator has reached the limit of good line construction, and, when one stops to think of the dimensions of an insulator used on a 60,000-volt transmission, one is inclined to think that the engineers are correct. Not only is it a difficult matter, from a mechanical standpoint, to find a pin that will take the necessary stress incident to an insulator of this large size and weight, but the problem of manufacture, from the standpoint of the potter, is one that is exceedingly difficult, so that apparently it is necessary to make a radical departure from the present practice of pin insulation in order to take care of the various difficulties that are encountered in the construction of insulators for the higher voltages, and it is the belief of the writer, and also of other engineers, that a suspended form of insulator will be the type which will be used, it being, from a mechanical standpoint, a comparatively simple matter to suspend any desired weight, and, from an electrical standpoint, it seems possible to so design an insulator that it will be mechanically strong and a good dielectric as well.

The suspended type of insulator would have the advantage that ample arcing distance could be provided without making the insulator top heavy and difficult to manufacture. It should be so designed that arcing cannot occur until the voltage is sufficient to rupture the air and cause the current to arc from end to end, this feature being of great importance where the insulators are mounted on steel towers, which is conceded to be the best engineering practice. On high-voltage lines, where steel towers are used, the pin type of insulator for 100,000 volts, or higher, would seemingly be almost an impossibility, owing to the size necessary to take care of the surges and other line disturbances and owing to the fact that the earth potential is carried into the head of the insulator by the steel pin and through the metal towers.

An ideal insulator, for all conditions of high-voltage stress, should be one that would take care of climatic conditions, such as fogs, dust deposits, salt spray, etc., and should have as few still air spaces as possible. That is to say, it should expose a large part of its surface to the wind and should have a long leakage distance of small area. In the designing of a type of porcelain insulator for this class of work, it should be borne in mind that cemented parts, if there are any, should be under compression and not under tension, owing to the strains to which it may be subjected to from expansion and contraction. There should be as few still air spaces as possible to avoid the accumulation of dust, insects, etc., and there should be nothing but porcelain, well vitrified, between the points of opposite potential. Engineers are now at work along these lines, and, as the result, a number of plans have been proposed

*Abstract of paper read at the annual convention of the Canadian Electrical Association, Montreal, September 11, 12 and 13.

embodying more or less of these ideas, and it is only a question of a short time before the successful insulator will be evolved for these higher tensions—if it has not already come to pass.

Transmission Conditions.

Leaving for the time being the open question of extraordinary potentials, we will take up the question of high-tension transmission as it exists today. Continuous operation of a transmission system is an absolute essential and depends to a large extent on the effectiveness of the insulator used. In this paper the writer only aims to discuss the qualities of porcelain insulators, as it is now generally conceded that porcelain is superior to glass for the manufacture of high-tension insulators, and, in fact, supersedes glass wherever the question of cost is not a paramount problem.

In the designing of an insulator for any given voltage, and especially for the higher voltages, there are three considerations of primary importance: First, electrical design; second, the mechanical strength; and third, the quality of the material. In the electrical design consideration must be taken of the dielectric strength of the adjacent air, so that sufficient distance be allowed between the points at which the line voltage is impressed that it will not arc over to the pin or crossarm under ordinary working conditions. In other words, make the potential gradient as gradual as possible from line wire to ground. These points of impressed voltage may vary greatly in an insulator of poor manufacture, although of the same electrical design.

Practice dictates the fact that on the insulator alone should be the reliance of the engineer for his insulation, and all insulators, whether of porcelain or glass, should be tested with approximately three times the full line voltage brought to the inside of the insulator head, and the entire burden of correct and sufficient insulation should be placed on the insulator itself and a large number of line troubles would be prevented.

It has been the unfortunate habit of some engineers to consider the cost of the insulator of paramount importance, and, when one takes into consideration the importance of the insulators to the construction of a line, one is always led to wonder why, by the additional cost of a few cents to each insulator, a reasonable factor of safety is not obtained. It is, however, pleasing to note that many engineers are profiting by the sad experience of their brothers and are securing their insulators based on specifications that insure a reasonable factor of safety, and, in fact, are in some cases going to the other extreme and not only require the manufacturer to guarantee their insulators to stand a rigid test, both before and after erection, but in one case which the writer recently noticed an additional clause was inserted requesting the manufacturers to guarantee that the railroad would not break them in transit, which, we will have to agree, was rather a severe test.

Reverting once more to the electrical design, it is necessary in the design of an insulator that the factor of safety be sufficiently large so that the abnormal electrical strains that may be, and are, occasionally brought to bear, will not cause a puncture and consequently a shutdown of the line. For instance, an insulator designed to carry 50,000 volts should stand a dry test of approximately 150,000 volts, thus giving a fair factor of safety to enable it to withstand the possible surge voltages caused by short circuits, etc. This very fact of requiring a reasonable factor of safety in the electrical and mechanical design of an insulator has decided the limiting possibilities of the pin type of insulator as approximately 60,000 volts line voltage, as, to secure a factor of safety of three, it would be necessary to build an insulator of mammoth proportions and uncertain body, having a weight that is almost prohibitive to pin work. This brings us again to the conclusion that the only method of securing a proper factor of safety on the higher voltages would be to use a suspended type of insulator.

Forty Yale undergraduates are now employed as motormen and conductors on the New Haven (Conn.) lines of the Consolidated Railway Company. Only five of them are motormen, as the company's rules require a motorman to weigh 180 pounds or over.

The Chicago elevated railroads continue to report large increases in the number of passengers carried. During August, 1907, the South Side Elevated Railroad carried 3,529,259 passengers, an increase of 28.58 per cent over August, 1906. During the same period the Northwestern Elevated Railroad carried 2,888,384, an increase of 27.33 per cent. The Metropolitan West Side Elevated Railroad carried 4,232,030, an increase of 10.5 per cent. The Northwestern and the South Side roads have both added considerably to their mileage during the year.

CHICAGO TRACTION DECREE ANNULLED AND TIME FOR ACCEPTING ORDINANCE IS EXTENDED.

On September 7 the United States circuit court of appeals decided to annul the decree of Judge Grosscup which ordered that the properties of the Chicago Union Traction Company be leased to the Chicago Railways Company. A motion of counsel for the Union Traction Company asking the court of appeals to vacate its ruling was denied on September 10. On Thursday of this week the city council extended the time for acceptance of the Chicago Railways ordinance from September 14 to February 1, 1908. In granting this extension the council exacted the following conditions:

That in case the Chicago Railways Company does not accept the ordinance already tendered it by February 1, 1908, the city will require the Chicago City Railway Company to extend its lines into the north and west sections of Chicago.

That the city of Chicago in order to confer full authority upon the City Railway Company to so extend its lines, grants permission to the said company "to construct, maintain and operate street railways in, upon and along the streets and public ways or portions thereof in the city of Chicago," now occupied by the Union Traction Company.

That the mayor of Chicago will forthwith take possession of the streets occupied by the Chicago Railways Company and turn possession of the same over to the City Railway Company in case the former company fails to accept its ordinance.

This arrangement contemplates defaults on the interest on underlying bonds of the Union Traction Company and the prosecution of the work of rehabilitation. Marshall E. Sampsell, receiver of the company, agreed that if the extension were granted he would proceed with the reconstruction and would in the meantime apply all the earnings "of said receiver during said period, remaining after the payment of operating expenses, to the purposes of rehabilitation."

John M. Roach, president and general manager, presented a communication to the council showing the condition of the rehabilitation work and stating that the improvements already received and under way will involve an outlay of \$1,500,000.

Decision of the Court of Appeals.

The opinion was delivered orally by Justice Brewer, as follows:

The arguments we have heard show that there is not a great public necessity which might otherwise be thought to exist for a unified system, inasmuch as there is given by the ordinance to the railway that owns the south side properties the right to proceed into the north and west sides, and thus establish a unified system.

It becomes, therefore, really a question of private interests and private rights. I think I may say for all of us—of course, I speak with a little hesitation with respect to my own knowledge of conditions here—that the ordinance which was tendered by the city was reasonable and fair, and that, as a business proposition, it would have been wise for all parties to accept it. But the courts do not make contracts for parties, and do not do business on their behalf.

They deal with rights as the parties have made them, and, although it may seem that a party insisting upon his legal rights is probably or even certainly bound to lose—why, if the party insists upon his legal rights, the court must protect him in them. There is no such wide discretion vested in a chancellor as permits him to disturb contract rights—rights of property.

The question has been before the supreme court more than once, and, as said in the case of *Nieland v. The American Loan Company*, 136 U. S., 97, the appointment of a receiver vests in the court no absolute control over the property and no general authority to displace vested rights. Because in a few specified and limited cases this court has declared a few secured claims were entitled to priority over mortgage debts, an idea seems to have obtained that a court appointing a receiver acquires power to give such preference to any general and unsecured claim.

It has been assumed that a court appointing a receiver could rightfully burden the mortgaged property by the payment of any unsecured indebtedness. Indeed, we are advised that some courts have made the appointment of a receiver conditional upon the payment of all unsecured indebtedness in preference to the mortgage sought to be enforced. Can anything be conceived which more thoroughly destroys the sacredness of contract obligations? One holding a mortgage on a railroad has the same right to demand and expect of the court

respect for his vested and contract priority as the holder of a mortgage on a farm.

So, when a court appoints a receiver of railroad property it has no right to make that receivership conditional upon the payment of other than those unsecured claims which by the rulings of this court have been declared to have an equitable priority, such as the claims for wages and supplies which are consumed and necessary for the continued operation of the road. No one is bound to sell to a railroad company or to work for it, and whoever has dealings with the company whose property is mortgaged must be assumed to have dealt with it upon the faith of his personal responsibility and not in expectation of subsequently displacing the priority of the mortgage liens. It is the exception and not the rule that such priority of liens can be displaced.

We emphasize this fact of the sacredness of contract liens for the reason that there seems to be growing an idea that the chancellor, in the exercise of his equitable powers, has unlimited discretion in this matter of the displacement of vested liens.

Destruction of the Liens.

Now, undoubtedly it is true that when a receiver is appointed of railroad property, street or steam railroad, there is a power vested in the court appointing, under certain conditions, to authorize the issue of receivers' certificates, and that those receivers' certificates are sometimes given priority over mortgage liens, but the rule is—notwithstanding I am forced to admit there have been some exceptions—the rule is, in the supreme court, and is emphasized in this case, that, as a general rule, no disturbance can be made of the contract obligations or its priority. And as these certificates are generally small with reference to the value of the property concerned, in this case it appears, I think, that \$822,000 of receivers' certificates are outstanding. Probably the condition of things required that something should be done to keep the plant in working, serviceable condition, and the amount is, relative to the value of the entire system, but a small amount.

But the case before us doesn't involve anything of that nature. We have before us this plan of reorganization, this order of the court, and the ordinance, and it seems to each one of us that it interferes most materially, substantially, in the destruction of the vested contract liens.

I have forgotten now the number, perhaps \$13,000,000 of mortgage bonds, I may not be right as to the figures; they were secured by specific contracts upon specific property. It was not displacing them slightly. The contract does not provide for displacing them slightly by the issue of a minor sum in receivers' certificates, but it takes the whole body of those contract obligations and puts them below a mortgage of from \$12,000,000 to \$15,000,000. It may be that it is wise, and I think we agree that it is a wise scheme, that that bond issue be made and that this railway system be unified and improved as contemplated in these ordinances. But it is not for the court to assume the function that it is wise and good business. Parties have vested rights.

Priority of the Liens.

Let me put the case in this way: Supposing the legislature had passed an act providing for the displacement of these mortgage liens and giving them security upon the property as it shall be perfected subsequent to the \$12,000,000 mortgage. Would a court, if the validity of that action of the legislature were before it, say that it was within the scope of legislative power thus to disturb priority of liens? And would the court sustain the act upon the theory that it believed the legislature was acting wisely, that it was a good business solution of difficult contingencies? Parties have inherent and sacred rights in property which cannot be disturbed except under the law of eminent domain or some provision of that kind when compensation is made for them. It does not lie in the power of the legislature or in the power of the courts materially to affect the liens themselves in the subject matter upon which they rest or their priority in point of time.

Now, here, of course, there could be no question upon that. It comes from all the discussions of counsel. This whole scheme assumes it is predicated upon the fact that the physical condition of the street railway system on the north side and west side is poor—that it needs improvement. The interests there are conflicting. The franchises are expiring or have expired. Rights are mingled, and the thing proceeds upon the theory that it is best for all interests that all these separate lines and separate corporate interests shall be merged in one corporation, whose duty it shall be to borrow money enough to put the physical property in good condition.

Now, that may be, and we think it is, a wise business proposition, and if the court had power to take hold of these things and do for the people who are mortgage bondholders that which it thinks best for them, we might have no hesitation in sustaining this; but every man in this court decides

this question in respect of his own property for himself. Life, liberty and the pursuit of happiness are guaranteed to each one of us. They are inalienable rights, and, because a man misjudges as to what is best for him, it gives to no court the right to step in and say, "We will fix this, because we think it is better that it should be fixed this way."

The provision is that this rehabilitating mortgage is not in terms limited. It is limited, however, by the fact that the money is to be borrowed, it is to be expended in the improvement of the unified system, and it is limited; and it is a fact, too, as stated by counsel who has just taken his seat, that a committee representing the city, a board of engineers I think you call it, has jurisdiction over the amount and character of the improvements.

Owners of Property Not Represented.

Now, what does that mean? It means that these improvements are not made according to the judgment of the bondholders. It means that they are not made according to the judgment of the present corporate owners of the property, either stockholders or bondholders, but it means that a body outside of them, not appointed by them, is charged with the responsibility of determining what shall be done in the way of improvement.

Now, I have no doubt, as was said by counsel, that the committee selected by the city of Chicago would act fairly and honestly, perhaps act with far better judgment than the trustees of these mortgages or the officers of the corporations themselves, being civil engineers and experts in their line of business, but at the same time no man is compelled to turn his property over to the control and management of another party. At least the courts are not charged with the duty, except in the case of insanity or imbecility, of taking a man's property and putting it into somebody else's hands to manage or determine how much expenditure is best for that property.

These voluntary organizations, which are common all over the country, do involve oftentimes a sort of moral pressure upon certain interests to concede something with the idea that they will get a larger benefit in the reorganization, but all those are voluntary; they are the action of the parties themselves. They are making new contracts. They are entering, in a certain sense, into a new relationship one with another, but it is because the individual is making the contract, and not because a court is making it for him.

In reference to this superintendence by this committee it is not provided, as I think, that that superintendence shall be under the judicial control of any court. The circuit court in making this order does not reserve to itself the power to supervise the action of the board of engineers, as it is called. The matter is intrusted, a business proposition, wisely, to men who are more competent probably than a court would be, but it is a giving up of judicial control of these properties in the rehabilitation to a committee not selected by the owners, appointed by the city, and not within judicial control.

I was going to read the provisions, but I hardly think it is necessary that I should, where the city names one engineer and the company the other—that is, the company which takes this property—and a third gentleman, Mr. Arnold, is "hereby selected and appointed as a third member," yet he holds life by the same tenure that the rest of us do and may not live long, and who the city or the committee will appoint in his place cannot be foreshadowed. At any rate, the personnel—I do not mean to cast any reflection upon the action of these men or upon the probabilities of the city selecting good men, but it is a selection not made by the present owners of the property. It is a selection made by a new party who becomes a lessee and practical owner of the property.

As I said a while ago, it is conceded that the amount of this rehabilitating mortgage is uncertain. It is limited in two or three ways, but it is, as shown in the plan of reorganization, something uncertain and no man can tell positively how much it will be, as the amount which will be needed for these purposes cannot be fixed with exactness. It is impossible to specify a limitation in respect of the authorized issue, and hence such amount must be left without limitation except as to the purposes for which such bonds may lawfully be authenticated under the mortgages.

We, of course, have been mindful in our conclusions of the fact that a week from this time is the expiration of the time fixed for the acceptance, and thinking perhaps that during the week the parties might come to some agreement in reference to the disposition that should be made of this property, believing as we do that the system proposed has its great advantages, and so, without stopping to write in full our views upon this or any other question, we announce our decision orally. At the same time, we reserve a right, each man of us, to put in writing such further expression as may seem to any one of us to be meet.

The order will be that the order made by the circuit court is set aside and the case remanded for further proceedings.

PIPING AND POWER STATION SYSTEMS—LIII.

BY W. L. MORRIS, M. E.

The velocity through the filter shown in Figure 314, would be about three feet per hour if none of the area were occupied by filtering material, but as the area through a filter bed is only about 25 per cent of the total area of the filter, the velocity through the filtering material will be about 12 feet an hour. A filter bed used, as shown in Figure 314, is not subjected to the same exacting requirements as the one used in the chemical system shown in Figure 66. In the filter shown in Figure 314 the water is constantly being repassed through the filter and if the filter bed does not remove the extremely fine particles but little harm will result from their presence, since the water must be practically at rest before they will settle.

Filters such as shown in Figure 66 ordinarily have about one square foot of filter bed for each 30-horsepower capacity. That shown in Figure 314 has about one-third of a square foot for each horsepower, but as it must pass boiler water as well as the feedwater, the area may be anywhere from 0.08 to 0.166 square feet per horsepower.

The system shown in Figure 314 has many commendable features. First, impurities which may pass through the purifier are returned again and they may then be removed.

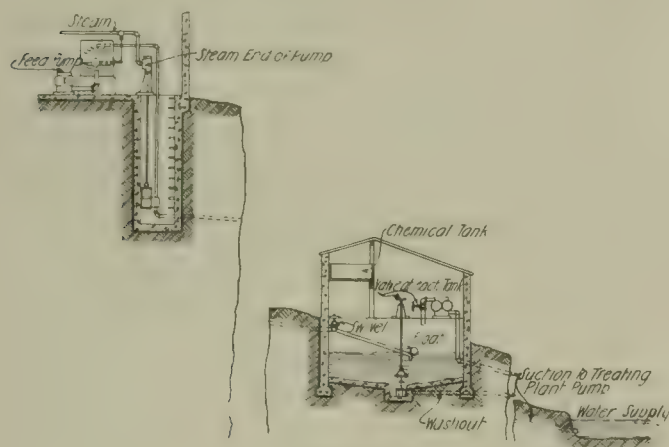


Figure 315 (N 4-1).

Second, the feedwater is raised to a high temperature before being fed to the boiler and many of the impurities are thus removed before reaching the boiler. Third, the discharge of impurities is easily accomplished, avoiding the expenditure of time and labor removing hard scale. Fourth, the purifier is located at a low point where it is easy to reach and support. Fifth, as it is located at a low point, it is easy to protect it from radiation such as is common with live steam purifiers. Sixth, the simplicity of the parts makes it an inexpensive system to install. Seventh, no expenditure is required for chemicals or other materials required in performing its work.

Water Treatment Minor Connection—Class N 4.

Intermittent chemical treating systems require a considerable amount of piping for their installation, due largely to the fact that separate pumps and heaters are generally required. In the water treating plant the pump is used solely in forcing water into the large tank. Steam may be brought from the main station to the chemical building, and instead of exhausting the pump into the main heater, the steam from the pump may be fed to a heater to be used for raising the temperature of the water before it is delivered into the treating tank.

In addition to the steam line to the treating plant there would be a line from the condenser discharge and a line from the intake. A pipe also would be required for delivering treated water to the boiler feed pump in the power house. If the treating tanks are placed more than 14 feet below the

feed pump and an open heater is used, the discharge from the tank should be run at a low elevation to a pump located as shown in Figure 315 (N 4-1). The steam supply to this pump is controlled by a ball float operated valve located at the heater, as shown.

If an open heater is used, this system of controlling the water to the heater is very satisfactory, and in most cases permits the use of a standard pump with the water cylinder on the level of the boiler room floor. Only in exceptional cases would the water supply be so far below the boiler room floor that it would necessitate placing the water end in the well, as shown in Figure 315.

The bottom of the precipitation tank should be far enough above the supply water line to insure an ample drop for the wash-out line which is used for discharging the precipitate. There should be hose connections to the pump in the chemical house, as it is necessary to wash out the settling tanks. These tanks should not be washed out very often, since it is found in practice that the agitation of the old sludge aids in carrying down the finer precipitate when it is first formed, and it therefore is beneficial to keep some of the old mud in the tanks at all times.

Figure 315 shows a water tank constructed of concrete. Before deciding upon the use of concrete for this purpose it would be well to submit the concrete materials to a chemist, together with a sample of the water. The decision to use such materials would depend upon the character of the water and the reagents necessary to treat it. Wood is very extensively used for chemical treating tanks, as iron deteriorates rapidly. In any case the tanks should be round in shape with a mechanically driven agitator (motor-driven or otherwise).

Cold water must be agitated longer than warm water. Water at 35 degrees must be agitated for about three hours to complete the chemical reactions and about 1½ hours at 90 degrees and about one hour at 170 degrees. If the tanks are not continuously agitated while chemical action is taking place, the chemicals fall to the bottom and thus a large proportion of the chemicals is wasted. If the water is brought to a state of rest the precipitation is quite rapid, 15 minutes generally being sufficient.

A complete plant for treating 600,000 gallons of water per day costs about \$10,000. Ordinarily the total cost, including interest on the investment, depreciation, labor, materials, etc., is from two to five cents per 1,000 gallons of water treated, depending upon the character of the water, chemicals required and the amount of labor needed to operate the plant. Assuming a cost of four cents per 1,000 gallons for treating the water and that the plant is run at its full capacity 16 hours a day for 30 days, the total cost of treating the water (1,920,000 gallons) would be about \$75, provided that special employees were not needed to operate the treating plant.

A chemical treating plant for 1,000 horsepower capacity would be much smaller than the 600,000-gallon plant previously mentioned and therefore the cost of installation per gallon of capacity would be somewhat greater. Boilers of 1,000 horsepower capacity require 4,000 gallons of water per hour. Consequently, if the tanks are changed every eight hours they must have a capacity of 32,000 gallons each or 96,000 gallons per day. The portion of the tanks holding water would then be about 20 feet in diameter and 14 feet high.

These tanks would have double the capacity if the water were changed every four hours instead of every eight hours. The chemical holding tank should be round, as the circular form of tank is best suited to use in conjunction with an agitator. If a tank is required for mixing the chemicals before they are fed into the precipitating tank, the water fed into the precipitating tank should be passed through the chemical measuring device and from there into the large tank, thus insuring that all the chemicals weighed out are emptied into the precipitating tank.

(To be continued)

News of the Week

Brooklyn Tunnel Safe.

William Barclay Parsons, consulting engineer of the Interborough Rapid Transit Company, made an inspection of the Brooklyn tunnel on September 7 and after spending four hours in the tubes said that the tunnel was absolutely safe. "The reports which have been published intimating that there was something wrong with the tunnel," he said, "have arisen from the fact that those sections of the tubes which run through quicksands have had piles driven under them and to add to the stability of the tubes and to prevent leaking an inner wall of concrete has been built at the points where some of the sections come together." Mr. Parsons said that the work of putting in this extra lining was begun more than two months ago with the consent of Chief Engineer Rice of the public service commission. He added that the additional work would not delay the opening of the tunnel and that it would be finished in time to allow of the operation of trains about the end of October.

More Steel in Car Frames.

In commenting on the accident on the Central Illinois Traction Company on August 30, in which 15 passengers were killed, L. E. Fischer, general manager of the Illinois Traction System, said last week that more attention must be paid to the construction of interurban car bodies, in order to lessen the number of injuries when collisions occur and that in the future all cars ordered for his system would have more steel in the underframe. Mr. Fischer is quoted as follows:

"The safety of the passengers rests primarily with the trainmen. If the men are carefully selected for their trustworthiness and reliability, and the lines are diligently supervised, the chance of accident is cut down to a minimum. But if there is mishap, then it depends on the car, and that is a point we are giving the closest attention.

"The cars that the Illinois Traction System is operating now are steel braced, and they have demonstrated that their occupants are safe in a shock that would rend a wood car to pieces. There was the trouble in some recent accidents—the frail wooden cars collapsing like kindling and affording little protection to the passengers. Our new cars are to be even stronger, with cross bracing of steel in the framework throughout, making them very solid and strong. That is the type that experience has demonstrated to be the safe one for long runs and high speed. The rickety, cheap car is dangerous, and its use inadvisable."

Mr. Fischer has issued a bulletin calling the attention of the company's trainmen to the Charleston accident, saying that this should forcibly remind them of the necessity of living up to all the small operating regulations, although only one passenger has ever been killed on the system.

New York Public Service Investigation.

The investigation by the New York public service commission of the first district into the financial and operating conditions brought about by the Interborough-Metropolitan merger and the previous consolidations was continued on September 5 and 6.

At the hearing on September 5 a letter from August Belmont was read, which explained to some extent the system of bookkeeping by which certain items were charged against the subway equipment account of the Interborough Rapid Transit Company, as testified by President Bryan and Auditor Gaynor on August 21. With the letter was included some correspondence between Mr. Belmont and Mr. Gaynor. Mr. Belmont said an injustice had been done by the creation of the impression that August Belmont & Co. had received \$450,000 commission on an issue of \$15,000,000 of notes of the Interborough Rapid Transit Company; that this represented a discount of 3 per cent which the company was obliged to allow in selling its notes at 97; that the notes were distributed by August Belmont & Co. among three banking houses and the firm's commission on the deal amounted to only \$37,500. Mr. Gaynor, as auditor of the company, was responsible for the methods of bookkeeping, and he had been asked to explain the reasons why certain items had been charged to construction account. Considerable misapprehension had arisen with regard to these accounts, because the subway equipment account was the only construction account the company had, but this account in no way affected the company's relations with the city, because the contract with the city provides that the property shall be purchased at a reasonable price as fixed by appraisal. Mr. Ivins said Mr. Gaynor would be given an opportunity to make an explanation later.

Mr. Ivins then took up the 999-year lease of the Metropolitan Street Railway to the New York City Railway and had read three agreements between the Metropolitan Securities Company, the Interborough-Metropolitan Company and the New York City Railway, which provided for a maze of financial operations affecting the lease. A copy of the lease, which was filed in 1902, was also put on record.

Oren Root, Jr., general manager of the New York City Railway Company, was then put on the stand to testify with regard to the lease. From his testimony and the records in possession of the commission it appeared that the purpose of the lease of the Metropolitan Street Railway to the New York City Railway was to secure a guarantee of a 7 per cent rental, in place of 7 per cent dividends, which it was doubtful whether the company could earn, on account of the competition from the subway, and that the New York City Railway was owned by the Metropolitan Securities Company, most of whose stockholders were the same as those of the Metropolitan Street Railway. The Securities company was to furnish \$23,000,000, of which \$11,000,000 was to be used to pay the floating debt of the Metropolitan Street Railway and the remainder to reconstruct the horse car lines. The company's estimates in 1902 provided for about \$12,000,000 to be expended in electrifying 75.9 miles of track. Mr. Root testified that 36.81 miles of this amount had been electrified. However, the three agreements between the Interborough-Metropolitan, the Metropolitan Securities and the New York City Railway, previously mentioned, show that the \$23,000,000 has been used up, although the electrification is not yet complete. With regard to the \$11,000,000 to be used for retiring the floating debt, about \$5,000,000 has not yet been accounted for to the commission.

In this connection Mr. Ivins read several sections from the penal code relating to the destruction of records, to the improper payment of dividends from other sources than surplus profits and to the application of any portion of the funds of corporations except surplus profits directly or indirectly to the purchase of shares of their own stock. He will seek to show that the New York City Railway is thus paying dividends not earned in the guise of rentals, and states that he intends to bring these matters to the attention of District Attorney Jerome.

Mr. Root also testified that there are 65.74 miles of horse car lines now operated in New York. The Twenty-eighth and Twenty-ninth street routes, he said, would have been electrified this year, but that the permission of the city authorities had been granted too late to complete the work before winter. Mr. Ivins went at great length into the details of the mileage, traffic conditions and the operating schedules of the many horse car lines still in service. Mr. Root agreed that in the case of most of these there was no physical obstacle to turning them into electric lines, but he contended that the traffic on many of the horse car lines was so light that there was no justification for the expenditure needed to electrify them.

The investigation will not be resumed until some time next week.

The commission has been considerably hampered in the investigation by the refusal of the Interborough-Metropolitan Company to allow an examination of its books. As previously announced, the company was ordered last week to show its books before September 5, but as there was some delay about serving the order the time has been extended to September 17. The Metropolitan Securities Company has also been ordered to open its books to the commission.

Annual Meeting of Colorado Association.—The annual meeting of the Colorado Electric Light, Power and Railway Association will be held next week at Denver, Colo., on September 18, 19 and 20. J. F. Dostal, 405 Seventeenth street, Denver, is secretary of the association.

Illinois Mayors in Favor of Electric Railway Commission.—The Illinois Mayors' Association, which has been in session at Bloomington, Ill., this week, has adopted a resolution favoring the election of state railroad and warehouse commissioners by the people and the creation by the legislature of a commission of three members with jurisdiction over the electric railways.

Wells, Fargo & Co. to Handle Des Moines Express Service.—Wells, Fargo & Co. have recently taken over the express business on the Inter-Urban Railway of Des Moines, Ia., and will station agents on the railway company's express cars running between Des Moines and Woodward, Perry and Colfax. The interurban company has handled the business itself heretofore, but believes that its patrons will be better served by the express company.

Electrical Show, New York.—The management of the Electrical Show announces that during the nine days of the show, from September 30 to October 9, inclusive, the Street Railway Association of the State of New York and the Empire

State Gas and Electric Association will hold a joint convention in the concert hall, Madison Square garden. The headquarters of the management of the electrical show are at 116 Nassau street, New York. George F. Parker is president of the exposition company.

Richmond Ordinance Enjoined.—Judge Baker of the United States district court at Indianapolis on September 5 issued an injunction restraining the city of Richmond, Ind., from enforcing an ordinance prohibiting the Terre Haute Indianapolis & Eastern Traction Company and the Dayton & Western Traction Company from operating their cars through the city. The ordinance became effective at midnight on September 5 and the police had been ordered to stop the cars but the injunction papers were served before any arrests were made. The case has been called for a hearing in Judge Baker's court on October 7. The dispute with the city is in regard to the expiration of the company's franchises.

Constitutionality of Pennsylvania Fare Law Attacked.—The Pittsburgh Railways Company has attacked the constitutionality of the Kennedy law, passed at the last session of the legislature, which prohibits street railway companies in cities of the second class from charging more than a five-cent fare, and thus prevents the company from charging 10 cents fare on its night cars between 12 p. m. and 5 a. m. The company has filed a demurrer in a suit brought by William Ashforth in the common pleas court to recover damages for having been ejected from a car for refusing to pay 10 cents fare, in which the act is claimed to be special and local legislation, as it affects only two companies in the state.

Louisville (Ky.) Strike is Averted.—The threatened strike of the employees of the Louisville Railway Company, which was voted for on August 26, because of alleged discrimination by the company in favor of non-union men, is believed to have been averted through the offices of Mayor Bingham, who has obtained from the representatives of the company a promise that no discrimination will be made against union men. At a meeting of 300 of the strikers on September 7 a resolution embodying plans for a settlement of the strike was unanimously adopted, with the provision, however, that, in case a settlement of the question in relation to the discharged men is not assured, the question of striking will be reopened by the employees.

Reports that Brooklyn Subway Project Will be Abandoned.—Citizens of Brooklyn have been greatly exercised of late by reports that the public service commission had practically decided not to award contracts for the construction of the Fourth avenue subway. The plans and form of contract were prepared by the old rapid transit commission, but the present commission is said to be in doubt as to whether the subway would be a profitable investment, as the route in many places lies through a thinly settled section. On account of these reports several indignation meetings have been held in Brooklyn urging the construction of the subway and protesting against the inaction of the commission. However, the commission has made no official announcement as yet as to its intentions.

New York Railroad Club.—It is announced that the next regular meeting of the New York Railroad Club will be held in the United Engineering Societies' building on Friday evening, September 20. Max Toltz of St. Paul, Minn., vice-president and general manager of the Manistee & Grand Rapids Railroad, will present a paper on "Steam Locomotive Versus Electric Locomotive." An invitation to formally discuss the paper has been accepted by Samuel Vaucrain of the Baldwin Locomotive Works, Philadelphia; C. A. Seley, mechanical engineer Chicago Rock Island & Pacific Railway, Chicago, Ill.; George Gibbs, chief engineer Pennsylvania Tunnel & Terminal Railroad, New York City; J. E. Muhlfeld, superintendent of motive power Baltimore & Ohio Railroad, Baltimore, Md.; and H. H. Vaughan, assistant to the vice-president Canadian Pacific Railway, Montreal, Que.

Utah Light & Railway Company Moves to New Quarters.—The general offices of the Utah Light & Railway Company have been moved to the Tribune building on West Temple street, Salt Lake City. The building recently has been remodeled at a cost of \$30,000 and will afford commodious quarters for the several departments of the railway company. The first floor will be occupied by the treasurer, city commercial agent and the superintendents of the following departments: Street railway service, construction, transmission lines, city electric service and gas. The general manager, auditor and assistant secretary will occupy the second floor, while the third floor will be given up entirely to the engineering department. Another improvement to follow later, if present plans are carried out, will be the erection in the rear and at the south of its present quarters of a large passenger suburban station for its electric lines.

Construction News

FRANCHISES.

Billings, Mont.—A special election will be held on September 14 to vote on the question of granting a franchise to the Yegen Company for the construction of an electric railway in this city and to several nearby towns. The line will carry both passengers and freight and if the franchise is granted work is to be started at once. It is stated that the plant for furnishing the power already has been completed.

El Paso, Tex.—Application for a franchise has been made to the county commissioners of El Paso county by J. W. Gibbs for the construction of a passenger and freight electric line from El Paso to Ysleta and on to San Elizario by way of Socorro. Work is to commence within three months of the date of the franchise, be completed to Ysleta within a year and to San Elizario within three years.

Memphis, Tenn.—The Memphis Light & Traction Company, a new company formed for the purpose of constructing and operating an electric railway in New South Memphis and to develop the Vance property south of the city for park purposes, applied for a franchise on September 6, covering a direct route through Memphis. The line will bisect the South Memphis lines of the Memphis Street Railway in South Memphis and afford a direct route to the business section of Memphis. Permission to establish a terminal at Monroe avenue and South Front street is covered in the application. K. D. McKellar is the local representative of the company.

Patoka, Ind.—The Evansville & Southern Indiana Railway Company has been granted a franchise for the operation of its interurban line in Patoka. Work on the extension of the line from Princeton to Patoka, about four miles, will soon be started.

Quincy, Ill.—The St. Louis Terre Haute & Quincy Traction Company has secured a 50-year franchise for entrance into the city with its interurban line. Between two and three miles of track will be laid in Quincy for the operation of cars through the business section. E. C. Barclay, Springfield, Ill., is secretary.

Salisbury, N. C.—The Piedmont-Carolina Railway Company has been granted a franchise for a belt line railway from Newton Heights to Salisbury and to a point near the new fair grounds.

Toledo, O.—A perpetual franchise has been granted to the Lima & Toledo Traction Company for the operation of its interurban line in Toledo. The company is to enter the city at grade over its own right of way along the canal and inside of 10 years must lower its tracks at its own expense.

Traverse City, Mich.—The voters of this city have recently voted, 865 to 39, in favor of granting a 60-year franchise for an electric railway to the Carter Construction Company of Chicago. It is proposed to build a local street railway system and also an interurban line from Traverse City to Petoskey.

Walla Walla, Wash.—C. L. Whitney of Walla Walla has applied for a franchise for an electric railway from the corner of Fourth and Alder streets to the fair grounds. This application is the result of the action of the Walla Walla Valley Traction Company, which decided not to build a line to the fair grounds in time for the fair this fall.

Wilmington, Cal.—The Pacific Electric Railway has secured the franchise asked for some time ago, for permission to run its tracks around the edge of the inner harbor to a connection with its San Pedro tracks. The company agrees to give the city of Wilmington permission at any time to establish openings to the water's edge. By the securing of this franchise the company is released from the necessity of constructing an expensive drawbridge at the point where its tracks now cross the bay.

Woodland, Cal.—O. V. Gwinn, representing the Northern Electric Company of Chico, Cal., has applied for a franchise to operate its interurban line in Woodland.

RECENT INCORPORATIONS.

Americus (Ga.) Railway & Light Company, Americus, Ga.—Incorporated in Georgia to build and operate an electric street railway, electric light and power plant in Americus, Ga. Capital stock, \$250,000. Incorporators: Congressman E. B. Lewis of the Third district; W. A. Dodson, Americus; and others.

Independence North & South Railroad.—Incorporated in Kansas to build a 200-mile system of interurban lines, radiating from Kansas City, West Side, and passing through Wyandotte, Douglas, Johnson, Miami, Coffey, Anderson, Linn, Woodson, Allen, Bourbon, Wilson, Neosho, Chautauqua, Montgomery and Labette counties. According to its charter the company may use steam, electricity, compressed air, gas or cables for the operation of its lines. Capital stock, \$10,000. Incorporators: C. S. Leeds and F. C. Daniels.

New South Investment Company.—Incorporated in North Carolina to build and operate an electric railway. Capital stock, \$5,000,000. Incorporators: Cornelius O'Connor of New York; Frederick H. Payne of Williamsport, Pa.; D. W. Noel of New York; and L. L. Gaskill of Salisbury.

TRACK AND ROADWAY.

Albia, Ia.—A meeting has been held by interested citizens of this place to consider a proposed extension to Hiteman, Ia., of the interurban line entering the city from the south. The line will cost about \$60,000.

Aurora Elgin & Chicago Railway.—It is reported that this company contemplates the construction of a bridge over Main street, Aurora, Ill., at a cost of \$100,000. Charles Jones, chief engineer, Wheaton, Ill.

Austin, Tex.—Announcement is made of a new interurban railway proposition for this section. It is stated that Cleveland and Columbus capitalists are considering the construction of an electric line from this city to Fredericksburg, about 75 miles, which, if built, will serve a rich farming section at present without railroad facilities. A costly bridge over the Colorado river is stated to be the only obstacle to building the road. It is thought that possibly a combination of the city, county and electric railway interests toward the construction of the bridge may be effected.

Beloit (Wis.) Traction Company.—O. S. Baylies, secretary and treasurer, Chicago, Ill., writes that this company has laid 5½ miles of track this year in the streets of Beloit, Wis. Power is purchased from the Rockford & Interurban Railway. Joel B. Dow of Beloit is president and Edward Main of Rockford, Ill., is chief engineer.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—Work on this company's proposed interurban line between Eburne and New Westminster has been begun between New Westminster and Chilliwack. The line will be 62 miles long and when completed will afford connection to all important points in the lower mainland. It will cost approximately \$1,500,000 and will take two years for its construction. Orders will be placed in the near future for the material needed in the overhead work.

Brownsville Carmichaels & Waynesburg Railway, Brownsville, Pa.—This company has awarded a construction contract to the Masontown Construction Company. The line will connect the towns named in the title, a distance of about 15 miles. Surveys are under way, franchises have been obtained and work is expected to be started in October.

Brunswick & Middletown Electric Railroad, Philadelphia, Pa.—John S. Mallette, chief engineer, states that this company was recently granted a franchise to build its line in Brunswick, Md. The company also proposes to extend from Brunswick to Petersville, Burkittsville, Broad Run and Middletown, 15 miles. The preliminary surveys have been made and a portion of the right of way secured. Construction will start in the spring. W. Schnauffer of Brunswick is president.

Buena Vista, Colo.—Charles A. Reiss of New York is interesting citizens of this town and vicinity in a proposition to build an electric railway connecting Buena Vista with the mineral district known as Taylor Park. It is the intention to build 12 miles during the next year. At a mass meeting last week several thousand dollars were subscribed toward the project.

Canandaigua Southern Electric Railway, Canandaigua, N. Y.—At a meeting of the directors and stockholders of this company, held in Canandaigua on September 5, announcement was made that plans for extending the road from Atlanta to Wayland, N. Y., and thence to Hornell by way of the Pittsburgh & Shawmut (steam) Railroad, are under consideration. If the plans are carried out the Pittsburgh & Shawmut road would be converted for electrical operation. Application for a franchise in Wayland was made some time ago, but later withdrawn on account of the opposition of the Rochester, Corning & Elmira electric road, which already has a franchise in that village. It is stated that with the revival of the proposed extension proposition another application will be made in Wayland. George H. Switzer of Bath, N. Y., is president.

Carthage, Mo.—Surveys for a proposed electric railway

from this city to Alba and Purcell, Mo., have been completed. As now proposed the line will traverse Third and Olive streets in Carthage and go north to the fair grounds, where it will cross the river and touch the stone quarries at the west end of the Missouri Pacific Railway. It is also planned to form a loop by running a spur line east on the north side of the river at Carthage, touching all of the quarries, connecting with the main line in the city. The maximum grade of the route as laid out is 2 per cent. Ira D. Hedrick, chief engineer.

Clio, S. C.—A committee has been appointed to consider plans for an electric railway from Clio to Bennettsville, S. C., 10 miles. Right of way has been secured but the capital has not yet been obtained.

Cincinnati Dayton & Ft. Wayne Traction Company.—Dr. Samuel F. George of Dayton, O., who is promoting this interurban line, announces that the Cincinnati-Dayton section will be built first with the intention of having that part of the road in operation within a year. The location of the Cincinnati terminal has not been decided upon, although there is a possibility that Brighton may be chosen. Right of way is being secured in Hamilton county.

Cincinnati Northern Traction Company, Hamilton, O.—Work on the construction of this company's new line between Hamilton and Middletown, O., has been suspended indefinitely on account of the litigation now pending between the company and the Pittsburgh Cincinnati Chicago & St. Louis and the Cincinnati Hamilton & Dayton railways regarding the crossing of the steam railways by the traction company's line. The road was to have been completed some time this year. J. C. Carland & Co., Toledo, O., have the contract for building the road.

Consolidated Railway, New Haven, Conn.—A force of men is now engaged in completing the stringing of the wires on the Rockville branch of this company's lines. The main line between Rockville and Melrose has been completed, the work now in progress being that on sidings in the railroad and coal yards. It is said that through service between Hartford and Rockville will be inaugurated within a short time.

Davenport & Dubuque Railway.—It is reported that this company will be organized soon to build a railway to connect Davenport, Maquoketa and Dubuque, Ia. T. M. Jenkins of St. Louis; O. Sampson, T. Daudel and J. L. Kinley of Andrew, Ia.; C. W. Farr of Maquoketa; and W. S. Hill of Ellwood are reported to be interested.

Dayton & Troy Electric Railway, Dayton, O.—This company is extending its second track north of Troy and at present has about 18 miles out of 31 double-tracked. The balance will be double-tracked as rapidly as possible.

Denver, Colo.—The Interurban Construction Company, which is to build an interurban line from Denver to Greeley, Colo., will start final surveys next week. Franchises and right of way in Denver, Adams and Weld counties have been acquired. The system will cost approximately \$1,500,000. It is stated that financial arrangements have been concluded with Kansas City capitalists who have agreed to take the bonds to be issued. E. N. Reaser is interested.

Enterprise Transportation Company, Boston, Mass.—This company has just completed the building of an electric railroad from its wharves in Fall River, Mass., to connect with the main line of the Old Colony Street Railway, enabling it to carry passengers to Boston.

Eugene & Eastern Railway, Eugene, Ore.—This company, which is building a street railway in Eugene and an interurban electric line from Eugene to Springfield, Ore., has awarded the contract for a bridge over the Willamette river at Springfield to L. N. Roney of Eugene. The proposed structure will be of wood, to be replaced in the course of a few years by a steel structure. It is planned to start work at once in order that the piers may be placed before the high water of fall and winter. Permission has been secured from the county court for the construction of its line along the county road at Judkins' Point, a rocky bluff between Eugene and Springfield, and along the Southern Pacific tracks, eliminating a wide detour which otherwise would have to be made around a big hill. Three cars ordered from St. Louis are en route.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—It is announced that the work of grading on the extension to Patoka, Ind., will begin within a few days.

Ft. Worth-Mineral Wells Interurban Railway, Mineral Wells, Tex.—The final surveys for this line were started on September 3 by engineers representing the American Engineering Company of Indianapolis, Ind., which has been awarded the contract for the construction of the line. It is stated that stock to the amount of \$200,000 has been subscribed. J. W. Beardsley, Mineral Wells, is interested.

Indiana Columbus & Eastern Traction Company, Columbus, O.—This company has accepted the franchise recently granted by the Springfield (O.) city council and will proceed at once to make the repairs and other improvements specified in the ordinance. These include the laying of new tracks through the park, repairing its track in other sections of the city and the construction of a new terminal station.

Interborough Rapid Transit Company.—The Bradley Contracting Company has started work on the Brooklyn loop lines on Section 904, east of the Bowery, and on Section 901, south of Duane street. The east station at Two Hundred and Twenty-fifth street, on the elevated extension of the subway a short distance north of the bridge over the ship canal, is now being used regularly and it is announced that the verbal consents of property owners for the erection of the stations on the elevated system on Broadway, at Two Hundred and Thirty-first street and Two Hundred and Thirty-eighth street, have been secured.

International Railway, Buffalo, N. Y.—The work of laying the rails of this company's line in Franklin avenue, which was started some time ago, has been delayed owing to a strike at the steel mills of the company which had the contract for furnishing the steel for the special crossings and curves. Pending a settlement of the Elmwood avenue extension project which is now in the hands of a commission appointed by the supreme court to decide if the railway shall double-track its line in Elmwood avenue between North and Virginia, the work on the Franklin avenue line was started as a step toward relieving the congestion in Main street. It is now thought that the line cannot be finished before next spring.

Jacksonville, Fla.—George W. Clark is reported to have given a bond to the board of county commissioners for \$10,000 to guarantee the building of a railroad from the city limits to Panama park within a year.

Johnstown Passenger Railway, Johnstown, Pa.—It is reported that this company proposes to build an extension to Richland and Stony Creek, provided right of way is furnished. F. T. Young is manager.

Kansas City, Mo.—It is stated that a company has been organized to take over the interurban line which R. G. Rawlings of Chanute, Kan., has been promoting from Chanute to Parsons, Cherryvale, Coffeyville and Independence, Kan. Work on the construction of the line will be started from Parsons in the near future and be pushed as rapidly as possible. Power will be distributed to the lines of the system from a power house to be built at Cherryvale, although gasoline motor cars of the type used by the Union Pacific may be used on a part of the system. W. B. Henderson, Kansas City, is interested in the new organization.

Kent County & Delaware Bay Railway.—Private right of way is being sought by this company for its proposed interurban line from Delaware City to Milford, Del., by way of Odessa, Townsend, Smyrna and Dover. It is stated that New York capitalists hold the bonds of the company and are financing the project.

Kittanning & Leechburg Railways, Kittanning, Pa.—It is stated that this company is planning a three-mile extension to its present line and the construction of a 90-foot iron span bridge.

Lancaster Oxford & Southern Railroad, Lancaster, Pa.—It is reported that the management has decided to convert this road into an electric railway, securing power from the McCall's Ferry power plant. W. M. Franklin, president.

Ludington Southern Railway, Ludington, Mich.—It is now stated that the electric railway between Ludington and Grand Rapids, Mich., will be completed within a year. The promoters state that 80 per cent of the right of way has been obtained and that eastern capitalists are ready to furnish \$285,000 as soon as the farmers along the road subscribe \$15,000. Several miles of the road have already been graded between Ludington and Pentwater, Mich.

Milwaukee Electric Railway & Light Company.—John I. Beggs, president, is reported as announcing that approximately \$50,000 will be expended in improving the street railway service to the fair grounds and that through trains from the Public Service building to the grounds will be one of the improvements. These improvements will not be started until next year.

Mississippi Valley Electric Railway, Nauvoo, Ill.—This company has commenced grading on a proposed line between Ft. Madison and Keokuk, Ia., and Hamilton, Carthage and Nauvoo, Ill., a distance of 42 miles. T. T. Luttgerding of Eldorado, Kan., has the grading contract. The Federal Construction Company of New York is the general contractor.

Mt. Hood Railway & Power Company, Portland, Ore.—As soon as the work now in progress on this company's power house has advanced satisfactorily a force of men will begin grading on its interurban line between this city and Mt. Hood. Several surveys have been made, but the choice of the exact route has not been announced. E. P. Clark of Los Angeles, president of the company, states that the initial investment will represent about \$2,000,000, while nearly twice that amount will have been spent at the completion of the road, which it is planned to have in operation within a year. Announcement also is made that the company will acquire private right of way in Portland by purchase instead of accepting the franchise granted some time ago. This action, while entailing considerable expense at the present time, is thought to be advisable because of the life of the franchise, which is 25 years. This period is not considered sufficient in which to place the road on a paying basis and allow for heavy tolls to the city or possible difficulties with future administrations.

Nashville (Tenn.) Interurban Railway.—H. H. Mayberry announces that this company expects to be operating cars between Franklin and Nashville, Tenn., by March of next year. Considerable difficulty has been experienced in securing right of way, but now all of the necessary right of way between Nashville and Franklin, and 95 per cent of the right of way between Franklin and Mt. Pleasant, by way of Columbia, has been secured. A large force is now at work on the grading. The road will be built and operated in sections, the first one being from Nashville to Franklin, the second from Franklin to Columbia and the third from Columbia to Mt. Pleasant. D. A. Proctor, chief engineer.

New York Westchester & Boston Railway, New York, N. Y.—Justice Dayton of the New York supreme court has issued a temporary injunction restraining this company from granting the use of its tracks within the city limits of New York to the New York & Portchester Railway.

Niagara St. Catherines & Toronto Railway, St. Catherines, Ont.—This company has secured options for the right of way from Welland to Port Colborne, Ont., and it is stated that the line probably will be built next year. The line from Welland to St. Catherines is expected to be completed during the present month.

North Alabama Traction Company, New Decatur, Ala.—Work on the half-mile extension of this company's line, which will complete its loop in Decatur and New Decatur, will soon be started. It is announced that other improvements aggregating about \$10,000, including the raising and lowering of street grades and paving between tracks, will be made. Ordinances already have been introduced in the city councils of Decatur and New Decatur providing for these improvements.

Northwestern Interurban Railway, Grand Forks, N. D.—J. L. Lamprecht and Dr. Stewart of Minneapolis are working on plans for the incorporation of this company with a capital stock of \$1,000,000 for the purpose of building electric street railways in Grand Forks and Crookston, N. D., and interurban lines connecting the two cities and connecting with Crookston and the Soo line.

Oakdale & McDonald Street Railway, Oakdale, Pa.—This company has just completed a new line $3\frac{1}{2}$ miles long, connecting Oakdale and McDonald, Pa. It is stated that the road will eventually be extended to Burgettstown and later to Steubenville, O.

Oakland (Cal.) Traction Company.—Following its plan to relieve the congestion of traffic in Shattuck avenue in the central business district of Berkeley, this company has begun the work of placing poles for the overhead line on its Telegraph avenue extension, for which franchises already have been secured. Work on the laying of the tracks will be started in the near future.

Ohio Electric Railway, Cincinnati, O.—It is reported that this company, which has just effected a consolidation of the Indiana Columbus & Eastern Traction Company with the Lima & Toledo Traction Company, is planning to extend its line east from Zanesville, O., in order to gain a direct connection with Pittsburg, Pa., by building to a connection with the lines of the Beaver Valley Traction Company and gaining an entrance to Pittsburg over the lines of the Pittsburg Railways Company.

Oneida Railway, Oneida, N. Y.—Surveys for this company's extension to Kenwood are now being made.

Phillipsburg, N. J.—Announcement is made of the organization of capitalists of this city for the purpose of building an electric railway from Phillipsburg to Clinton, N. J., where it will connect with other lines. The road will be about

30 miles long and will pass through Stewartsville, Bloomsbury, Asbury, New Hampton Junction, Glen Gardner and High Bridge.

Pittsburg Railways Company.—This company has leased the old Pittsburg & Castle Shannon narrow-gauge steam railroad and plans are under way to convert it into a modern interurban line. It is stated that probably by the first of the year the Charleroi cars will be running over the new line. It is also reported that this company has completed plans for an extension of its interurban system from Finleyville on the Pittsburg-Charleroi line to Bentleyville and thence to Waynesburg.

Pueblo, Colo.—N. C. Vannata is preparing to begin surveys for the proposed line from Pueblo to Fowler, Colo., for which N. Douthitt is seeking a franchise.

Pullman La Crosse & Columbia River Railroad.—It is reported that the surveys for this line, passing about 10 miles south of Colfax, Wash., through Union Flat, are about completed. J. O. Staats of La Crosse has charge of the surveying.

Red Lodge, Mont.—At a meeting of the board of trade held recently for the purpose, it was decided to take steps toward the construction of an electric railway from Red Lodge to the Bear Creek coal mining camp. Estimates on the necessary grades and approximate cost of the construction of the line will be secured at once. It is stated that the Amalgamated Copper Company is interested in the Bear Creek coal properties, which it intends to develop for the purpose of securing sufficient fuel to run its smelters at Butte and Anaconda.

St. Johns Light & Power Company, St. Augustine, Fla.—Steady progress is reported on the work of converting this company's steam railway running to South Beach, Fla., for electrical operation. The wires have been strung over the South Beach bridge and trolley cars were operated over this portion of the line on September 5. It is stated that the entire line will be in operation by the end of the month, should no delays occur in the delivery of construction material.

Selma (Ala.) Street & Interurban Railway.—Announcement is made of the intention of this company to extend its line through Elkdale Park to the Highlands on the Summerfield road. This will afford direct communication with one of the best suburbs of Selma.

South Side Elevated Railroad, Chicago, Ill.—It is reported that the Oakenwald avenue branch, which reaches the district between Thirty-fifth and Forty-second streets, will be opened for traffic on September 23.

Texas Traction Company, Dallas, Tex.—The grading on this line from Dallas to Sherman, Tex., is practically completed and the ties are on the ground ready for tracklaying when the first consignment of steel arrives. This is expected within a few days. The piers for the bridges have been placed and the 3,000-foot trestle over the east fork of the Trinity river, just east of McKinney, is nearly completed. Tracklaying will probably commence about October 1 in order to have the road in operation by the end of the year.

Tidewater Development Company, Birmingham, Ala.—Announcement is made that President Dewberry of this company is in New York perfecting arrangements for the organization of a new company, to be known as the Birmingham & Gulf Railway & Navigation Company. It is stated that the new organization will take over the Tidewater Development Company and its acquired properties, among which is the Tuscaloosa Belt Railway, connecting Tuscaloosa and Holt, Ala., and whose reported acquisition by the Tidewater interests was announced in the Electric Railway Review of last week. It is stated that the officers of the Belt Railway will remain the same and the line will become an important link in the projected electric railway from Gadsden to Tuscaloosa, several franchises for which have been secured by the Tidewater Development Company. It is stated that the new deal represents an investment of approximately \$11,000,000.

Toledo Fostoria & Findlay Railway, Fostoria, O.—The grading on this company's extension to Toledo has been completed as far as Walbridge and ties are now being delivered for tracklaying. Two and one-half miles more remain to be graded before connection with the Lake Shore Electric line at Drouillard's Corners can be made, from whence entrance to Toledo will be had.—Work is also progressing on the overhead crossing of the Hocking Valley at Le Moyne, where it will cross the steam line at a height of 26 feet. Instead of a trestle the company is building permanent approaches, requiring 40,000 cubic yards of earth for the fill. It is planned to have this portion of the work completed by November 1. A subway will be used in crossing the four tracks of the Lake Shore & Michigan Southern south of To-

ledo, on which work will be started as soon as the plans are completed.

United Railways & Electric Company, Baltimore, Md.—President W. A. House has announced that after a careful investigation it has been decided to abandon for the present the project of extending the York road line from Towson through Lutherville and Cockeysville to Timonium. The territory is already adequately served by the Northern Central Railway and it is not considered that the population is sufficient to make an additional line a paying venture. The line was surveyed over a year ago.

United Traction Company, Albany, N. Y.—This company is planning the extension of its Pine Hills branch to the country club. A spur for the accommodation of extra cars at Chadwick park has been completed and the company expects to start soon on the Western avenue extension, which it is planned to have completed before winter. The building of the Arbor Hill line and the improvements contemplated in Troy, Rensselaer and elsewhere have been delayed until next spring owing to the heavy expense already incurred and the difficulty in getting orders filled at the steel mills.

Virginia City, Mont.—George R. Welden of Dillon, Mont., has completed surveys for a proposed electric railway from Blaine Springs to the Eastern & Pacific mine, which, if built in a direct line, will be 11 miles long. If built by way of Virginia City the distance will be 12 miles.

Washington Frederick & Gettysburg Railway, Frederick, Md.—The first link in the construction of this road, which is being built between Frederick and Thurmont, Md., has been opened for operation between Frederick and Yellow Springs. The line will be completed as far as Lewiston within six weeks, from whence it will be extended to Thurmont. Franklin B. Smith, manager, Frederick, Md.

Whittier, Cal.—A committee of the local board of trade held a conference with J. McMillan, manager of the Pacific Electric Railway at Los Angeles, for the purpose of submitting plans to place Whittier on the main line of the company's proposed road to Riverside, instead of making it the terminus of a branch road from Los Nietos, as now contemplated. One of the propositions is to give the company right of way over Second street in Whittier. The matter will be laid before H. E. Huntington for further consideration.

Winnipeg (Man.) Electric Railway.—This company has approved plans for extensions to its lines to be built in the suburbs of Ft. Rouge. W. Phillips, general manager.

Youngstown & Ohio River Railroad, Lisbon, O.—Announcement is made that this company, which is building an interurban line from Youngstown to East Liverpool, 51 miles, has established regular service from Lisbon to Youngstown. Construction is well advanced from Lisbon to East Liverpool.

POWER HOUSES AND SUBSTATIONS.

Americus (Ga.) Light & Railway Company.—It is reported that this recently organized company will start at once upon the erection of a new power plant. The new company will take over the properties of the old company now doing the business. It is also reported that the new company will build a five-mile electric railway in the city.

Bristol & Plainville Tramway Company, Bristol, Conn.—This company has contracted for the erection of a power plant in Highland Court. The station will be 42 by 30 feet and two stories in height. W. W. Crothers, a local contractor, has been given the contract for the structure.

Ft. Smith (Ark.) Light & Traction Company.—This company is reported to be spending \$50,000 for improvements in its power station and for new machinery to increase its capacity.

Jacksonville (Fla.) Electric Company.—This company is preparing to install in its power station a new 800-kilowatt generator, 520 horsepower of Babcock & Wilcox boilers, a new smokestack and a new switchboard.

Oskaloosa (Ia.) Traction Company.—This company is enlarging its power house and will increase its power equipment by the addition of a Buckeye compound engine of 700-horsepower capacity.

United Railways & Electric Company, Baltimore, Md.—It is reported that the L. B. Stillwell Company, electrical engineer of New York, has made another contract with the United Railways & Electric Company of Baltimore for control of the power stations of this company for another six months. It is expected that at the expiration of this contract the Stillwell company will continue in a consulting capacity for the railway's power service.

Personal Mention

Mr. Otto Schilling has been appointed superintendent of the Mattoon & Charleston Interurban Railway, effective on September 7.

Mr. Charles H. Stanley has been appointed purchasing agent of the Cleveland Electric Railway, succeeding his brother, Mr. George A. Stanley, resigned.

Mr. Roy Brennan has been appointed district traffic agent of the Illinois Traction System at Bloomington, Ill., succeeding Mr. S. W. Johns of Decatur, Ill., who has resigned.

Mr. J. A. Wells has resigned as electrical and chief engineer of the Augusta (Ga.) Railway & Electric Company to engage in the electric lighting business at Cornelia, Ga.

Mr. W. S. Townsend, master mechanic of the East Liverpool Traction & Light Company, East Liverpool, O., has been appointed a member of the standardization committee of the Central Electric Railway Association.

Mr. Willis C. Conrad, heretofore assistant claim agent of the New Orleans Railway & Light Company, has been appointed claim agent, succeeding Mr. William H. Renaud, recently appointed private secretary to President Foster.

Mr. J. E. Monell has been appointed assistant general superintendent of the northern division of the Illinois Traction System, with headquarters at Decatur, Ill. Mr. Monell heretofore has been connected with the Springfield office of the company.

At a meeting of the executive committee of the Birmingham (Ala.) Railway Light & Power Company on September 3 the resignations of Mr. Robert Jemison, president, and Mr.

J. A. Emery, vice-president and general manager, were accepted and Mr. A. H. Ford of New York, vice-president, was elected president and general manager. Mr. Jemison declined an election to the office of chairman of the board, but he and Mr. Emery will continue to act as directors. Mr. Jemison has been at the head of the Birmingham street railway system since its institution, about 20 years ago, and resigns to retire from active business. An announcement of his resignation and a brief biographical sketch were published in the Electric Railway Review of July 13, 1907, page 54. Mr. Emery has been general manager of the company since 1903. Mr. A. H. Ford, the new president, was formerly superintendent of the New Orleans & Carrollton Railroad Light & Power Company and is now president of the American Cities Railway & Light Company, which controls the Birmingham Railway Light & Power Company, the Memphis Street Railway, the Little Rock Railway & Electric Company, the Knoxville Railway & Light Company, and the Houston Light & Power Company.

Mr. E. J. Stewart, traffic manager of the New Westminster branch of the British Columbia Electric Railway Company, New Westminster, B. C., has been appointed assistant general manager of the Chilliwack line. Mr. W. Dunlop has been appointed traffic manager of the New Westminster branch.

Mr. C. T. Converse has been appointed traveling auditor of the New England Investment & Security Company, with headquarters at Boston. Since last February and until his present appointment Mr. Converse was associated with the Woonsocket (R. I.) Street Railway.

Mr. E. E. Darrow, general manager and purchasing agent of the Toledo & Indiana Railway, has resigned to become associated as expert railway engineer with a syndicate of St. Louis and New York bankers, with headquarters in New York City.



A. H. Ford.

Financial News

Coney Island & Brooklyn Railroad.—W. N. Dykman, counsel for the company, stated before the public service commission, first district, on September 3, that the company would make the improvements ordered by the commission. Mr. Dykman said that the improvements which the company has under way will cost more than \$1,000,000 and that \$600,000 of this amount had been expended for a new power house. The company has incurred obligations in carrying out the plans for improvements and dividends will not be declared for two years.

Conneaut & Erie Traction Company, Erie, Pa.—Robert M. Watson of Philadelphia was appointed receiver for this company by Judge Dallas of the United States circuit court at Philadelphia on September 5, on application of A. M. Poole of New York. Mr. Poole stated that he holds notes of the company aggregating \$34,866 and that there are other outstanding notes amounting to \$103,342.

Galveston-Houston Electric Company.—The directors have declared an initial semi-annual dividend of 3 per cent on the preferred stock. This company was incorporated on May 8, 1907, to acquire the control of three of the Stone & Webster properties as follows: Galveston (Tex.) Electric Company, Houston (Tex.) Electric Company, Galveston-Houston Electric Railway. The Galveston-Houston Electric Company thus acquires the Galveston and Houston properties and the Galveston-Houston railway, which is building an electric road between Galveston and Houston. The stockholders of the Houston Electric Company and the Galveston Electric Company will have the option of exchanging their holdings share for share for stock of the new company. The preferred stock of the Galveston Electric Company is non-cumulative, but the preferred stock of the new company is cumulative.

Hattiesburg (Miss.) Traction Company.—The organization of this company, which has acquired the properties of the Hattiesburg Electric Light & Power Company, the Hattiesburg Gas Company and the Hattiesburg Street Railway Company, has been completed by the election of the following directors: A. F. Thomasson, H. S. Stevens, H. A. Camp, N. B. Blount, C. Z. Stevens, J. D. Donald, R. C. Huston, S. C. Travis, T. E. Ross, G. L. Hawkins, B. McClanahan, George Komp, J. J. Stevens and J. B. Burkett. The following officers have been elected: A. F. Thomasson, president; H. S. Stevens, first vice-president; H. A. Camp, second vice-president; N. B. Blount, secretary-treasurer; and C. Z. Stevens, general manager.

Los Angeles Pacific Company, Los Angeles, Cal.—A mortgage for \$20,000,000 is reported to have been executed to the Southern Trust Company of Los Angeles as trustee. Of this amount \$12,000,000 will be used to retire at or before maturity the existing bonded debt.

Milwaukee Northern Electric Railway, Port Washington, Wis.—A trust deed has been filed to the Fidelity Trust Company of Wisconsin as trustee, securing an issue of not exceeding \$4,000,000 of first mortgage 30-year 5 per cent bonds. The bonds are dated April 15, 1907, and mature on August 1, 1937. Of the authorized issue, \$2,500,000 may be used for the liquidation of indebtedness incurred for the construction and equipment of the proposed railway between Milwaukee, Cedarburg, Port Washington and Sheboygan, including power plant, car house, rolling stock, etc. Upon the completion of the new line the remaining \$1,500,000 bonds may be issued for the construction of an extension from Cedarburg by way of West Bend to Fond du Lac and for other extensions, double-tracking, betterments and additional rolling stock, as may be deemed necessary by the directors.

New York New Haven & Hartford Railroad.—The corporate existence of the subsidiary Rhode Island Securities Company has been terminated. The electric railway properties which it controlled in Rhode Island will be owned and operated directly by the New Haven road.

Northern Ohio Traction & Light Company, Akron, O.—Stockholders are offered the right to subscribe for \$1,000,000 of treasury stock at \$20 per share payable at the rate of 25 per cent on September 20, on October 20, on November 20 and on December 20, 1907. The proceeds will be used for necessary improvements. An underwriting syndicate has been formed to acquire the stock which is not taken by shareholders.

Philadelphia Rapid Transit Company.—John B. Parsons, the president, has issued the following statement to stock-

holders: "In view of the many false rumors and charges with respect to this company the board has deemed it wise for me to make an official statement. First, the company has no floating indebtedness or overdue accounts and has cash in banks to the amount of upward of \$3,000,000. Second, while the operations of the company during the fiscal year ended June 30, 1907, show a deficit of \$364,048, the gross receipts for the first two months of the current fiscal year show an increase of \$310,327. Third, the cash balance of the company and money to be paid by stockholders on the next call will completely finance the company's requirements and complete extensions and betterments under way. Fourth, the company cannot make any change in its rates of fare without the consent of the city. It contemplates no changes in free transfers except to correct the abuse of same."

Rochester & Eastern Rapid Railway, Rochester, N. Y.—Earnings for the year ended June 30, with a comparison, were as follows:

Year ended June 30—	1907.	1906.
Gross	\$249,423	\$229,024
Expenses	168,963	144,946
Net	\$ 80,460	\$ 84,078
Other income	9,559	8,879
Total income	\$ 90,019	\$ 92,957
Charges	120,114	85,009
Deficit	\$ 30,095	\$ *7,948

*Surplus.

Rochester (N. Y.) Railway.—Earnings for the year ended June 30, 1907, with a comparison, were as follows:

Year ended June 30—	1907.	1906.
Gross earnings	\$2,400,859	\$2,046,670
Operating expenses	1,484,018	1,204,903
Net earnings	\$ 916,841	\$ 841,767
Total income	967,683	900,518
Fixed charges	516,067	556,952
Balance	\$ 451,616	\$ 343,566
Dividends	270,000	270,000
Surplus	\$ 181,616	\$ 73,566

ELECTRIC RAILWAY EARNINGS.

Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.

July—	1907.	1906.
Gross earnings	\$117,494.21	\$101,073.92
Operating expenses	67,985.46	61,286.31
Net earnings	49,508.75	39,787.61
January 1 to July 31—		
Gross earnings	686,771.85	592,959.69
Operating expenses	416,980.51	368,376.69
Net earnings	269,791.34	224,583.00

Lexington & Interurban Railways Company, Lexington, Ky.

July—	1907.	1906.
Gross earnings	\$ 52,806.58	\$ 50,185.53
Operating expenses	32,742.14	30,931.30
Net earnings	20,064.44	19,254.23
January 1 to July 31—		
Gross earnings	302,502.31	281,587.86
Operating expenses	202,271.09	194,143.71
Net earnings	100,231.22	87,444.15

Norfolk & Portsmouth Traction Company, Norfolk, Va.

July—	1907.	1906.
Gross earnings	\$ 274,017.88	\$162,586.08
Operating expenses	166,722.05	108,393.64
Net earnings	107,295.83	54,192.44
January 1 to July 31—		
Gross earnings	1,374,198.16	957,573.17
Operating expenses	867,203.73	633,692.44
Net earnings	506,994.43	323,880.73

Dividends Declared.

Houghton County Street Railway, Houghton, Mich., preferred, semi-annual, 3 per cent.

Northern Ohio Traction & Light Company, Akron, O., quarterly, one-half of 1 per cent.

Portland (Ore.) Railway Light & Power Company, preferred, quarterly, 1¼ per cent.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

Manufactures and Supplies

ROLLING STOCK.

Elgin & Belvidere Electric Company, Chicago, Ill., has purchased one car.

Union Street Railway, New Bedford, Mass., will buy twelve 13-bench open cars.

Utica Southern Railroad, Utica, N. Y., under construction, is reported to be in the market for cars. Frank H. Baxter, chief engineer, Utica.

Marion Bluffton & Eastern Traction Company, Bluffton, Ind., will be in the market for two 15-bench open cars and two trailers for interurban service.

Western Railways & Light Company, Ottawa, Ill., officially advises us that it has placed an order with the Danville Car Company for three double-truck cars, 28 feet long, and two 22-foot cars. H. E. Chubbuck, general manager, Ottawa.

Redlands & Yucaipe Electric Railway, Redlands, Cal., was reported in the Electric Railway Review of August 17 to have placed an order for four passenger cars, two express cars and four trailers. O. D. Collins, chief engineer, Redlands, Cal., writes us that the order has not been placed.

Ft. Dodge Des Moines & Southern Railroad, Des Moines, Ia., which was reported, in the Electric Railway Review of August 31, to have ordered several cars, advises us that it has awarded a contract for two double-truck cars to the St. Louis Car Company. These cars will have a seating capacity of about 100 passengers. J. L. Blake, general manager, Boone, Ia.

Pittsburg & Butler Street Railway, Pittsburg, Pa., was reported, in the Electric Railway Review of August 31, to be in the market for several cars. Charles Gibson, Jr., vice-president, writes that although the purchase of new equipment has been contemplated, orders will probably not be placed for some time. This company has bought one gasoline motor car and one trolley repair car.

Texas Traction Company, Dallas, Tex., as previously mentioned in the Electric Railway Review, in May placed an order with the St. Louis Car Company for eight passenger coaches with smoking compartments, four combination smoking and baggage coaches and two express and baggage cars. Delivery is to be made in December, 1907. The specifications of the passenger coaches and smoking and baggage cars call for the following details:

Wheel base	6 ft. 6 in.	Height, inside	9 ft. 1½ in.
Length of body	45 ft. 6½ in.	Sill to trolley base	10 ft.
Over all	58 ft. 6 in.	Track to trolley base	
Width, inside	8 ft.	.....	13 ft. 6 in.
Over all	9 ft.	Body	Wood
Underframe ..	Wood and steel		

Special Equipment.

Air brakes	General Electric	Lamps	Mosher arc
Couplers	Tomlinson	Interior finish	Mahogany
Curtain fixtures		Journal boxes	Symington
Curtain Supply Co. and		Markers	Ohio Brass Co.
Hartshorne spring rollers		Motors	4 GE-73
Curtain material	Silk	Paint	Pullman green
Destination signs	Illuminated	Seats	St. Louis Car Co.
Fenders ..	Steam railroad type	Trolley attachments	
Gears and pinions	Falk Co.	.....	Knutson trolley retrievers
Hand brakes ..	St. Louis Car Co.	Trucks	St. Louis Car Co.
Heating system		Special devices	
Consolidated Car-Heating Co.		.....	Duner patent door device
Headlights	Mosher		

SHOPS AND BUILDINGS.

Athol & Orange Street Railway, Athol, Mass.—Plans are being made for a 154-foot addition to the car house at Athol.

Pacific Electric Railway, Los Angeles, Cal.—It is reported that this company will tear down its present station at Long Beach, Cal., and erect one that will cover the company's entire property at Sixth street and American Avenue.—The corner of Fourth and Front streets, San Pedro, Cal., is reported to have been purchased by this company for \$20,000. The management has been looking for a station site for some time past.

Redlands (Cal.) Central Railway.—This company has purchased a site for car houses on the south side of Citrus avenue, between Church and Junction streets. Construction will begin at once. The intention to build on Brookside avenue,

previously mentioned in the Electric Railway Review, has been abandoned.

Union Street Railway, New Bedford, Mass.—This company expects to build an addition of 300 by 350 feet to its car houses.

TRADE NOTES.

Legare & Legare, civil and municipal engineers, 1422 Main street, Columbia, S. C., will be glad to receive catalogues of paving materials and road machinery.

New York Car & Truck Company, Kingston, N. Y., has constructed 80 of its maximum traction trucks for the New York & Queens County Railway of Long Island City.

American Car & Foundry Company, St. Louis, Mo., shipped 10,347 cars during the month of August. This is the largest number the company has ever shipped in one month.

A. L. Whipple, heretofore eastern representative of the Curtain Supply Company, Chicago, has been appointed eastern manager of the same company, with offices in Park Row building, New York.

American Car & Foundry Company, St. Louis, Mo., has declared its regular quarterly dividend of 1½ per cent on the preferred stock and 1 per cent on the common stock, payable on October 1.

G. Cecil Nuckols, for the past three years advertising manager of the S. Obermayer Company, Cincinnati, O., has received the additional appointment of advertising manager of the Electrical Tool Company of the same place.

O. M. Edwards Company, Syracuse, N. Y., manufacturer of window fixtures, rollers and other railway devices, has secured the services of Edward Laterman of Jersey City, N. J., who will work in the eastern sales department of the company.

Parker Boiler Company, Philadelphia, Pa., has sold, through its New York office, twelve 645-horsepower boilers, superheaters and oil burners to the Southern Pacific Company, for service in the electrification of that road at Oakland, Cal.

Buffalo Steel Brake Beam Company, Buffalo, N. Y., manufacturer of steel brake beams for steam and electric cars, is erecting a building, 60 by 300 feet, at South Buffalo. The company now has a plant at North Buffalo, but its present facilities are inadequate.

T. P. Bailey, general manager of the L. E. Myers Company, Chicago, has resigned to take charge of the automobile interests of the St. Louis Car Company. Mr. Bailey was at one time manager of the railway department of the Chicago office of the General Electric Company.

Robins Conveying Belt Company, 19 Park Row, New York, is receiving bids for the erection of an addition to its plant at Passaic, N. Y. It will be two stories high, 40 by 70 feet, and is expected to be finished this fall, when the company will move its offices from New York to Passaic.

Sterling-Meaker Company, Newark, N. J., has appointed W. E. Hinmon as western representative, with headquarters at 175 Dearborn street, Chicago. Mr. Hinmon was at one time superintendent of the Dayton & Western Traction Company and more recently with the Ohmer Fare Register Company.

Lewis O. Cameron of Atlanta, manager of sales in the southern district for the Pressed Steel Car Company, was married on September 4 at Calvary Episcopal church, New York, to Miss Louise Wann of that city. The bride is the daughter of Mr. and Mrs. Charles Wann of New York and niece of F. A. Wann, general traffic manager of the Salt Lake route at Los Angeles.

Dodge & Day, engineers and constructors of Philadelphia, have submitted a betterment report covering the entire factory of Fayette R. Plumb, Incorporated, of Frankford, Pa., and are now engaged in making extensive alterations to the forge shops. When this work is finished other departments will be taken up and ultimately the entire plant will be remodeled.

Joseph M. Brown, Chicago representative of the Dressel Railway Lamp Works, New York, desires to announce the removal of his offices from 504 Great Northern building to 411 Dearborn street, where a storeroom will also be maintained. Mr. Brown expects to be located at his new quarters on September 16, and trusts that his many friends will continue their valued favors as heretofore.

E. R. Carichoff has joined the engineering staff of the General Electric Company at Schenectady, N. Y., where he will be associated with W. B. Potter in the electric railway

department, specializing on the design of controllers. Mr. Carichoff has had many years' experience in this class of work and was associated with Frank J. Sprague in the development of the multiple-unit controllers for electric railway operation. He has more recently had offices in New York as a consulting electrical engineer and electric elevator expert.

D. C. & William B. Jackson, engineers, of whom Dugald C. Jackson, William B. Jackson and William J. Crumpton comprise the firm, announce that they have removed their western office from Appleton, Wis., to the Commercial National Bank building, Chicago, in charge of Mr. Crumpton. An eastern office will be opened in Boston, Mass., in September. The firm makes a specialty of examinations and reports, designs and management of electric light, power and railway plants, engineering projects, etc.

J. H. Wagenhorst & Co., Youngstown, O., manufacturers of electric blue printing machines, report a very prosperous season with orders which keep their shops continually busy. Among recent sales they report as follows: E. R. Thomas Detroit Company, Detroit, Mich.; J. Flood Walker, San Antonio, Tex.; Luzerne Engineering Company, Hazelton, Pa.; surveyor-general's office, Cheyenne, Wyo.; J. E. Myers, Penn Station, Pa.; Harris Automatic Press Company, Niles, O.; American Thread Company, Holyoke, Mass.; Phoenix Manufacturing Company, Eau Claire, Wis.

Wisconsin Engine Company, Corliss, Wis., manufacturer of heavy-duty Corliss engines, hoisting machinery, compressors, etc., has had plans and specifications prepared by Kirchhoff & Rose, 201 Grand avenue, Milwaukee, Wis., for a new pattern storage shop, 40 by 160 feet, and a pattern shop, 220 by 140 feet. The buildings will be of concrete and brick construction and will cost from \$30,000 to \$35,000. Plans have also been prepared for a brick office building, 40 by 80 feet, to cost about \$15,000. It has not been decided definitely whether the construction of these buildings will be commenced this fall or next spring.

General Fireproofing Company, Youngstown, O., has been awarded the contract for furnishing and erecting pin-connected girder frames and cold twisted lug bars as reinforcement for two new reinforced concrete buildings for the Victor Talking Machine Company at Camden, N. J. One structure is a six-story factory building, 132 by 90 feet, and the other a power house, one story and basement, 173 by 70 feet. Ballinger & Perrot, Philadelphia, are the architects; Jay M. Whitham, Philadelphia, engineer; and the general contractors are J. S. Rogers & Co., Stanwick, N. J. The contract with the General Fireproofing Company calls not only for the sale of the reinforcing steel, but for its erection in the forms ready for concreting.

Standard Roller Bearing Company of Philadelphia, Pa., has recently made many large additions to its plant and now has the largest works of its kind in the world. The buildings extend over one-half mile of ground from end to end, having a floor space of over 500,000 square feet, the concern employing over 1,500 men. The business has grown to such proportions as to necessitate the establishing of a thoroughly organized department of publicity. The new department will be conducted by C. Dickens Sternfels, who has been identified in a similar capacity with the Arthur Koppel Company, Pittsburg, Pa., for the past three years. Mr. Sternfels assumes charge of the Standard Roller Bearing Company's publicity department on September 16 and will be located at Philadelphia, Pa.

Standard Underground Cable Company, whose general offices are in the Westinghouse building, Pittsburg, Pa., on account of the San Francisco earthquake, has for the past year been obliged to maintain its Pacific coast headquarters in Oakland. It has now permanently relocated its offices at 511-514 Shreve building, San Francisco. A. B. Saurman continuing as Pacific coast manager. The company's new factory at Oakland is four times as large as the old factory, which was destroyed by fire shortly after the earthquake. It is as nearly fireproof as possible, and is equipped with new, up-to-date machinery for the manufacture on short notice of insulated wires and cables for practically every service. It is also equipped with complete warehouse facilities for handling the products of the company's eastern factories, carried in stock for Pacific coast delivery.

Acme Road Machinery Company, Frankfort, N. Y., manufacturer of road building machinery and contractors' supplies, writes that work has begun on its new buildings, which are to replace the ones recently lost by fire, previously mentioned in the Electric Railway Review. The machine shop will be 74 by 206 feet. Adjoining this in the rear is a blacksmith shop, 74 by 100 feet, and in the rear of the blacksmith shop is

a foundry, 60 by 90 feet. On the south side of the machine shop the power plant, superintendent's office and tool room are located in a building 40 by 50 feet. On the north of the machine shop, and connected with it by an industrial railway, is a storage shed, 300 by 24 feet. One end of this building is used for the erection of road machines. At the west end of the machine shop is a wood shop, 50 by 100 feet. On the south side of these buildings a new office building will be erected, plans for which have not yet been completed.

General Electric Company, Schenectady, N. Y., has just received a large order for railway equipment from the Utah Light & Railway Company of Salt Lake City. The Utah company is planning large extensions to its present 90 miles of track and will install 50 new cars. The contract calls for 50 complete quadruple equipments, consisting of 200 GE-80 40-horsepower motors, with K-28 controllers. In addition the company has ordered 74 GE-80 motors, with extra controllers, circuit-breakers, rheostats, etc., for the re-equipment of old cars.—The company entertained a party of distinguished German visitors at Schenectady on September 5. The visitors were designated by the German government as a commission to visit America to inspect the electric railways and high-tension transmission systems of this country and Mexico. Numbered among the party were Privy Councilor Wittfeld of the Prussian government; Prof. Dr. W. Reichel of the Royal Technical University, Berlin; Director Frishmut of the Siemens-Schuckert Works; Mr. Pforr and Director A. Elfes of the railway department of the Allgemeine Elektrizitäts-Gesellschaft; and Director Jordan of the Lahmeyer Works. The party inspected also the power houses and locomotives of the New York Central lines, the Long Island Railroad, the New York New Haven & Hartford system, and the plants of the Interborough Rapid Transit Company.

ADVERTISING LITERATURE.

Electric Service Supplies Company, Philadelphia, Pa.—"The Keystone Traveller" for September is as interesting and bright as usual.

Ohmer Fare Register Company, Dayton, O.—A folder gives the names of 64 electric railway companies that have placed orders for the Ohmer fare register. A few types of registers are also illustrated.

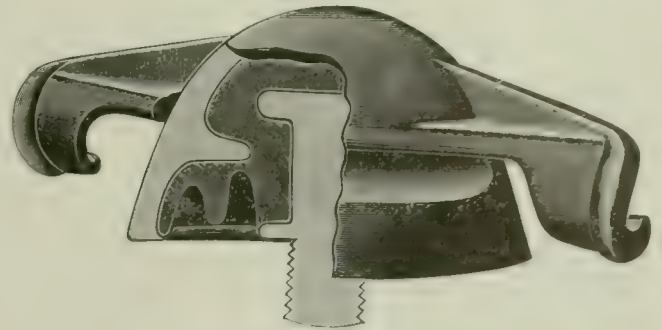
Aurora Specialty Manufacturing Company, Aurora, Ill.—This company manufactures electric railway specialties, and catalogue No. 2 devotes its 52 pages, 6 by 8 inches in size, to that class of material used in the construction and maintenance of the overhead line. The introductory contains a strong argument in favor of treated wood for insulation. The company's numerous specialties are well illustrated and described.

Golden-Anderson Valve Specialty Company, Pittsburg, Pa.—This company has issued a pamphlet describing and illustrating its type of angle and globe non-return valve. This is a complete line of automatic non-return valves adapted for all pressures. When installed between the boiler and the steam header they automatically cut off the boiler from the header in case of a boiler accident. There are many other cases where these non-return valves are very useful. A line of reducing valves as well as a line of hand operated "clean seat" valves is also shown. These valves have the advantage that they can be packed with the valve open and steam on the line. A complete line of tilting traps and blow-off cocks are illustrated and several varieties of float valves for water tanks and other uses.

Adams & Westlake Company, Chicago, Ill.—Catalogue No. 120, just published, is devoted to signal lamps and lanterns. It is an unusually handsome book, 6 by 9¼ inches, containing 200 pages, and bound substantially in yellow cloth. Only the recognized standard types of signal lamps and lanterns are shown, but the company is prepared to design and furnish lamps for all descriptions of signal work. Throughout the catalogue special emphasis is laid on the Adlake non-sweating balance draft. The first of the many two and three color half-tones, which are used as illustrations, is a sectional view of an Adlake signal lantern, clearly showing the principle of non-sweating balanced draft. The catalogue is most complete. It includes illustrations and descriptions of Adlake engine signal lamps, switch lamps, coach or caboose marker or tail lamps and flags, electric railway lamps, etc. An excellent idea is the publication, as an appendix to the catalogue, of the rules taken from the authorized edition of "The Standard Code of Train Rules," issued by the American Railway Association. In this way the Adams & Westlake Company places before railroad officials the adopted rules pertaining to signals, together with the various styles of lamps and signals made to conform with these rules.

HEAVY NEW TROLLEY HANGER.

The Electric Traction Supply Company, 310 Market street, St. Louis, has recently placed on the market the extra heavy type of hanger shown in the accompanying illustration. This hanger is especially designed with reference to the needs of heavy trolley line construction, being made of extra heavy



Heavy New Insulated Trolley Hanger.

malleable castings. The insulation is so molded into the casting as to produce an extra deep petticoat. This prevents any moisture from accumulating and does away with a very frequent cause of surface leakage. The casting is made extra heavy, so as to withstand the heaviest blow of a trolley wheel, and the insulation is the well-known I. X. L. composition.

THE BAKER HOT WATER HEATER.

The safe heating of trolley cars has always been considered a rather difficult problem. The ordinary car stove in a collision or other accident is likely to be a source of consid-



Baker Heater.

erable danger. A system of heating that is not dependent on the condition of the power house and line has many advantages. A safe hot water heater is manufactured by William C. Baker, 143 Liberty street, New York. It consists essentially of double or single coil of pipes through the firebox of the heater. The outside shell of these heaters is made of ¼-inch thick boiler plate. With this heater in operation the largest opening into the firebox is a ⅝-inch hole. It is claimed that in a collision or other accident the boiler plate shell of this heater can be badly bent out of shape, but it is impossible to break it open and allow the hot coals to come out. In removing the danger of the heater's setting fire to the car in case of accident the principal objection to the hot water heater is removed. These heaters are made both single and double coil. The advantage of the double-coil heater lies in the fact that as each side of the car has an independent circulation system heating of the entire car is provided for, which, with some forms of single-coil heaters, is impossible. The arrangement of the double coil in the firebox does not interfere with the operation of the fire. Another advantage of this heater lies in the fact that it is possible to get almost any desired degree of heat, from a very mild heat for comparatively warm days, to a very intense heat in severe weather. These heaters have but few parts, are of very heavy construction and are not liable to get out of order. The simple construction and arrangement make repairs very easy.

Long Trolley Trip.

H. A. Nicholl, general manager of the Indiana Union Traction Company, and president of the Central Electric Railway Association, entertained a party of prominent interurban railway men, including the executive committee of the Central association, with a three days' trip from Indianapolis to Detroit and return in the private car "Martha" of the Indiana Union Traction Company. The party included among others: F. D. Norviel, general passenger agent of the Terre Haute Indianapolis & Eastern Traction Company; J. B. Crawford, superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company; C. C. Reynolds, general manager of the Terre Haute Indianapolis & Eastern Traction Company.

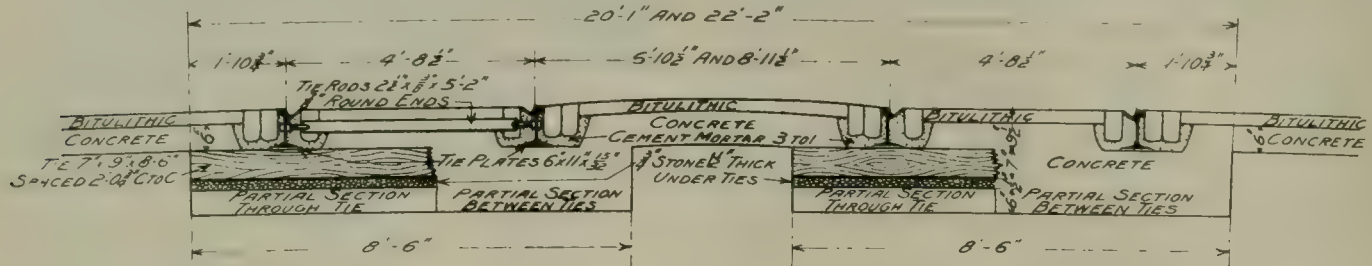
TRACK IMPROVEMENT AT ATLANTIC CITY.

In the Electric Railway Review of July 13, 1907, page 43, was published an account of the new track construction in Atlantic avenue, Atlantic City, N. J., on the electric line of the Atlantic City Electric Railway, which is operated by the Pennsylvania Railroad as a division of the West Jersey & Seashore Railroad.

The accompanying engravings from photographs show the character of this work, which includes the paving by the company of the entire avenue from curb to curb with a bitulithic wearing surface over a concrete foundation. That the Pennsylvania is giving the main business thoroughfare of the con-

crete is six inches thick under the ties and extends up between and over them to a height sufficient to provide a solid bed for the bitulithic wearing surface. In order to provide against deterioration of the paving along the rails, two granite blocks are placed on the outside and one granite block on the inside of the rail and these are laid in a cement mortar mixed in the proportions of three to one.

In a paper on "Recent Methods of Construction and Pavements of Tracks in Boston" Mr. Plimpton says of the bitulithic pavement, which is used in connection with the track work in Atlantic City: "It is very satisfactory, as it presents a firm and gritty surface, and horses can get a better foothold on it, when the street surfaces are in a slippery condition,



Atlantic City Track Improvements—Cross Section Showing Details of Track Construction and Paving.

vention city a very substantial paving, and the Atlantic City Electric Railway a roadbed of permanent character, is shown by the results of an unexpected test in which a 10-wheel steam locomotive, weighing 184,000 pounds, left the rails at the switch which connects the street railway line with the tracks of the Pennsylvania Railroad and ran a distance over the pavement, leaving only the slight indentations in the pavement, as

than they can on most smooth pavements."

The gritty surface referred to is obtained by scientifically combining broken stone of varying sizes mixed with bitumen, and from the very nature of its parts it is difficult to conceive how it can be other than one of remarkable durability. The greatest care is exercised to secure the hardest stone available, in sizes from one inch down to impalpable powder, the finer



Atlantic City Track Improvements—Showing Cracks Made in Paving by 10-Wheel Engine.

shown in the engraving. After the engine had slid back on the track the assistant engineer in charge of the work, A. B. Clark, measured the depressions and found them to be only $\frac{1}{4}$ and $\frac{1}{16}$ of an inch in depth, respectively. The deeper depression is said to have been due to the sharp slant in the crown of the street at this intersection.

The track construction in many respects is similar to that used by Arthur L. Plimpton, civil engineer of the Boston Elevated Railway Company, in and around Boston. As indicated in the accompanying diagram, it will be noted that the

particles being used to fill the spaces between the larger stones.

The proportions of the materials used are first carefully determined by physical tests with a view to obtaining the smallest possible percentage of voids or air spaces in the mineral aggregate, the character and shape of the stone varying in each particular case.

The proportions having been determined, the formula for the proposed pavement is fixed, and in order to guard against deviations in the slightest degree when the work of laying

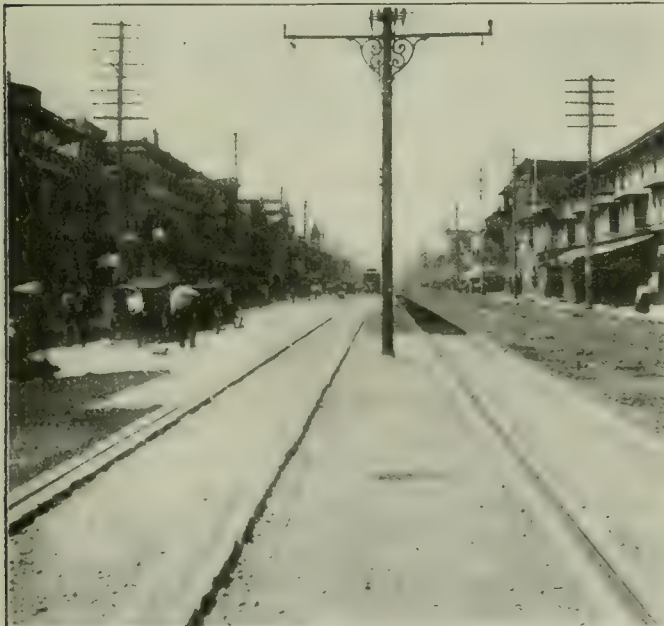
has been started, samples of the mixture are taken several times a day at the mixing plant, as well as of the finished pavement in the street, and are sent to the laboratory for analysis. Should any departure from the established formula be found it is promptly remedied.

The mixture is hauled to the street in a heated condition,



Atlantic City Track Improvements—Crossover in Front of Passenger Station.

spread upon the foundation to a uniform thickness and compressed with heavy rollers. Upon the finished pavement is laid a layer of heated stone chips, which, under compression,



Atlantic City Track Improvements—Concrete and Granite Block Stretchers.

is forced into the surface, making it sufficiently gritty to prevent horses from slipping and automobiles from skidding.

The Twin City Rapid Transit Company of Minneapolis, Minn., will exhibit at the Atlantic City convention of the American Street and Interurban Railway Association a collection of the company's advertising posters, etc., which will occupy a wall space 11 by 35 feet, and will include a birdseye view of the company's lines in St. Paul and vicinity, 8 by 13 feet. The exhibit will be in connection with the paper to be read by A. W. Warnock, general passenger agent, on "Advertising from the Standpoint of the Street Railway Company."

GRAPHITE LUBRICATION.

BY H. C. WOODRUFF, GENERAL MANAGER UNITED STATES GRAPHITE COMPANY, SAGINAW, MICH.

Although the excellence of graphite for all sorts of lubrication and its particular adaptability to certain difficult lubrication is a matter with which most of us are familiar, few, perhaps, are cognizant of the fact that there are two forms of graphite—flake, or foliated, and amorphous, or non-structural, graphite—and that though chemically the same the latter is capable of finer pulverization and with careful treatment may be reduced to an impalpably fine powder absolutely free from grit or any sort of harmful impurity. Flake graphite, on the other hand, no matter how finely pulverized, always retains its original micallike or crystalline structure, and, comparing one with the other, there is a vast difference in nature, texture, action and effect.

In the first place, amorphous graphite is adhesive in the highest degree. It stays put, and adhesiveness is one of the first requisites of an efficient lubricant in that to cool a hot bearing it is absolutely essential that the lubricating agent "stay put" where applied. To illustrate: Take a pinch of finely pulverized amorphous graphite and rub same in the palm of the hand, on paper or on some other convenient surface and observe its action.

Note that the more one rubs the more effective the lubrication, for this form of graphite is not easily removed from surfaces in frictional contact, but maintains constant and effective duty right at the point of contact and is at its best under heavy frictional pressure in that, as above stated, it is adhesive in the highest degree—"stays put"—and there is absolutely no waste, as every particle is an active lubricating factor.

Then, too, as an impalpable powder it readily and quickly penetrates and distributes itself in a smooth, slippery, even coating between the tightest bearings, filling every pore, crevice and interstice, thereby evening irregular bearing surfaces and reducing friction to a minimum.

Let us also see how, mixed with lubricating oils, this amorphous graphite will minimize friction.

A microscopic examination of perfectly smooth bearings—cylinder surfaces for instance—will disclose many minute irregularities, which, in the nature of things, must be productive of more or less friction. This friction, of course, means wasted energy—energy that instead of being utilized as power is absorbed as heat—a condition that more often than not means an overheated bearing with the consequent loss of time and temper. To effectively overcome this friction and utilize this otherwise wasted power, a lubricant possessing considerable "body" is required—that is, a substantial lubricant of such a nature as to eliminate as far as possible these microscopical irregularities and provide a bearing offering minimum resistance to the surfaces in play.

Experience, which is man's teacher, has not only demonstrated time and again that oil in itself will accomplish this only to a certain extent, but it has also taught that pure, soft, finely powdered graphite, properly and judiciously applied, will do wonders, so it only remains to make the proper application of the right sort of graphite. It has, therefore, long been the endeavor of intelligent engineers to secure a graphited oil—that is to say, an oil in which graphite floats or is held in suspension without precipitation sufficiently long to perform its duty, for it is easy to see the great advantage to be derived from the use of an oil having every drop impregnated with solid lubricating matter.

This seemingly simple problem, however, is one that has until lately baffled engineers of experience, but it has now been found that amorphous graphite when reduced to an impalpably fine powder will, when mixed with oil in the proportion of about one teaspoonful to the pint of oil, remain in perfect suspension long enough to feed through lubricator tubes without clogging, thus causing every drop of oil to carry its mite of graphite.

Accumulator Cars in Germany.

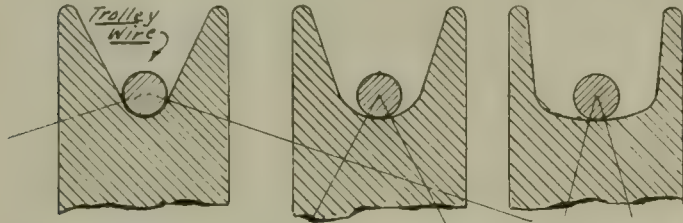
A United States consular report states that accumulator cars have been running since February on three German railway lines. The arrangements have been made by the Prussian railway department, which also, by special agreement, controls the Hessian railway. The new cars run four or six times a day, and the maximum speed is 28 miles an hour. The carriages are three-axle cars built for this purpose. The batteries consist of 180 cells of about 200 ampere-hours capacity, each weighing 121 pounds and containing four positive and five negative electrodes, a car battery weighing about 10 tons and yielding 68.5 kilowatt-hours; that is, 7 watt-hours per kilo (2½ pounds) of all weight complete. Each car travels about 37 miles a day. The full car weighs 38 tons.

HOLMES & ALLEN FLEXIBLE TROLLEY HEAD.

Ever since the inauguration of the trolley system there has been serious trouble from trolleys jumping, especially at high speeds, such as are maintained on interurban service. Numbers of experiments have been made and numerous ideas have been put into models and tested, but nothing has yet proved superior to the present and original type of fixed harp and wheel, although the adoption of this system has meant at least 40 per cent heavier outlay than would be necessary with a side-running trolley.

The accompanying illustrations of a head invented by Holmes & Allen, Wellington, New Zealand, are almost self-explanatory, but a brief description, together with some facts, figures and claims, will enable the reader to appreciate the simplicity and certainty of this novel invention, and the reason it has met with such success and been so universally adopted by all under whose notice it has come.

The first claim for this device is that it allows of speeds



Holmes & Allen Trolley Head—Diagram Showing Contact Surface Comparisons Between Holmes & Allen Trolley Wheels and Present Types.

on trolley systems which are now impossible. Garnet B. Holmes, one of the inventors, who is at present in New York carrying on extensive business in this connection, states that throughout their numerous private and official trials in Australasia they have never yet been able to dislodge one of their trolleys from the wire by even excessive driving down grades where the ordinary trolley jumped coming up at low speed.

Now this is a wide claim, but a glance at this patent head soon shows the reason for its remarkable tenacity to the wire.

If it were possible to watch a fixed trolley head passing along the wire at speeds up to 20 miles an hour, it would be found that on meeting hangers, ears or any special work, the sudden increase in diameter of the conductor gives the wheel such a blow that it causes the whole head to be knocked downward about half an inch, and before it can again regain



Holmes & Allen Trolley Head—Side View.

its contact with the wire the car and head have traveled onward a foot or so, carrying with it an arc corresponding to the air gap and the current drawn off, and every time a spark occurs metal goes with it. The amount of fusing on even a 100-car system in a year involves a considerable maintenance expense.

The fixed type would not follow even perfect alignment if the wire fitted the wheel properly, therefore a round section wheel of greater width than the wire has to be used to allow the wire to swivel in the wheel at these points and especially at curves, where the lower inner rail throws the trolley head out several inches.

The Holmes & Allen head uses a "V" type wheel, which fits the wire and the wheel swivels with the wire. This type of wheel gives the greatest possible contact surface and saves a considerable amount of fusing. The contact surface as seen in the diagram is claimed to be about 11 times greater

in a "V" wheel than in a flat section wheel. This "V" wheel has always been recognized as the superior type and correct in principle, but how to apply it to the fixed head has been a problem many engineers have failed to solve, and have put up with all the present and past trouble for the want of something better. To use this type of wheel Holmes & Allen have mounted the spindle in two sliding blocks carried in guides, and by the aid of light springs to keep the wheel normally in line, have secured a cushioning action which is the keynote to the success of this wheel for where poles equipped with this head are knocked down at ears, etc., these little springs, which are normally compressed, quickly return the wheel to the wire, thereby causing only momentarily arcing and in fact almost entirely reducing it. These springs being in compression while the wheel is on the wire suspend the wheel in equilibrium and when taking curves the pressure coming off one side allows the spring on that side to extend and give the wheel a lead around the curve, thereby preventing it from jamming and flying off.

Besides this type of head the inventors have patented a non-fouling swiveling head, which has met with great success. One of the most important claims for this type of trolley head is that it allows side pole construction, even with double

tract, where the trolley wire can be as much as eight feet out of the center of the track, thereby saving the second pole on the opposite side of the street, which is necessary to suspend the present wire directly over the track for the fixed heads.

Engineers have been abandoning the old swiveling system and going back to the fixed harp and wheel, because this type, although it has a great tendency to leave the wire, will not damage the overhead construction or become entangled when it leaves the wire. The Holmes & Allen non-fouling swiveling trolley head is claimed to have overcome this great disadvantage and not only is it said to be non-fouling under all conditions, but the cushioning action of the light springs which operate the non-fouling gear makes the upward movements of the trolley wheel very lively, preventing it from leaving the wire under running conditions. During some of the trials held in Australia, one of the tests, which lasted close onto 1,000 miles at high speeds through all kinds of overhead work and around



Holmes & Allen Trolley Head—Top View.

some very complicated curves, resulted in the head never once leaving the wire.

It is estimated that the saving effected on a 100-car system with this type of head would mean at least \$5,000 per year and that by the installation of this side-running system, roughly speaking, \$2,500 per mile would be saved in the initial cost of erecting trolley wire, poles, etc.

Garnet B. Holmes, of this firm, who is now in this country in the interests of the trolley head, is making his headquarters while in New York at 116 West Seventy-ninth street.

According to reports the Great Western Power Company will build at Oakland a large generating station. The plans call for a building 100 by 250 feet. It is proposed to install steam turbines of 5,000 horsepower each. This auxiliary station is to be independent of the long-distance transmission system and is designed to furnish power in case of emergency. The cost of the auxiliary plant will be in the neighborhood of \$2,500,000.

The postoffice authorities at Washington, D. C., have notified the postmaster at Orland, Ind., that a mail service will be established on the St. Joseph Valley Traction line on September 16.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 12

CHICAGO, SEPTEMBER 21, 1907

WHOLE No. 230

TABLE OF CONTENTS.

Editorial:		Improvements of the Springfield Street Railway.....	342
—Economy in Light Cars.....	327	News of the Week:	
—St. Louis to Erie by Trolley.....	327	—German Commission Inspecting Electric Railways.....	343
—Making Friends by Keeping Clean.....	328	—Boston & Northern Asks Freight Rights.....	343
—Wide Wheel Treads.....	328	—Organization of Chicago Board of Supervising Engineers..	343
—Brake Shoes and Heads Chosen.....	328	—New York Rapid Transit Affairs.....	343
—Proposed Standard Axles for Motor Cars.....	328	Construction News:	
—Maintenance Costs of the Metropolitan Elevated Railway.	329	—Franchises.....	345
Concrete Poles for Transmission Line.....	329	—Recent Incorporations.....	345
Annual Reports:		—Track and Roadway.....	345
—Fonda Johnstown & Gloversville Railroad.....	330	—Power Houses and Substations.....	347
—Northwestern Elevated Railroad, Chicago.....	330	Personal Mention.....	348
—Philadelphia Rapid Transit Company.....	330	Financial News.....	349
Fall Meeting Central Electric Railway Association.....	331	Manufactures and Supplies:	
Unexpected Shocks.....	331	—Rolling Stock.....	350
Pay-as-You-Enter Cars and Dispatching System in Chicago		—Shops and Buildings.....	350
(Illustrated).....	332	—Trade Notes.....	350
Armature Baking Oven (Illustrated).....	335	—Advertising Literature.....	351
Standardization Committee Formulates Standards (Illustrated).	335	Electrification of the Baltimore & Annapolis Short Line.....	352
Expert Accountants Say that Milwaukee Reserves are Excessive	340	A New Gasoline Motor Car (Illustrated).....	352
Atlantic City Convention Bulletin No. 3.....	340	Black Enameled Wire.....	353
Steam Turbine Tests.....	341	New Cars for Northern Indiana (Illustrated).....	353
Piping and Power Station Systems—LIV. By W. L. Morris,		Lintern Car Signals (Illustrated).....	354
M. E. (Illustrated).....	341	New Cars for Nashville (Illustrated).....	354

The hauling of non-revenue load becomes more and more a question of importance in electric railway operation as heavier types of passenger rolling stock are introduced. The manager of an important system operating in the New England states recently stated that the dead-weight loads had increased the power station output for a given period 34 per cent, while the receipts that could be credited to the use of heavier cars had shown but a small gain. The problem of maintenance of cars enters into such an equation and undoubtedly is a most important factor; nevertheless the desire for permanency in rolling stock and the combined use of large cars for both city and interurban service cannot result otherwise than to increase the operating expenses. The heavier types of cars have not as yet been in service long enough to furnish ample data from which to draw definite conclusions, but it is safe to say that in the choice of cars for city service the purchaser should bear in mind the fact that there are at present many parts of the rolling stock equipment that can be made lighter without sacrificing the durability of the car. The standardization committee of the American Street and Interurban Railway Engineering Association, when considering the possible standards to be recommended for universal practice on electric railways, wisely considered the question of dead weight to be an important factor in the design of an efficient car.

The reported announcement by C. C. Reynolds, general manager of the Terre Haute Indianapolis & Eastern Traction Company, that the Indianapolis & Northwestern line is to be extended next spring from Crawfordsville, Ind., to Danville, Ill., is exceedingly important. This link is the only one to be completed in order to make possible

a continuous trip on electric railway cars from St. Louis, Mo., to Erie, Pa., a distance of over 600 miles, by way of Springfield, Champaign, Indianapolis, Dayton, Lima, Toledo and Cleveland. Across Illinois and Indiana the trip would be made over the lines of only a single system for each state, the Illinois Trac-

tion System and the Terre Haute Indianapolis & Eastern Traction Company. While the figuring out of long-distance continuous trolley trips may be considered an undertaking more interesting than profitable, and while it is extremely unlikely that anyone in St. Louis desiring to go to Erie would choose such a slow, roundabout route as would be presented by the electric railways under present conditions, unless he were taking a vacation trip for the novelty of the ride and the variety of scenery to be encountered, the fact that such a trip is destined to become a possibility in the near future is at least important as indicating the remarkable growth of the interurban network that has taken place within the last few years.

It has been no secret that the report of the Philadelphia Rapid Transit Company for the year ended June 30 last would show a deficit, but the disclosures which are now made of the reasons for this result are surprising. Although stress is laid upon the higher costs of labor and materials, another cause is specially mentioned. The cost of

the settlement of damage claims amounted last year to \$1,217,587, or 6.73 per cent of the passenger receipts. President John B. Parsons states that 10 years ago the system required only 2½ to 3 per cent of its gross receipts in order properly to provide for the accident claims. He attributes the change in large measure to "ambulance chasers." The extent of this expense on the Philadelphia lines shows how important it is for street railway managements in large cities to guard against excessive charges for claims and damages. The cost of injuries and damages to the Twin City Rapid Transit Company was shown in the tabulation of earnings published in the Electric Railway Review of September 14, 1907, page 301. In the calendar years 1905 and 1906 the expense to the Twin City company was 2.58 and 2.7 per cent, respectively, of gross earnings. The Twin City company undoubtedly protects itself somewhat by the use of gates. The expenses of accident claims and damages on the Kansas City Railway & Light Company in the year ended May 31, 1907, were 5.74 per cent of gross revenue, but in

the case of that company the cost had been reduced to that percentage from 7.97 per cent of gross revenue in the fiscal year ended May 31, 1903. Of course, as congestion becomes more acute with the growth of a city, the difficulty of preventing accidents increases. But unfortunately it is not only accidents with which railways have to cope. Only the most vigorous defensive policies will prevent piratical attacks on profits through dishonest claims; and it is regrettably true that frequently in defending themselves against injustice of this character street railways arouse the hostility of the unthinking part of the public.

In recent car house design much care has been taken to provide ample quarters for employes. Lounging rooms well lighted, heated and ventilated are becoming familiar features of the newer terminal buildings. It is not unusual to find these rooms provided with billiard tables and other sources of amusement, including a collection of magazines. The lavatory provisions are usually ample and hot water is generally to be found with plenty of soap and clean towels. The importance of having the car men neat and clean is a matter worthy of careful attention. As the car men come in contact with the general public and as the railway company is judged by its representatives, it will readily be seen that a conductor or motorman with untidy clothes and dirty hands is sure to create an impression that the management may be careless about other things as well as the appearance of its men. If this idea of carelessness on the part of the management is allowed to become fixed in the public mind it will take a long period of excellent operation to remove it. Every time any slight delay occurs the untidy appearance of the car men may be pointed out as an example of the company's methods of doing business. Most runs are so timed that layovers occur at terminal stations where there are ample cleaning facilities. A little persuasion in this matter on the part of a management would undoubtedly result in impressing the public with the fact that details as well as the larger undertakings were being carefully watched. This should help in bringing about satisfactory relations with the patrons of a company.

Increase in weight and speed of cars has brought about a steady increase in the size and weight of the various members of the mechanical and electrical equipment. There is still a tendency to use light wheels having narrow treads. This is unhappily true in some cities which limit by ordinance the dimensions of the rail head and wheel tread. In the days of light cars and narrow wheel treads the wheels passed through the special track work on their flanges and there was no particular trouble from chipped flanges or worn special work. As the weights per wheel increased, the special work became more quickly pounded loose, frog points wore off rapidly or the flanges of cast-iron wheels were badly chipped. Grinding out the special work to prevent the weight from being carried on the flanges only resulted in the special work wearing out more quickly. Present tendency toward wide flanges is well shown in the recommendation of the "Standardization Committee" of the American Street and Interurban Railway Engineering Association. The recommendation calls for a 2½-inch tread for city service, and for 3 and 3½ inch treads for combined city and interurban service. As many city cars approach interurban cars in weight would it not seem that the width of the wheel tread could be considered as a function of the load per wheel rather than of the speed? The principal advantage of a wide wheel tread in city service lies in the fact that its width affords a much better support in passing over special work. It would seem that the use of wide wheel treads on all except the lightest cars would be amply repaid by the increased life

of the special work and the easier maintenance of the cars on account of freedom from much of the present jarring in passing over intersections. The increased comfort to the passenger also should be a consideration.

The standardization committee of the Engineering association, after a very extended and careful discussion of the subject, will undoubtedly recommend two types of brakeshoes and brakeheads. Due to the present multiplicity of patterns and varied designs of brake heads and shoes it is believed that a considerable saving can be brought about if these two standards are recommended. The two combinations of heads and shoes may briefly be described as follows: For those wheels which vary in width between three inches and the Master Car Builders' contour the recommendation of the committee will probably include a standard design of brakehead and brakeshoe differing but little from the steam railroad practice. It is to be noted that the shoe of this type and its connection are symmetrical and will permit the reversal on the brakehead of any shoe which shows taper wear. In this way all shoes can be worn down to the lowest possible scrapping weight before removal. It should also be noted that the head and shoe of the proposed design are interchangeable with present steam railroad practice. The desirability of including this feature of interchangeability in the design of heads and shoes for the wider wheels used on electric railways is obvious. Elsewhere in this issue the deliberations of the committee and the manufacturers who assisted the committee at the New York meeting appear in abstract. The smaller shoe, which the committee seemed favorable toward recommending, would be suitable for wheels with treads less than three inches in width. The details of this shoe follow the general design of the proposed standard, but on account of the narrow width of wheels the width of the brakehead was reduced to 2¾ inches. This will permit it to be located over the tread portion of the brakeshoe. The brakeshoe part of the standardization problem is probably the most available source for ready reduction in cost of maintenance and it is therefore to be hoped that the Engineering association and the American association at the Atlantic City sessions will recognize the careful effort of the standardization committee and hasten the adoption of these two types of brakehead.

PROPOSED STANDARD AXLES FOR MOTOR CARS.

It is fortunate that the attempt to standardize electric motor car axles by a national association has been postponed until the present time, when the size and weight of cars have almost approached those of steam railway practice and when it seems advisable to adopt the standards of the M. C. B. Association as far as practicable. Compared with that for ordinary railroad cars the motor car axle is complicated by the necessity for a gear seat in addition to the wheel seats and for a straight section at the central portion for the motor bearings which make a wide departure from the M. C. B. standards in that part of the axle between the wheels.

The committee has wisely recommended that the four M. C. B. standard axles be adopted so far as the journals and dust guard seats are concerned. It does not seem possible to design a motor car axle which can be made from a standard M. C. B. axle of the same capacity on account of the extra seat required for the gear and no interchange of axles can be secured, but the adoption of the standard journals makes it possible to use the M. C. B. standard journal boxes, bearings and lids. This will be a great advantage to the electric lines and to manufacturers, in avoiding a multiplicity of patterns and in maintaining stocks of material. It will also be approved by those steam lines which have electrical equipment, and the number of such roads will rapidly increase in numbers.

The stresses in a motor car axle are more severe for a

given weight of car than those of steam roads on account of the direct loading of weights, not spring supported, and due to the additional torsional stresses. The track of electric lines is not usually so good as that of the steam lines, and the loads on axles due to frogs, crossovers, and the sharp curves of city lines produce stresses which are more frequent and severe than those pertaining to ordinary railroads. The fracture of motor car axles of comparatively large size has been most frequent at the inside of the wheel seat, indicating that the stresses concentrated there were due to blows delivered at the wheel flange. The use of the large M. C. B. wheel seats will be quite an advantage in this respect, but care should be taken to avoid sharp fillets or too sudden a change in diameters. It is possible that the M. C. B. journal could be improved by making a large fillet at the outside collar; both axle and bearing would not then wear so rapidly and this change would not interfere with the use of standard bearings.

Intelligent axle design will contribute materially to the reduction of the number of broken axles, but the quality of the material should not be neglected and the new designs which are proposed for standards should be accompanied by carefully prepared specifications relating to the quality of axle steel. Fortunately the members of the M. C. B. Association have had a large experience with axle steel and this knowledge has enabled them to prepare specifications for steel axles which ought to be satisfactory for motor car service.

MAINTENANCE COSTS OF THE METROPOLITAN ELEVATED RAILWAY.

A review of operations of the Metropolitan West Side Elevated Railway Company of Chicago for a series of years shows a striking increase in the expenditures for maintenance of way and structures.

The present operating company was formed to purchase at foreclosure sale the property of the Metropolitan West Side Elevated Railroad Company. The new company did not begin operation of the road until February, 1899, and the property was therefore in the hands of a receiver during nearly the whole of the fiscal year ended February 28, 1899. In that year the expenditure for maintenance of way and structures amounted to \$1,131 per mile of structure. In the following year this expense rose to \$1,172 per mile, and since then it has increased rapidly until in the 12 months ended February 28, 1907, the expenditure on this account averaged \$5,709 per mile of structure. This was slightly below the figure for the preceding year, \$5,790, which was the highest in the history of the company. The average in the nine years has been \$3,387.

These figures permit an appreciation of the present heavy cost of maintaining the elevated structure and show the rapidly increasing maintenance requirements as the age of the structure grows. In a complete analysis account should be taken of the extensions and of the varying density of traffic on different parts of the system. As portions of the extensions are relatively new, the figures relating to the average maintenance cost per mile of structure are governed by conditions for which some allowance should be made.

Passing to the expenditures for maintenance of equipment it is found that in the last seven years the Metropolitan road had applied from 4.7 to 8.5 per cent a year of its passenger revenue on this account. An approximation is possible, based on the equipment owned at the end of the fiscal years, of the average expenditure per car.

The present equipment of the road comprises 468 motor cars and coaches. As 50 of the motor cars were not put into service until November and December last, for the purpose of this computation 418 may be accepted as the basis for the maintenance expenditures of \$211,216. The average expended per car last year was \$505. The following table shows the expenditure for maintenance per car, the percentage of gross passenger revenue which was applied to maintenance of

equipment, and the cost of maintenance of way and structures per mile of structure in the fiscal years ended February 28, 1901 to 1907, inclusive:

Year ended February 28.	Average expenditure for maintenance of equipment per car.	Maintenance of equipment —Per cent of gross passenger earnings.	Maintenance of way and structures —Per mile of structure.
1907.....	\$505	8.1	\$5,709
1906.....	483	8.5	5,790
1905.....	390	7.8	5,509
1904.....	424	7.2	3,324
1903.....	390	6.9	2,826
1902.....	235	4.7	2,702
1901.....	300	5.1	2,323

In no year in the life of the present Metropolitan company has the road failed to increase its gross revenue from all sources and its passenger traffic. Gains in gross above the preceding years extended from 0.6 per cent in 1905 to 16.3 per cent in 1903. The daily average number of passengers carried increased from 80,938 in the fiscal year ended February 28, 1900, to 136,361 in the last fiscal year, or 68.4 per cent. In the same period there was an increase in the single-track mileage, owned and operated, from 36 to 51.13 miles, or 42 per cent. The following figures show the percentage of increase in each fiscal year over the previous 12 months in the gross revenue from all sources, and the variation in the cost of conducting transportation:

Year ended February 28.	Per cent of increase in gross, all sources, over previous year.	Conducting transportation. Per cent of gross passenger earnings.
1907.....	9.9	34.9
1906.....	13.4	32.9
1905.....	0.6	33.6
1904.....	5.2	35.1
1903.....	16.3	33.9
1902.....	7.6	31.0
1901.....	6.8	32.3

The cost of conducting transportation has been between 31 and 35.1 per cent of gross passenger earnings in the seven years. With one exception, this expense in the last fiscal year was the highest in the entire period. In citing this fact reference should be made, in fairness, to the inevitable higher costs of operation which the increased expenses for labor and materials entail. During the present year traffic is increasing materially. The gain from March 1 to August 31 was 12.9 per cent over the corresponding period of last year. The company, however, has increased the wages of its trainmen, and as other expenses are also high, any cost of conducting transportation which is close to last year's figures would represent economical handling of the business.

Concrete Poles for Transmission Line.

W. D. Boyce, owner of the Marseilles Land & Water Power Company of Marseilles, Ill., has decided on the use of concrete poles for his transmission line from Joliet to Peru. The concrete, after being well mixed, is placed in long molds made of seasoned lumber and is then properly tamped and allowed to dry. In each mold are placed from 8 to 10 ½-inch steel rods for reinforcement that extend from bottom to top of the pole. After the concrete is thoroughly set the poles are tested before being used. In testing each pole is subjected to a load of 700 to 2,000 pounds, according to its size and length.

The poles are made in several sizes. The smaller ones are 30 feet long, and 9 inches square at base and 6 inches at top. These weigh about 2,000 pounds. The larger ones are 45 feet long and 14 inches square at base and 6 inches at the top, weighing about 7,000 pounds each, and support a load of 3,000 pounds. All the poles taper gradually and have an obelisk appearance. The cost of the poles is estimated at from \$8.00 for the smaller to not over \$25 for the larger ones.

ANNUAL REPORTS.

Fonda Johnstown & Gloversville Railroad.

Gross earnings from the passenger business of the Fonda Johnstown & Gloversville Railroad in the fiscal year ended June 30 increased in larger proportion than the earnings from freight business. Passenger earnings amounted to \$544,700, an increase of \$46,739, while the gross revenue from freight traffic was \$212,882, an increase of \$1,769. The operations for the year, with a comparison, were as follows:

Year ended June 30—	1907.	1906.	Increase.
Miles operated	85.77	85.77	.....
Earnings from operation	\$774,536	\$728,710	\$45,826
Expenses of operation	402,582	374,360	28,222
Net earnings	\$371,954	\$354,350	\$17,604
Other income	20,397	48,175	*27,778
Gross income	\$392,351	\$402,525	*\$10,174
Charges, taxes, etc.	356,818	357,144	* 326
Net income	\$ 35,533	\$ 45,381	*\$9,848
Operating expenses—per cent of gross earnings	51.98	51.37	0.61

*Decrease.

The earnings and expenses are presented in detail. Notwithstanding the increase of \$28,222 in operating expenses, due to the increases in wages and the prices of materials, the cost of conducting transportation, in percentage of gross earnings, was only slightly larger. In percentage of gross earnings the expenditures in the different accounts comprised in operating expenses were as follows:

Year ended June 30—	1907.	1906.
Maintenance of way and structures	10.36	9.65
Maintenance of equipment	5.76	5.94
Conducting transportation	30.82	30.40
General expenses	5.04	5.38
Total	51.98	51.37

Northwestern Elevated Railroad, Chicago.

In the fiscal year ended June 30, 1907, gross earnings of the Northwestern Elevated Railroad of Chicago increased 7.7 per cent over the previous year, operating expenses increased 5.5 per cent, and net earnings from operation increased 9.1 per cent. The increase in taxes was large, amounting to \$45,687. The figures, with a comparison, were as follows:

Year ended June 30—	1907.	1906.	Increase.
Passenger earnings	\$1,550,816	\$1,456,454	\$ 94,362
Other earnings (including Loop net earnings)	549,500	492,273	57,227
Total earnings	\$2,100,316	\$1,948,727	\$151,589
Maintenance of way and structure	50,681	65,092	* 14,411
Maintenance of equipment ...	141,738	147,387	* 5,649
Conducting transportation ...	458,774	415,556	43,218
General expenses	93,111	77,538	15,573
Total operating expenses. \$	744,304	\$ 705,573	\$ 38,731
Net earnings	\$1,356,012	\$1,243,154	\$112,858
†Taxes	217,311	171,624	45,687
Bond interest	791,123	783,466	7,657
Other interest		7,566	* 7,566
Total charges	\$1,008,434	\$ 962,656	\$ 45,778
Surplus	\$ 347,578	\$ 280,498	\$ 67,080
Operating expenses (including maintenance reserves), percentage of earnings (excluding Loop net earnings)	46.38	46.62	.....
Operating expenses, maintenance reserves, Loop account and taxes percentage of earnings (excluding Loop net earnings)	64.36	62.72	.....

*Decrease. †Includes compensation to city on account of Loop.

The maintenance figures for the last year include \$35,054 set aside for the maintenance reserve fund. In the previous year a similar appropriation amounting to \$71,700 was made.

In his statement accompanying the figures M. B. Starring, the president, says that the increase in expenses was due principally, in addition to increased taxes, to increased compensation to the city on account of the Loop contract, to additional service, to increased wages and additional insurance.

Mr. Starring states that the operation of the 34 new combination motor cars which were purchased during the year proved satisfactory. "The wide door entrance space and the pneumatically operated door," he says, "add much to the loading and unloading facilities of these cars, and will be adopted in future purchases." Mr. Starring refers to various improvements which have been made during the year, to the proposed Evanston line, and to a stub terminal which is desired on North Water street.

Concerning the loop situation, Mr. Starring says that it "is being carefully checked and examined by expert engineers with a view to ascertaining in just what way changes in or additions thereto may be made so as to best accommodate the patrons of the lessees, and subserve all interests."

Philadelphia Rapid Transit Company.

The fifth annual report of the Philadelphia Rapid Transit Company, covering the year ended June 30, 1907, corresponds in its main figures with the expectations which had been generally entertained regarding the operations of the company.

Operating expenses required 55.52 per cent of gross passenger receipts, as compared with 52.36 per cent in the preceding year. In his annual statement John B. Parsons, the president, says that the increased expense in operation is due to three causes: First, to increases of wages; second, to increased cost of supplies; and third, to the large amounts paid out in settlement of claims by the accident department.

Following the form of report as made by the company the operations for last year, with comparisons with the previous year, were as follows:

Year ended June 30—	1907.	1906.	Increase.
Number of passengers carried	492,137,038	448,576,785	43,560,253
Receipts from passengers ..	\$18,095,503	\$17,483,145	\$612,358
Operating expenses	10,046,488	9,153,605	892,883
	\$ 8,049,015	\$ 8,329,540	*\$280,525
Miscellaneous receipts, interest, etc.	196,577	193,104	3,473
	\$ 8,245,592	\$ 8,522,644	*\$277,052
Taxes and licenses, paid and accrued	1,120,683	1,075,216	45,467
	\$ 7,124,909	\$ 7,447,428	*\$322,519
* Fixed charges, paid and accrued	7,488,958	7,143,432	345,526
Deficit	\$ 364,049	\$ 303,996	*\$668,045

*Decrease.

Bearing in mind that operating expenses were \$10,046,488, it may be readily appreciated that the amount paid out in settlement of claims during the last year, \$1,217,587, was excessive. This sum represents an increase of \$326,266 over the preceding year. Mr. Parsons, recognizing the grave nature of this situation, says that this part of the business presents the most serious of the problems with which the management has to deal. Regarding the causes of this large expense Mr. Parsons says:

Ten years ago 2½ to 3 per cent of the gross receipts took care of the accident account. Today it is approaching 7 per cent, which is equivalent to a dividend of \$2 a share upon the stock. This increase is due largely to a new enterprise which has grown up and which has been termed "ambulance chasing." The slightest accident is hunted up and reported by runners in the employ of lawyers of doubtful standing, many of whom are briefless except for this class of business, but who are most expert in preparing cases of this character

in such a manner that they will meet the requirements of the law and catch the sympathy of the jury. There are many physicians in league with these lawyers, whose testimony is of such a nature as to exaggerate the injury and to show that any trouble the claimant may be suffering from might have been caused by the accident.

It is but a short step from an exaggeration of an injury to the manufacture of a claim, and there is no doubt that in many cases we have been forced to pay money in settlement of claims which have been absolutely unjust. This matter is receiving the most careful attention of your management. The new relations between the company and the city should go far toward correcting this evil. At the same time a determined effort will be made to break up the business of inciting and creating fraudulent claims against the company.

During the past 12 months, or more, there has been considerable criticism about the affairs of your company, much of it of a frenzied character. This, in a great measure, accounts for the large sums paid out in the settlement of claims.

The report contains a brief statement concerning the movement by retail merchants of Philadelphia which culminated in the passage of a new franchise. The contract involves the surrender of what the company believed to be perpetual franchises, but Mr. Parsons expresses the opinion that if the contract is carried out in the spirit in which it was entered into, it will inure to the growth of the city, the comfort of its citizens and the prosperity of the company. Concerning the attitude of the company toward the contract Mr. Parsons makes it plain that the new arrangement was entered into in good faith. Those who are familiar with the history of the contract will recall that a new arrangement was essential in order that the company might be able to raise much-needed capital for improvements. If a public movement had not already been started in Philadelphia to question the constitutionality of the contract it would seem almost incomprehensible that the company should not be given an opportunity to prove its good faith and to show what it can do with the support and co-operation instead of the hostility of the authorities and the public.

In connection with the figures for last year there is also presented a statement showing the capital received from the date on which the company began operation, July 1, 1902, to June 30, 1907, and the application of the proceeds. There has been received for capital investment a total of \$33,265,140. The largest single item of expenditure is the cost of the Market street subway and elevated construction, \$12,864,032. In the same period the company has expended the following amounts:

Building construction	\$1,075,648
Overhead and underground construction.....	805,292
Track construction	5,615,296
Power house construction	3,369,578
Conduit construction	712,827
Car equipment	3,061,537
Tools, fixtures and miscellaneous equipment.....	61,996

The disbursements also include \$850,000 for the fire insurance fund and advances to subsidiary companies.

Respecting that portion of the Market street elevated line which was placed in operation on March 4 last, Mr. Parsons says that the receipts from this part of the road are all that could be expected from a partially completed railway.

Details are presented concerning some of the improvements of the year. Extensions of existing lines, comprising 29.48 miles of new track, were built during the year, and 22.16 miles of track were laid with 141-pound rails. The company now has 619.95 miles of track, of which 112.01 miles are laid with 141 and 137 pound rails and 62.43 miles are laid with T-rails.

The power-generating equipment was increased by 18,000 kilowatts. A list of the power houses and substations and also other details regarding the power equipment are presented in the report. There is a total of 939.45 miles of underground cables in the distribution system, including 104.52 miles of three-conductor high-tension cables. There are 187.4 miles of overhead cables, including 14.97 miles of high-tension cables. The length of underground conduits is

1,233,761 feet. The length of single underground duct is 11,470,764 feet, or 2,172.49 miles.

A list is given of the car equipment, which includes 2,151 closed cars and 1,242 open cars, making a total of 3,393 operating cars for the surface system. There are also 395 miscellaneous cars. On the elevated division there are 40 double-truck steel cars, making a total of 3,828 cars of all kinds. A full description of the physical features of the property was published in the Street Railway Review of September 15, 1905, page 517.

FALL MEETING CENTRAL ELECTRIC RAILWAY ASSOCIATION.

President H. A. Nicholl has announced that the first regular meeting of the Central Electric Railway Association after the summer vacation will be held in the sun parlor of the Chittenden hotel, Columbus, O., on Thursday, September 26. This being the first fall meeting, prospects are good for an unusually large attendance, members and invited guests from Ohio, Indiana and Michigan having expressed their desire to be present. There will be a special car leaving Indianapolis at 10 a. m. Wednesday for Columbus, passing through Richmond, Dayton and Springfield, and all those desiring to make the trip from these points are cordially invited. W. F. Milholland, secretary and treasurer, Indianapolis, announces the following programme:

Morning Session.

10:30 a. m. Business meeting.

11:00 a. m. Report of "Train Rules Committee." F. D. Carpenter, general manager Western Ohio Railway, Lima, O., chairman.

11:30 a. m. "Single-Phase and Catenary Construction." Paper by G. D. Nicholl, electrical and mechanical engineer Indianapolis & Cincinnati Traction Company, Rushville, Ind.

Report of "Insurance Committee." Henry N. Staats, general manager American Railway Insurance Company, Cleveland, O., chairman.

12:30 p. m. Adjourn for lunch.

Afternoon Session.

2:00 p. m. Report of "Standardization Committee." R. C. Taylor, superintendent motive power Indiana Union Traction Company, Anderson, Ind., chairman.

2:30 p. m. Report of "Express Committee." A. A. Anderson, general manager Indianapolis Columbus & Southern Traction Company, Columbus, Ind., chairman.

3:00 p. m. "Twelve-Hundred-Volt System." Paper by a representative of the General Electric Company.

Discussion.

Unexpected Shocks.

During a recent process of changing a steam road to electric traction some wood frame cars were being overhauled and equipped as trailers. While some workmen were engaged in installing the rods and brake rigging upon these cars one of them complained of having received an electric shock. It was found that the brake rigging which he was handling was not only connected to the rail through the truck, but that no trolley wire was in that part of the shop. A few minutes spent in watching the case revealed the cause of the trouble. The rails beneath the cars were not bonded and a joint occurred in each rail between the trucks. These joints were rusty and the fishplates and bolts not tight. The track ran through the shop to a dead end and some movement of cars was taking place on this track beyond the trailers. The brake rigging that was being put up by the men was connected some to one truck and some to the other, but none of the rigging happened to connect the two trucks together. It is evident that with an unusually bad joint at this point there would be a difference of potential between the two trucks equal to the drop at the rail joint and anyone touching the brake rigging of the two trucks or the brake rigging of one and the rail beyond the joint would receive a shock equal to that potential, which in this case was sufficient to frighten, even if not to hurt.—H. I. Emanuel in The Electric Journal.

PAY-AS-YOU-ENTER CARS AND DISPATCHING SYSTEM IN CHICAGO.

An important announcement regarding the progress of the Chicago traction rehabilitation was made by Mayor Busse on Thursday of this week. The mayor gave out a report from President T. E. Mitten of the Chicago City Railway Company. This report made public for the first time the fact that 300 pay-as-you-enter cars will be placed in service next month. Other parts of the communication related to the introduction of a dispatching system and to plans for reconstruction. The report was accompanied by photographs of one of the new cars, some of which are reproduced herewith.

Type of Standard Car.

In the Street Railway Review for September 15, 1905, page 591, the standard type of car for the Chicago City Rail-

Car Development.

The standard car of 1907 is of the same general design as the cars built in 1905 and 1906, except that, as the result of a very careful investigation, the cars now under construction have been especially designed to prevent accidents, minimize overcrowding and insure the collection of fares. The cross seats have been lengthened slightly so as to afford more seating room to passengers. Certain other changes also have been made with a view to lessening the noise, improving the ventilating and heating arrangements, insuring better protection to the motormen and conductors and giving greater comfort and safety to passengers.

Cause of Accidents.

During 1906 approximately 30 per cent of our accidents were caused by persons getting on or off moving cars and many of the most serious personal injuries resulted therefrom. Quite a large proportion of these accidents were caused by excessive overcrowding of cars during the rush hour, which, under the present method of operation, we have



Pay-as-You-Enter Cars in Chicago—Showing Loading and Unloading While Car is at a Stop.

way was described and illustrated. It is understood that these cars, which have now been in successful operation for two years, were built so that they might readily be adapted for the pay-as-you-enter plan of collecting fares.

It may be of interest to recite briefly some of the constructional details of these cars. The length of the body over end panels is 32 feet 5 inches, length over all 45 feet 9 inches, width inside 8 feet 2½ inches, width outside over all 9 feet. As the cars have been operated, the seating plan comprised seven cross seats on each side of the car and longitudinal seats in each corner with ample room for four passengers, the total seating capacity being 44.

Each car body is mounted on two trucks of what is commonly known as the M. C. B. type. The truck frames, equalizers, bolsters and motor suspension are of forged steel, all parts being machine fitted. A 500-pound double-plate 33-inch chilled cast-iron wheel is used with ⅝-inch flange and 2½-inch tread. The axles are 4½ inches in diameter in the journal boxes, 5½ inches at the wheel fit and 5 inches in the motor bearings. The motors are of the GE-80 type, having a capacity of 40 horsepower. K-28 controllers are used and straight air brakes.

An abstract of the report made public by the mayor as it relates to the rolling stock and a telephone dispatching system follows:

been unable to overcome for the reason that at the time of worst congestion the conductor is often of necessity engaged in the collection of fares inside of the car, from which point his view of the rear step is oftentimes obstructed by standing passengers. The conductor is also at such times entirely unable in any way to control the taking on of additional passengers after the car has become fully loaded.

The so-called "gate" system now in general use in Minneapolis and St. Paul, by which gates at the entrance of both platforms of the car are closed by the motorman before starting and not opened until the car has come to a full stop, has not been considered sufficiently flexible for use under the Chicago conditions; neither is the method in vogue in European cities, by which the number of passengers which may be carried on a car is arbitrarily fixed and as rigidly enforced, considered practicable.

Pay-as-You-Enter System.

During the past three years a type of car and method of collection have been perfected and adopted in Montreal, Can., known as the "pay-as-you-enter" car system. The result secured from the operation of this system, principally in the reduced number of accidents, has been such as to attract the attention and investigation of many of the more prominent and progressive street railway managers, with the result that cars of this type are now under construction for use in New York, Buffalo, Cleveland and Detroit. The method in detail is as follows:

Large platforms are used at either end of the car, the arrangement being such that the car may be operated in either direction. The rear platform is supplied with two

doors, the one nearest the platform step for exit only, and one at the inner side of the platform for entrance only. From the body of the car to the front platform one door gives exit only, and upon the front platform only is smoking allowed. By this means smokers are accommodated and at the same time objectionable smoking or expectoration in the passageways or on the platforms traversed by non-smokers, are eliminated. Passengers are permitted to alight by way of the front platform, but not to enter, the closing of the door being controlled through the use of a lever by the motorman, thus eliminating a very numerous class of accidents caused by passengers attempting to board moving cars by the front entrance and falling beneath the wheel.

In entering the car, all passengers will pass the conductor,



Pay-as-You-Enter Cars in Chicago—Showing Position of Conductor on Divided Platform.

who is stationed on the rear platform in the space provided between the exit and entrance doors. The entrance part of the rear portion of the rear platform, which is barred off from the exit passage, will hold as many as 20 persons, so that there need be no delay, even at busy corners, although no fare passenger enters the door of the car without having first paid fare to the conductor, who is provided with every facility for making change rapidly.

The conductor being on the rear platform at all times, and with the divided entrance, cannot only control the overloading of the car, but is never out of sight of the car step, and thus has no excuse for giving the go-ahead signal while persons are boarding or alighting therefrom.

Results in Montreal.

The management of the Montreal Street Railway system has produced statistics to show that passengers are loaded and unloaded with the pay-as-you-enter cars more quickly than possible by the old method. They also stated that within two weeks after this type of car had been placed in service a very large percentage of their passengers entered into the spirit of the plan and had their fares in hand before getting on the car, ready for payment to conductor, which, of course, greatly facilitated the operation. The Montreal newspapers, which, at the outset, were inclined to be skeptical, are now outspoken in favor of the plan.

New Cars in Chicago.

Under the terms of the settlement ordinance the company is required to "increase as rapidly as possible the number of double-truck cars * * * until there shall be in operation * * * at least 800 such cars." Five hundred and five double-truck cars are now in operation upon the company's lines and 300 additional are being built by The J. G. Brill Company, under contract for delivery during the months of October and November, 1907.

As the pay-as-you-enter car can be readily adapted to the present method of fare collection, the 300 cars now under contract have been so designed as to permit of the trying out of the pay-as-you-enter feature as an experiment, with the idea of either adopting the plan as a whole or of later making such changes as may be found necessary to fit the Chicago conditions.

All of our standard 1905 and 1906 cars can be readily adapted to this pay-as-you-enter feature, it meaning simply the lengthening of platforms and the rearrangement of doors.

As we propose to clearly set forth, through the newspapers, the objects sought to be attained by making the change in method of fare collection, and as the city, under our partnership arrangement, is interested even more than ourselves in reducing the number of accidents and increasing the amount of net receipts, we are confidently relying upon the co-operation of not only our passengers and the press, but of the city authorities as well.

The illustrations show the position of conductor on the divided platform, loading and unloading while the car is at a stop and "Take next car, please," exhibiting the position of the conductor when his car has been loaded to the agreed maximum number permissible.

Experience in Montreal shows that from three to five passengers will have paid fare and passed into the body of the car while the remaining capacity of the entering platform is being filled, so that more than half of the seating capacity of the car can be taken on at a busy corner, and the car proceed without any delay owing to this method of fare collection.

Dispatching System.

A complete system of telephonic communication, built by the Municipal Signal Company (Cregier System) and similar in all essentials to the system now being satisfactorily used in the loop district by the Chicago police department, is being installed for the purpose of affording speedy means of communication between the terminals and certain other specified points upon the Cottage Grove and Indiana avenues



Pay-as-You-Enter Cars in Chicago—Showing Position of Conductor when Car Has Maximum Load.

lines and the Cottage Grove avenue division headquarters, located at the Thirty-ninth street and Cottage Grove avenue car station.

The result which it is desired to accomplish is to secure a greater flexibility in the movement of cars, so as to reduce delays and interruptions to traffic to the minimum, as well as to govern the movement of cars more nearly in accordance with the actual demands of the traffic.

Present System.

Upon the present system, in which there has been no material change since the days of horse cars, the schedules

upon which the cars are operated are supplied to the men at the time the cars are first placed upon the street, and are made as nearly in accordance with the requirements of the traffic as is possible from the information at hand. In order to provide against delays occasioned by track obstructions and other causes, a leeway or so-called "dead time" is allowed at the ends of the line, which, for the year 1906, approximated 10 per cent of the total timetable cost. To overcome interruptions to service at points where delays occur, supervisors are assigned to certain districts, their duty being to turn the cars on the crossovers, or switchbacks, so as to maintain the intervals between the cars as evenly as possible. As the delays of this character often occur simultaneously upon the different parts of the same line, the confusion ensuing from the efforts of the different supervisors, each working independently to overcome the delay in his particular district, may readily be imagined, the result often being that cars are running entirely at variance with the printed schedule, causing a very irregular service and a consequent over and under supply of cars as compared to the requirements of the traffic.

Telephone System.

The plan which it is now proposed to try out, confining the experiment at the outset entirely to the Cottage Grove avenue division, is one which contemplates placing the various supervisors and starters under the direction of a dispatcher, located at the division headquarters, from which a supply of cars and men can be drawn as required.

This dispatching system will not only permit of the supervisors' notifying the dispatcher and receiving instructions from him in case of trouble or delay, but will also enable the dispatcher to call by signal one or all of the supervisors to the signal telephones located upon the street, so that the whole movement of the cars may be intelligently governed by one master mind, which directs the movements of the subordinates.

At the outer terminal, a suitable structure will be provided, from which a starter will govern the movement of cars by signal, so as to preserve the proper interval between cars, under the direction of the dispatcher. The motormen will then only be required to carry a card containing the running time, which consists of the minutes allowed for making the round trip; this instead of their carrying the complicated schedule which now contains the detail of the entire day's work.

In case of a delay to traffic occurring at any point on the line, the dispatcher, upon being advised, immediately instructs the starter at the outer terminal, so that the cars are thereafter dispatched from the end of the line at less frequent intervals in order to hold in reserve sufficient cars to cover the space made vacant by the period of obstruction; the readjustment of cars to proper intervals can thereafter be made as fast as practicable.

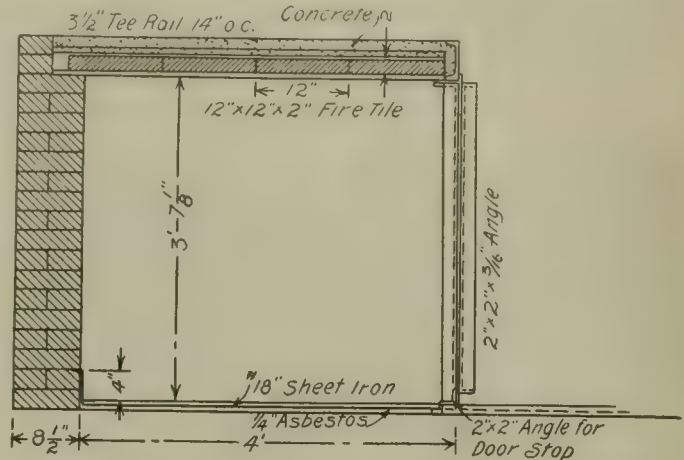
This plan makes possible the calling out of extra cars on short notice at times of heavy and unexpected travel, and the respacing of cars upon the line to permit of their proper insertion. It will also serve to reduce the lay-over or dead time at the ends of the line, as, in connection therewith, it is intended to provide a car sweeper and repairer with the necessary tools, so that not only will the fenders and other damageable portions of the car be promptly repaired and thus serve to avoid accidents and the liability therefor, but the train crews themselves, who are the higher priced of our employees, will be relieved of the car sweeping at the ends of the line, and, as the structure in which the starter is located will also be provided with toilet conveniences for motormen and conductors, their remaining at the terminus for any considerable length of time and the consequent blocking of the streets with idle cars will by this means be eliminated.

The steam end of the 6,000-kilowatt Allis-Chalmers turbine alternator recently shipped to the Kings County Electric Light Company of Brooklyn is said to be one of the largest and most powerful so far built. As an indication of its size it is interesting to note that a steel forging weighing 240,000 pounds went into the construction of its spindle.

A plan has been worked out for the operation by electricity of the state railroads of Sweden. Power is to be generated at five water falls, the Karse, the Trollhaetta, the Motala, the Hammarby and the Elfkarleby. Based on the requirements for 1905, the installation of the central power stations and the transmission lines would cost \$16,400,000. The yearly operating expenses, including administration, are estimated at \$1,578,000, as against \$1,700,000 at present, a saving of \$122,000. Single-phase current is to be used. The scheme will affect the operation of 1,240 miles of road and is the most extensive that has yet been proposed in Sweden.

ARMATURE BAKING OVEN.

In the shops of the Oakland (Cal.) Traction Company there has been built an armature baking oven of interesting design. The general appearance of this oven is shown in an accompanying halftone illustration and a cross-sectional view



An Electric Baking Oven—Details of Wall and Floor Construction.

shows its details of construction. It will be noted that the oven is comprised largely of a steel framework insulated with asbestos and filled in with brick and concrete.

The oven is electrically heated by two resistance frames, each comprising six coils. These coils are wound on sections of one-inch gas pipe, 3 feet 9 inches long, covered with two layers of $\frac{1}{8}$ -inch sheet asbestos covered with shellac. The



An Electric Baking Oven—View of Electrically Heated Oven, Showing Heating Coils.

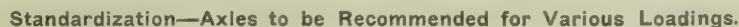
resistance coil proper comprises No. 21 annealed iron wire, 0.032 inch in diameter, tinned and wound about the asbestos with seven turns to the inch.

As shown in the illustration the oven is in three sections. Two of these sections are suitable for baking armatures and one is fitted with racks for baking field and other coils.

The Toledo & Chicago Interurban Railway, Kendallville, Ind., has received from the city of Kendallville a check for \$20,000, representing a bonus which the citizens of that town voted to the company as an inducement for it to locate its power plant and offices in Kendallville.

Axles.

Warren Thorpe (Baldwin Locomotive Works) thought the axle sizes as stated were in line with his company's experience. They found the intermediate sizes to be disappearing. The axles most used were the 4½, 5½, 6 and 6½ inch.



H. H. Adams wanted to bring out the point that existing motors in large numbers were of practically a new design. The small sizes were very popular now, and it looked to him as though the committee, in deference to the fact that these

motors were on the track now and practically new, ought to give them some consideration.

Mr. Evans replied that it was no reflection on any motor designed or in service, or any motor, truck or axle which was popular, to say that the committee had recommended as the best possible practice a heavier design for like service. He saw no advantage, for instance, if he had to use a 5-inch axle, in knowing that the standardization committee recommended a 5-inch axle. But it would be decidedly advantageous if the committee recommended a 5½-inch axle, because then he would feel reasonably well assured that when the next motors were designed they would be sufficiently large to take 5½-inch axles. The committee could not be governed so much by that which was in service, but while it hoped to be able to standardize the present equipment it should recommend rather advanced practice.

Mr. Thorpe, from the manufacturers' side, thought it better that the number of standard axles should be limited. If there were to be two axles he would rather have one axle as the standard, so that he would have the authority of the association in case he should specify such-and-such an axle in the absence of the customer's specification.

Mr. Schermerhorn, in recommending the 5-inch axle for motors ranging from 50 to 65 horsepower, had had the point in view that motors of those capacities were used on many city lines where comparatively low-speed equipments were wanted. The largest gear ratio was 71 to 12, 3-pitch gear. If they used a larger size of axle, it meant increasing the distance between the armature and axle centers and using a larger pinion. For that reason he favored recommending a 5-inch axle for the 50 to 65 horsepower sizes of motors.

J. E. Webster (Westinghouse Electric & Manufacturing Company) said that the General Electric Company had a 40-horsepower frame used in city service, and on the same frame placed high-speed windings. To make that motor economically, both windings should go on exactly the same frame, and this was to the advantage of the customer as well as the manufacturer, because he might have the two different windings so that he could interchange his frames and windings.

He thought the 5½-inch axle would be used in the next larger size motor, and in a good many cases in the 60-horsepower motor. People wanted intermediate axles, and if the manufacturers could confine them to ½-inch sizes rather than leave them open to ⅓ or ¼ inch sizes, there would be fewer sizes in operation, and fewer standard axle bearings to carry in stock, than if any one turned down axles to the sizes he saw fit.

(After some informal discussion the choice of axle dimensions was left with Mr. H. H. Adams and Mr. Benedict to report on later.)

Gear Fit.

Mr. Webster considered it practical to adopt but four sizes of gears for the six axles. It looked off-hand as though the 4½ and the 5 inch axles should take the same gear fit, rather than a 5 and 5½ inch axle.

H. H. Adams thought gear fits of 5½, 6, 7 and 8 inches would make a very desirable recommendation, particularly as they were in line with the original recommendations of the Central Electric Railway Association. In each case the maximum gear fit had been taken for the capacity of the motor.

Mr. Thorpe said that the Baldwin Locomotive Works made its axles with gear fits one inch larger than the motor bearings and the wheel fits ⅛ inch smaller than the gear fits. The advantages were that if the motor bearing were mentioned they then knew the dimensions of the wheel fit and the gear fit without any further explanation.

Mr. Evans said it had been the common practice to maintain the gear fit one inch larger than the motor fit, for the reason that the key was generally one inch square. That avoided the necessity of the keyway going below the motor fit. But in considering these axles they would go a little further than necessary. The committee did not consider it advisable to increase the gear fit the extra ½ inch. For instance, on one axle there was a 5½-inch motor fit, a 6-inch gear fit and a 5⅝-inch wheel fit. He thought that four sizes of gear fits were sufficient.

Axle Lengths.

Mr. Evans did not think it wise to recommend a length of 51 inches between the hubs, because the cast-iron wheel makers desired no wheel hubs less than 6¼ inches in length on the wheel fit. It appeared to him that it would be perfectly safe to adopt the previous recommendation of 50 inches between hubs, with a 6½-inch gear fit.

Replying to a question, A. H. Weston (T. H. Symington Company) thought 51 inches between hubs was not possible with a 6½-inch wheel fit, and at the same time give a proper clearance between the hub and the back of the box. Fifty inches between hubs was the maximum.

It seemed to H. H. Adams very desirable to maintain

the axle lengths the same as the standards in Master Car Builders' practice. It seemed that if it were possible to keep the motor dimensions to within 50 inches between hubs, it would certainly be desirable to do so.

E. S. Lewis (Standard Steel Works) advised not making the length of wheel fit much less than 6¼ inches on an axle which had a motor requiring 5½ by 10 inch journals. It would not make any difference in the length of hub, whether it were cast iron or steel if it were properly fitted with the fits bored smooth.

In closing the remarks on the subject of axle lengths Mr. Evans had found that the discussion brought out no particular reason for varying from the recommendations practically decided on at Cleveland; that was, 48 inches between the wheel hubs for all motors using a journal not larger than 4¼ by 8 inches, and 50 inches between wheel hubs for axles which required journals of 5 by 9 and 5½ by 10 inches.

H. H. Adams suggested that, as many axle and wheel details required special consideration, the subject be submitted for a report to a committee on axles that would be appointed for next year. That would not affect the general recommendations of the committee. He believed that the matter of long axles for single-phase motors should be submitted to a committee for further consideration, to endeavor to work with the electric companies, and, if possible, get uniform practice in that respect.

Gear Wheels.

Mr. Webster was very anxious for all gears to have the same fit, so that a gear designed for any motor could go on any axle. With 50 inches between hubs on the larger motors it seemed practically necessary to use a 6½-inch gear fit.

Mr. Schermerhorn said that practically all of the motors designed by the General Electric Company, whether alternating current or direct current, had been arranged for 48 or 50 inches between wheel hubs. He was particularly anxious to standardize the dimensions of the gear. If 50 inches between hubs were used on the larger motors they could take care of a 6¼-inch length of gear hub, but not make a universal gear. The offset on the end of the hub could not be of one dimension for all motors.

Mr. Evans, with the consent of the balance of the committee, stated that they would for the present standardize on the gear wheel hub of 6¼ inches for all sizes. He requested Messrs. Adams and Benedict to meet Messrs. Schermerhorn and Webster to report later on axle details.

H. H. Adams thought the committee was practically a unit on the question of gear keys. The old style key, with the square shoulder, had given too much trouble with the older type of axles. The milled type of keyway did away with a great deal of the trouble heretofore existing on the same diameter of axle.

Journal Boxes.

Mr. Evans said the journals had been discussed along with the axles. The journal sizes were 3¼ by 7, 4¼ by 8, 5 by 9 and 5½ by 10 inches. These provided for the same journals as commonly used on the electric traction lines.

The journal bearings recommended would conform very closely to the general practice. The journal box took care of M. C. B. bearings.

Mr. Weston, in introducing the subject of journal boxes, felt that the subject was to a great extent decided at the Cleveland meeting; but since that time several points had suggested a slight change in the standard as recommended. After some discussion he would recommend a distance between pedestal guides of 5 inches for the four sizes of journal boxes. He submitted to the consideration of the committee blue prints showing journal boxes for the four sizes of the Master Car Builders' journals, with pedestal fit dimensions to which he believed the Baldwin Locomotive Works, American Locomotive Company and The J. G. Brill Company could best mutually conform without involving too radical a departure from their existing designs, and from what they had found satisfactory in the past. He believed truck manufacturers would agree that if the width of the pedestal leg (or shoe on the pedestal leg) of an M. C. B. type of truck were made a fixed dimension, there would be no reason why the distance over the seat on the top of the box for the equalizing beam likewise could not be made to a fixed dimension. The diameters of spring seats shown were what the Brill company had found to be good practice. The manifest advantages of standardizing all exterior dimensions of journal boxes which pertained to the fit to the truck instead of only the pedestal fit dimensions was that it eliminated the numerous variations which different truck builders (without much consideration) were liable to make in the design of the top of the box for the same type of truck. He recommended strongly to the committee the advisability of adopting standard journal boxes which would be standard throughout, with respect to their fit to the truck.

The chairman appointed a subcommittee representing the truck builders, and also the journal box builders, to formulate recommendations for use in the final report.

Brakeshoes.

Mr. Evans, introducing the subject of brakeshoes, said that throughout the general west the opinion was gaining ground very rapidly that for a great number of years the traction companies had used a much narrower wheel than was economical or even safe, and certainly a much narrower wheel tread than was desirable. A very decided expression had come to him since the Cleveland meeting, favoring a wheel tread $3\frac{1}{2}$ inches wide. A great many of the mechanical men and managers generally were inclined to censure the committee for not having insisted on a wider wheel. This was, of course, particularly true of the managers who operated interurban lines, and also of the engineers of maintenance of way and manufacturers of special work, as they considered

pany), speaking of using wide treads, said that while there was no question about its being good practice, and while those people who operated cars would be glad to conform to that practice, it was absolutely impossible to do so in a large number of cities. Some cities specified the kind of rail that should be put in, others the width of the head; there were cities where the streets were paved with paving that was not smooth, and came up above the rail, and therefore they must have a wheel, and of course if they had a wheel they also must have a brakeshoe that would conform to the conditions which existed.

It seemed to him that the committee in making recommendations could not tie itself down to one standard of widths, no matter how much it would like to and no matter how good practice it might be. If the committee made recommendations that absolutely could not be put into practice the people would not adopt them. They should recommend something that was practical, something that could be used all over the country. He felt that while it would be desirable and be good practice to recommend a 3-inch tread wheel, with a $\frac{7}{8}$ -inch flange, as the smallest that should be used, it could not be adopted. Therefore the committee should recommend a $2\frac{1}{2}$ -inch tread wheel with brakeshoes to conform to it. The result would be two different sizes of brake shoes and heads designed along the same lines.

Mr. Page summed up his remarks as follows:

"Now, if we had a standard recommended by this association and the other bodies, backed up by the American association, then we would have something to go to our people with who are putting up the money, and we could say: 'Here is something every one is going to use, that has been practically worked out by practical men.' Therefore we would get a start on something that was standard, and that, of course, is what we are all after. What this meeting is for here today is to start on the right lines, and I think it would be a serious mistake if we undertook to try to force the issue and insist on a 3-inch tread wheel only."

The committee then adjourned until 9 o'clock Saturday morning.

Saturday Morning Session—Journal Boxes.

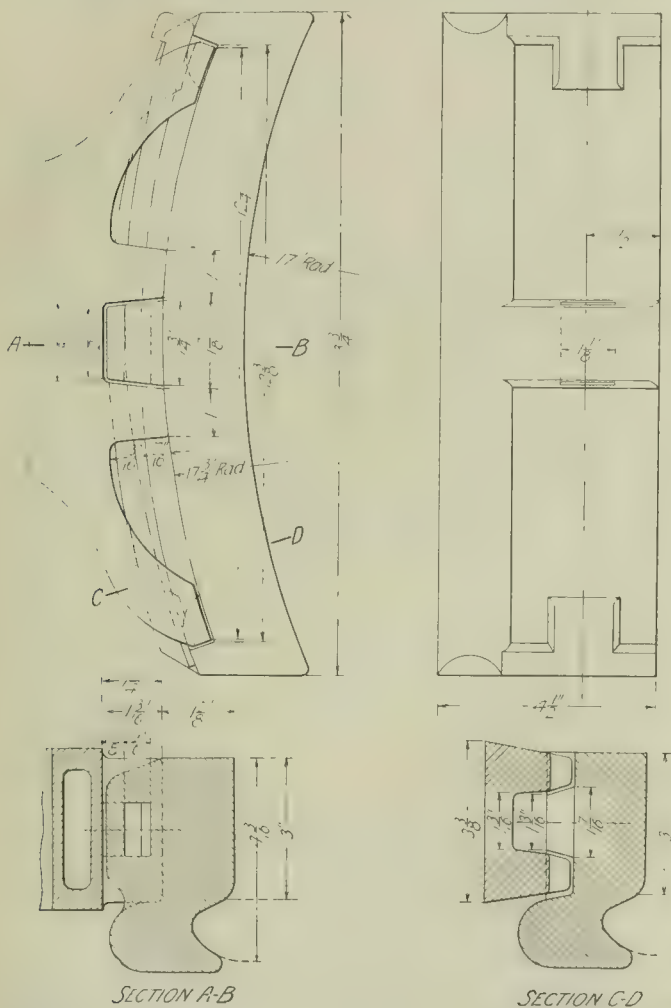
Mr. Evans stated that the subcommittee had agreed with regard to the dimensions of journal boxes and that Mr. Weston would prepare detail drawings of boxes conforming to these dimensions and those of the standard journals. The dimensions chosen were a width of $6\frac{1}{8}$ inches for the three smaller journals and a width of $8\frac{1}{8}$ inches for the three larger journals. For the distance between pedestal guides a dimension of $4\frac{3}{4}$ inches was agreed upon for all boxes, the width of seat for equalizer bars to be $7\frac{1}{2}$ inches or the diameter of seats for helical springs to be $6\frac{5}{8}$ or $7\frac{5}{8}$ inches.

The manufacturers were agreed on these boxes, there being no contention with regard to the two larger sizes. It was only with regard to the two smaller sizes that Mr. Thorpe had made a minority report on account of a possible increase of weight.

Gear Seats.

H. H. Adams said that after consideration by the subcommittee the best dimension for gear seats was determined on as $6\frac{1}{2}$ inches, instead of $6\frac{1}{4}$ inches. The motor builders felt that $6\frac{1}{2}$ inches was a sufficient length to meet their requirements and by adopting $6\frac{1}{2}$ inches for all axles they could meet the requirements of the alternating-current motor, with 50 inches between hubs.

Mr. Webster said that he and Mr. Schermerhorn had considered the gear subject quite thoroughly. It seemed that some motors had the pinion head extending outside of the face of the pinion. It was thus necessary to have a bulge in the gear case to provide clearance. Mr. Schermerhorn had found that if he put a gear hub on both sides of the gear on the smaller axles having 48 inches between wheel hubs, he would have a gear hub of 1 inch on the wheel side and $\frac{1}{2}$ inch on the motor side. On the gears for the larger axles, having 50 inches between wheel hubs, using a $5\frac{1}{4}$ -inch gear face, there would be a $\frac{3}{4}$ -inch gear hub on the motor side and $\frac{1}{2}$ -inch gear hub on the wheel side. That would allow a clearance of $\frac{1}{4}$ inch between the wheel flange and the gear case, which Mr. Schermerhorn said was being used now on some motors, and considered satisfactory. With the Westinghouse motor it was almost universal practice to have the pinion nut recessed in the opening, so that there was no bulge in the gear case, and this gave $\frac{3}{8}$ inch more clearance. That, of course, in adopting the $6\frac{1}{2}$ -inch gear fit all the way through would make it possible to put any motor on any axle, provided the bore of the gear were changed in diameter to fit the gear fit on the axle, which, of course, could easily be done. They would then have a universal clearance between gear case and the wheel flange. It would be different on the two sides of a motor; but on the larger axles taking 50 inches between gear hubs, with Westinghouse motors it would be 1



Standardization—Proposed Standard Brakehead, Flanged Shoe and Key for Wheels with 3-Inch Tread and Over.

it very desirable indeed to have a wider tread to assist in carrying the heavier cars over the special work. It appeared as though that sentiment was gaining ground very rapidly.

F. W. Sargent (American Brake Shoe & Foundry Company) said that inasmuch as there was a possibility of a $3\frac{1}{2}$ -inch tread wheel being seriously considered, it would seem to him that the 3-inch wheel of the Central Electric Railway Association and the brakeshoe for that wheel would not be needed. In other words, where a company had a $3\frac{1}{2}$ -inch tread it could adopt the Master Car Builders' brakehead. That head could be applied to the Master Car Builders' standard wheel, which had a $4\frac{1}{4}$ -inch tread, and on other treads down to one of 3 inches. Then the proposed standard for the narrow-tread wheel would accommodate the wheel treads from $2\frac{1}{4}$ up to 3 inches, and would answer perfectly well for the narrow tread.

The Central association had considered practically an M. C. B. brakehead. It was $3\frac{3}{8}$ inches wide. Mr. Sargent was in favor of a recommendation that would comprise two standards, the narrow-tread and the M. C. B.

H. C. Page (Springfield (Mass.) Street Railway Com-

by the District of Columbia commissioners. If the committee was looking forward to recommending something that would come in use within the next 10 years, a $3\frac{1}{2}$ -inch tread would be very desirable. He thought the best thing to recommend for present adoption would be the $2\frac{1}{2}$ and the $3\frac{1}{2}$ inch treads.

Mr. Page would like very much to have the association go on record for the 3-inch T-rail.

Mr. Angerer said that the large cities were working toward wider tread by adopting standard rails of their own. In this connection he presented a composite drawing of the rails of Chicago, Boston, Philadelphia, Buffalo and New York, with a $\frac{7}{8}$ -inch flange and a $3\frac{1}{2}$ -inch wheel tread. While this wheel overhung even the wide head to some slight extent, it was not any worse than the $2\frac{3}{4}$ -inch tread which was used

were rolled, practically, and in steam work or with T-rail they used $\frac{5}{8}$ inch for the same reason.

Brakeshoes and Heads Recommended.

The chairman announced that after deliberation the sub-committee had decided that two brakeheads were necessary. These are shown in an accompanying illustration. One would be similar to the head in common use on steam railroads with some slight changes as suggested by Mr. Sargent. These changes would not interfere with the interchange of brakeshoes either way. This head would be used for shoes on any wheels having 3-inch treads or wider up to and including the Master Car Builders' standard wheel tread and flange.

The second shoe would be adapted for the accommodation

Axes and Gears to be Recommended by Standardization Committee of American Street and Interurban Railway Engineering Association.

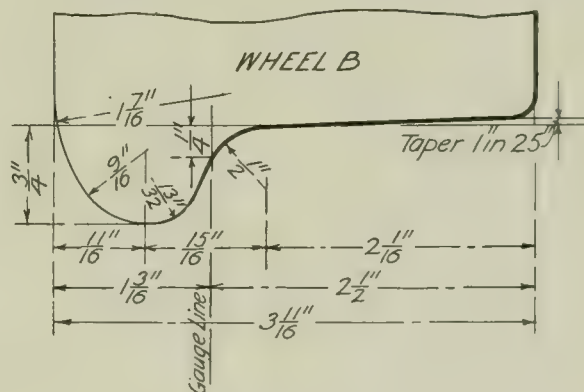
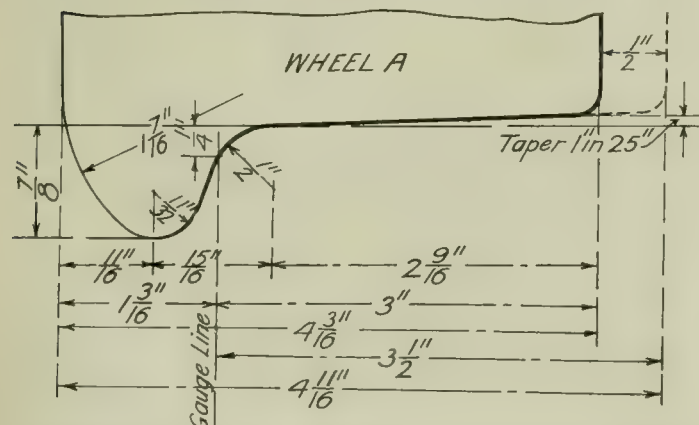
Type—	Journals, inches.	Motor fit, inches.	Gear fit, inches.	Wheel fit, inches.	Distance between hubs, inches.	Centers nals.	Maximum capacity.	Horse-power.	Length of gear seat.	Gear pitch, inches.	Gear face, inches.	Diameter of gear hub and motor bearing flange.	Finished width, gear hubs, side.	Motor side.
EA.....	$3\frac{3}{4} \times 7$	$4\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{7}{8}$	48	75	15,000	45	$6\frac{1}{8}$	3	5	8	1	$\frac{1}{8}$
EB.....	$4\frac{1}{4} \times 8$	5	6	$5\frac{1}{2}$	48	75	19,000	45-65	$6\frac{1}{8}$	3	5	8	1	$\frac{1}{8}$
EB1.....	$4\frac{1}{4} \times 8$	$5\frac{1}{2}$	6	$5\frac{1}{2}$	48	75	22,000	65-100	$6\frac{1}{8}$	3	5	8	1	$\frac{1}{8}$
EC.....	5×9	6	7	$6\frac{1}{8}$	50	76	27,000	100-150	$6\frac{1}{8}$	$2\frac{1}{2}$	$5\frac{1}{4}$	$9\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$
EC1.....	5×9	$6\frac{1}{2}$	7	$6\frac{1}{8}$	50	76	31,000	150-200	$6\frac{1}{8}$	$2\frac{1}{2}$	$5\frac{1}{4}$	$9\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$
ED.....	$5\frac{1}{2} \times 10$	7	8	$7\frac{1}{8}$	50	77	38,000	200-250	$6\frac{1}{8}$	$2\frac{1}{2}$	$5\frac{1}{4}$	$10\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{4}$

in Brooklyn. He had no doubt that some chipping of treads would take place, but where they had been tried it had not been so very serious. While the first wide wheels put on of course had been interfered with by the paving, the paving block had usually proved softer than the wheels, and had chipped away rather than the wheels.

Mr. Evans said they were not recommending something that they could expect to be enforced tomorrow or the day after or the next year, but were recommending for everybody the very best practice in the judgment of the members who formed the committee. He thought they should take an advanced stand in this matter, and recommend something that would be an object for everybody to build toward. They had done that in the axles and other parts that had been considered.

Gauging Wheels.

Mr. Thorpe said that the question of gauging wheels had



Standardization—Wheel Treads to be Recommended, Showing on the Left Wide Tread for Combined City and Interurban Service and on the Right Narrow Tread for City Service.

been a serious one in connection with electric railway work. Some companies had both T and grooved rails, some T-rails only, and some all grooved. Also the flanges were innumerable in contour; finally, the amount of play allowed varied very largely. Trouble was experienced owing to the fact that the method of measuring varied very largely. A good many electric railroads did not use the M. C. B. method of measuring, that was, taking a point on the flange $\frac{1}{4}$ inch or 17-64-inch above the tread.

Mr. Evans said it was the usual practice of traction companies to allow $\frac{1}{4}$ inch play between the gauge of the track and the gauge of the wheels.

G. S. Vickery (Pennsylvania Steel Company) said it was advantageous in special work to have a fixed point below the top of the head from which to measure the gauge of track. For girder rails his company had $\frac{1}{4}$ inch, because that brought the gauging below the bottom of the fillet on all the rails that

width of the tread. Mr. Evans had found that a portion of the committee thought it advisable also to recommend a wheel of narrower tread to suit some local conditions.

Mr. Evans questioned P. H. Griffin (New York Car Wheel Works) regarding the taper of the tread. Mr. Griffin replied that it would be advisable to consider the experience of the steam railroads. He favored a taper of $\frac{1}{4}$ inch on a wheel tread four inches wide. The Master Car Builders recommended a taper of 1 in 20.

Mr. Evans thought the committee should recommend the section of wheel tread and flange called the Central Electric Railway standard. There had been no particular points brought out in objection to it except that some had considered the flange as too high. He felt it advisable to recommend a similar wheel tread with suggestion that the section could be cut down to $2\frac{3}{4}$ -inch width of tread where absolutely necessary or widened to $3\frac{1}{2}$ -inch width of tread.

EXPERT ACCOUNTANTS SAY THAT MILWAUKEE RESERVES ARE EXCESSIVE.

The report of an investigation of the Milwaukee Electric Railway & Light Company by Barrow, Wade, Guthrie & Co., public accountants, has been made public by John T. Kelly, city attorney of Milwaukee. An abstract of the report follows:

Depreciation Reserves.

We do not agree with the policy of the management in loading operating accounts with what we regard as excessive charges for various reserves. In most cases it is quite proper to accumulate a reasonable reserve, but in our opinion the reserves accumulated by this company are unreasonably large and result in the concealment of the actual profit earned.

The amount accumulated by the depreciation reserve over and above the very liberal charges made against this account was on January 1, 1907, \$593,554.72, a sum far beyond the needs of the company and so large as to suggest that its purpose was to permit the sequestration of a portion of the profits.

Valuation of Property.

From all sources of information at our command, we are of opinion that a present value of \$7,000,000 for all of the railway property necessary to the successful operation of the system is absolutely fair to the company.

The books of the company opened on January 1, 1897, place a valuation on the property of \$14,186,951.95, but do not disclose any of the details making up this amount.

The North American Company (a corporation with its principal offices in New York City) has been since 1894, and is now, the principal, if not the sole, owner of the capital stock of such street railway and lighting companies as have operated in the city of Milwaukee subsequent to January, 1894, so that the city is able to deal with the original owner of these properties, and not, as is usually the case, with an innocent purchaser for value.

The most important item eliminated from the property account was that of the excessive valuation placed upon the so-called "St. Gall's church property" at the time of its transfer from the North American Company under date of December, 1901. In July and August, 1899, the real estate upon which now stands the Public Service building was purchased for the amount of \$251,313.39. This real estate does not appear again on the books until December 30, 1901, when it is placed in property account at a valuation of \$2,885,000. The property was transferred to the North American Company on December 1, 1899, the intention being that that company should hold it until the improvement could be financed.

The "property account" has been systematically used as a dumping ground for all kinds of extraordinary expenses, and other items wholly foreign in their nature to what is commonly known as property. In this practice, however, it is only fair to say that the Milwaukee Electric Railway & Light Company follows the custom prevailing among the majority of public service corporations in causing the property accounts to be of sufficient size to offset the capitalization irrespective of the character of the items dumped therein.

Relation to Milwaukee Light Heat & Traction Company.

The relations of the Milwaukee Electric Railway & Light Company with the Milwaukee Light Heat & Traction Company are peculiarly intimate and intimately peculiar. All, or nearly all, of the stock of the Milwaukee Heat Light & Traction Company is owned by the other company. It had originally a capital stock of \$500,000, all of which was subscribed for and paid by the Milwaukee Electric Railway & Light Company by the transfer of \$100,000 in bonds, \$280,000 in real estate and the balance in cash to the traction company. In 1905 the capital stock was increased to \$1,000,000, the parent company subscribing for the stock and paying for it by transferring all lines of railroad extending outward from the city limits to the Traction company.

In addition to paying interest on all advances, the Milwaukee Light Heat & Traction Company has paid handsome dividends every year since 1897, the rate since 1903 having been 10 per cent.

Mr. Beggs' Management.

We note that there was paid to John I. Beggs, general manager of the company, in 1906, a salary of \$21,000. While this is an unusually high salary, we are of the opinion that the quality of Mr. Beggs' management justifies it.

From the standpoint of the stockholder, the books disclose results which mark the management of this company as being of uncommon capacity. From this standpoint there is left little to be desired, since in addition to the payment of good dividends, the property has been so well kept up that it is probably in better condition at the end of each

year than ever before, while ample reserves have been accumulated with which to meet every possible contingency which may reasonably be expected to arise in the conduct of the business.

The methods of accounting in use in the Milwaukee Electric Railway & Light Company are highly commended by the report, except as to the way in which the property account has been used.

ATLANTIC CITY CONVENTION BULLETIN NO. 3.

Bernard V. Swenson, secretary and treasurer of the American Street and Interurban Railway Association, 29 West Thirty-ninth street, New York, has issued Convention Bulletin No. 3, under date of September 13, describing the arrangements made for the annual convention of the street and interurban railway associations, to be held at Atlantic City, N. J., October 14, 15, 16, 17 and 18. In addition to the programmes of the meetings of the various associations, which were published in last week's issue of the Electric Railway Review, the bulletin contains the following information in regard to the convention:

Hotel Accommodations.

We desire to impress upon you once more the advisability of securing hotel accommodations immediately if you have not already done so. Select your hotel and address the manager, stating the number of rooms desired, whether with or without bath, number of people who will probably occupy rooms, and whether or not any ladies will be in the party. More than 75 hotels (with their rates) were listed in Bulletin No. 2. All of these hotels are within a short distance of the Steel Pier where the convention meetings and the exhibition will be held. In July we sent to you a booklet descriptive of Atlantic City, together with a pamphlet giving additional data concerning the hotels, names of their managers, rates and other information of this character. We will be pleased to advise you more fully concerning this subject upon request. There will be no advance in the regular hotel rates during the convention week.

Exhibit of Manufacturers' Association.

The Manufacturers' association is making great preparations for a most magnificent exhibit which will cover the entire Steel Pier. This exhibit will be larger and more comprehensive than ever before. One hundred and seventy-five different companies have already been assigned exhibit space, and the total amount of floor space will be considerably greater than that used at the 1906 exhibit in Columbus.

Transportation Matters.

Because of the unsettled steam railroad situation the Trunk Line Association has made it a rule this season to grant reduced rates not more than one month in advance. Our application has been before the Trunk Line Association ever since last June, and we confidently expect the usual reduction in rates. As soon as this and other transportation matters (such as special trains, etc.) are decided, a bulletin will be issued containing full information bearing on this subject.

Registration and Information Bureaus.

All the delegates and guests of the American, Accountants', Engineering and Claim Agents' associations will register and receive badges at the Association Booth, which will be located at the Boardwalk entrance to the Steel Pier. This booth will be kept open from 9 o'clock a. m. to 6 o'clock p. m. during all days of the convention. It will be the general headquarters for the American, Accountants', Claim Agents' and Engineering associations, and will serve as an information bureau concerning association matters.

The Manufacturers' association will also have a booth at the same place, which will take care of similar matters relating to the exhibitors and the members of the Manufacturers' association.

There will be a local postoffice, telephone booths and telegraph stations, located at the Boardwalk entrance to the Steel Pier, convenient to the place of registration.

Entertainment.

Those in charge of the entertainment features of the convention will have some announcements to make in the near future. It is expected that there will be a vaudeville performance on Tuesday evening, a theater party on Wednesday evening and that the annual banquet will be held on Thursday evening. In addition, there will be a number of other forms of amusement, including a euchre party, roller

chair rides, etc., which will be especially arranged for the ladies of the convention.

Convention Days.

The morning of Monday, October 14, will be reserved for registration purposes, and the first meetings of the convention will be held on the afternoon of that day. The meetings of the various associations will continue throughout the week, closing on Friday, October 18. Considerable attention has been given to the arrangement of the days upon which the various associations will meet. The following general schedule of meeting days has been decided upon:

A. M.		P. M.	
Monday —Registration	and	Engineering, Claim Agents' badges.	
Tuesday —Accountants', Engineering, Claim Agents'		Accountants', Engineering, Claim Agents'	
Wednesday —American. Joint session of all associations.		Accountants', Engineering, Claim Agents'	
Thursday —American, Accountants'.			
Friday —American.			

Meeting Places.

The opening session of the American association convention, which is also a joint meeting with the affiliated associations, will be held in Casino hall, a large audience room seating 800 people, and located at the Boardwalk end of the Steel Pier. The Thursday and Friday sessions of the American association convention will be held in the sun parlor, which accommodates about 250 people, and is located near the outer end of the Steel Pier.

The meetings of the Accountants' association will probably be held in a large audience room in the Chalfonte hotel, which, as previously stated, is the headquarters hotel for the Accountants' association. All meetings of the Engineering association convention will be held in the sun parlor near the outer end of the Steel Pier. The meetings of the Claim Agents' association will be held in a suitable audience room in the St. Charles hotel, which is the headquarters hotel of that association.

Convention Programmes.

The committees on subjects have been actively engaged on the programmes of the four associations for several months past, and there is every prospect of a convention at which will be presented a number of interesting papers which will be of great value to the member companies. Each of the four associations will have a programme which in itself will amply repay those in attendance. While the programmes of the various associations are practically complete, as shown in this bulletin, it is expected that the official programme will show several additions papers bearing upon subjects of more than usual interest.

Steam Turbine Tests.

A turbine test of a 1,000-kilowatt Allis-Chalmers unit was recently made at the power house of the Kokomo Marion & Western Traction Company by Paul Diserens of Purdue University and representatives of the owners and builders. The turbine was designed for 1,000 kilowatts at 1,800 revolutions per minute, using dry saturated steam at 140 pounds at the throttle and 28-inch vacuum at 30-inch barometer. The auxiliaries include a motor-driven exciter, a steam-driven exciter, two small circulating pumps and a standard Allis-Chalmers turbo-jet condensing apparatus. The average load during the test was 553.3 kilowatts and the run was four hours. The steam pressure at the turbine throttle was 136.4 pounds and at the turbine inlet 61.9 pounds. The vacuum was 26.59 inches, with the barometer at 28.98 inches, equivalent to a vacuum of 27.66 inches, with a 30-inch barometer. The turbine ran at 1,800 revolutions per minute. The water used was 55,662 pounds, the drip 450.6 pounds and the boiler leakage 5,344.6 pounds. The moisture in the steam was 2.82 per cent by calorimeter. Dry steam supplied to the turbine per hour 12,115 pounds, and the actual consumption 21.9 pounds per kilowatt-hour, the guarantee at half load being 24 pounds, with a 28-inch vacuum.

The Philadelphia & West Chester Traction Company of Philadelphia, Pa., has recently equipped its lines with telephones. Each car carries a portable telephone, and jack boxes are installed at every switch and turnout and at several other places.

PIPING AND POWER STATION SYSTEMS—LIV.

BY W. L. MORRIS, M. E.

Instead of using a steam pump to fill the tank a centrifugal pump driven from a line shaft connected to a small engine may be used. This line shaft may also drive the agitators. The exhaust from this engine may be delivered directly into the water at the side of the tank, the heat thus being taken up during the entire time the water is being agitated as well as when the tanks are being filled. The pump and agitators should be fitted with clutches or tight and loose pulleys so that either can be run without the other.

If a station operator has trouble with boilers on account of the impure feedwater, it is advisable that he learn all he can about chemical treatment before making any definite decisions or letting contracts. The manufacturing chemists should analyze the water, state its properties, the reagents to use, quantity of each which are necessary, and submit a price for the reagents. From time to time after a treating plant has been installed it will be advisable to send a sample of untreated and a sample of treated water to the chemist's works to determine if the proper kind and quantity of reagents are being used and to determine if the reagents being used are giving the best results.

If an operator properly equips himself with information on treating systems he will be familiar with what he must do if a treating plant is installed and by knowing the requirements of chemical treatment he can readily determine the size of the tanks and other mechanical details. The operator will then be in a position either to construct the treating plant himself or, by the knowledge he has, to obtain very close figures from the manufacturers designing and constructing such apparatus. Thus, by having the necessary information, the additional money ordinarily charged by manufacturers for their expert advice may be saved.

The successful operation of any water treating plant is dependent almost wholly upon the chief operator, and if it is necessary for him to become thoroughly familiar with this subject why should not this information be secured before planning the installation of a plant? If the chief operator has no other means of obtaining the information desired, it would no doubt prove to be a good investment to install a small vertical internally fired boiler in the boiler room within easy reach of the firemen. This small boiler need not be over 10 horsepower and should be connected to one of the regular steam mains. A separate pump should be installed for feeding this boiler with treated water prepared in a small experimental treating plant consisting of a couple of temporary tanks.

The expense of such an experimental plant would be very slight, as the boiler could probably be rented and one of the spare pumps piped temporarily for feeding the small boiler. It is highly probable that after using the experimental plant for a month or two the employees operating it would be familiar with chemical treatment and any decision which might then be made regarding a permanent installation would be based on a definite knowledge of the conditions and would undoubtedly be correct.

The principal requirement for chemical treatment is to know what one is doing. The engineers in the plant are not fitted in any way to analyze the water and they must adapt the situation to what is available from the manufacturing chemist. It is well to know the conditions to be met from the start. The chemical treatment of water must be done correctly at all times and as often as the water changes the treatment must be changed. When the small experimental plant can be operated successfully on a commercial basis, then it will be time and good practice to install a chemical treating plant to supply all the boilers.

Water to Hydraulic Elevators—Classes O 1 to O 3.

If elevators are installed in a power house they are gen-

erally of the hydraulic ram construction termed "lifts," generally low lifts only, such as from the boiler room basement to boiler room floor level, a height of 10 to 20 feet. The elevator platform is placed on the end of a plunger and the cylinder is dropped into a well or casing. The valve used to admit and discharge water from the ram is generally of the balanced piston type with cup leather washers such as are used on heavy hydraulic rams. This valve is quite easily operated and permits the use of large port openings.

For boiler room service the pipe connection from the operating valve to the elevator cylinder and the discharge line from the elevator cylinder should each be about one-fourth the diameter of the plunger if the pressure carried at the pump is 60 pounds. If high-pressure water is available, say at 120 pounds, it can be used very satisfactorily. The use of warm water at 125 degrees or over should be avoided if possible, as the stuffing box packing and cup leather in the operating valve deteriorate rapidly when warm water is used. The reason for this is that the heat removes the lubricant from the packing. A standard three-way valve can be used for an operating valve, but is much more difficult to move and will leak considerably if it is used frequently.

In the construction of a hydraulic ram it is the best practice to fit a brass sleeve on the ram which passes through the stuffing box, but unless the brass sleeve is properly fitted considerable difficulty and annoyance will be occasioned by leakage. In no case should the joint between the brass tube and the ram be made tight at its outer or upper end. The inner end should be made tight and the outer end should be left free to move and discharge any water that may have leaked by the inner end, thereby avoiding the possibility of the pressure inside the tube causing a rupture. Considerable difficulty is experienced if the upper end of the brass sleeve is rigidly attached to the iron ram, because the expansion and contraction of iron and brass are not the same. This unequal expansion and contraction causes the joint at the inner or bottom end of the ram to leak and make trouble. The same difficulty is experienced if the brass sleeve bears against a shoulder on the ram at its upper end. A much better construction is obtained if the upper end of the brass tube is free to expand and contract, and to secure this the upper end of the ram, where the brass tube ends, should have a slight groove turned in it, as shown in Figure 316 (O 1-1). The tube can be placed on the ram and the lower end "spun" into the shape as shown.

One the most useful applications of the plunger hydraulic elevator is for coal and ash lifts in small stations. The general plan for installing a plunger elevator in a small power house is shown in Figure 317 (O 1-2). In such an installation the hydraulic elevator would lift the coal car about seven feet. The weight of the car would be about 1,000 pounds, and would be loaded with from 1,000 to 1,500 pounds of coal. About 100 trips per day would be required for handling the coal used in a 20-hour day, and about 20 trips would be required to remove the ashes. The total number of trips per day would therefore be about 120 in 20 hours, or about six trips per hour.

In practice it has been found that one man on each shift can handle coal and ashes of the quantity stated and also weigh each car of coal. Ordinarily the coal is shoveled but once—from the car to the overhead bin. The storage space, which requires additional shoveling to load the coal into the small cars, is used only in case of shortage. The ash car can be placed either on a coal track or, if the conditions will permit, at the end of the overhead track that runs over the furnace hopper. This track is extended over the railroad ash car which is left standing on a stub switch.

The capacity of the daily storage bin should be slightly

greater per foot of length than that of a railroad coal car. The small cars have a drop front, which facilitates loading them with ashes from the floor and they are also fitted with dump bottoms. Scales are provided so that tests of a certain coal or boiler can readily be made. Ashes are delivered to the small car while it is on the boiler room floor level. The only power device required for this entire system is therefore the hydraulic lift, and the best practice is to use low-pressure water service for the ram if the station has its own water supply or has a storage tank into which the ram can discharge if city water is used.

If an open heater is used, fitted with a float admission valve to carry low water in the heater, it is quite probable

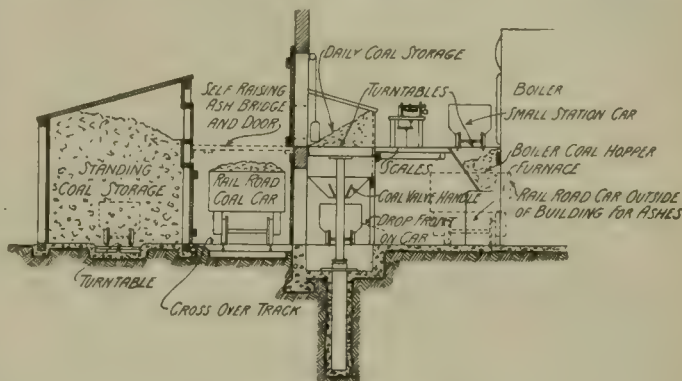


Figure 317 (O 1-2).



Figure 316 (O 1-1).

that all the ram water would be saved by discharging it into the heater. The elevator as shown would require about 500 pounds of water per trip, or 60,000 pounds per day. The coal which the elevator would handle would evaporate about eight times as much water as would be used by the elevator.

Unless some forethought is given and preparations are made for sinking the cylinder casings considerable trouble may be experienced. It is difficult to dig a small deep hole and even more so to keep it plumb.

The most usual construction is to drop a sheet metal sleeve into a hole and fill in around it. This sleeve should be considerably larger than the cylinder.

Care must be taken in setting the sleeve to see that it is not out of place more than the clearance between it and the cylinder. This sheet metal sleeve will not last long in such a location, and to prevent the banks from closing in on the ram cylinder it is advisable to fill in around the sleeve with a sand and cement grout up to the point where the concrete floor of the elevator pit begins. If the casing leaks so badly that the grout runs into it, the interior of the sleeve can be kept from filling with cement by filling it with water. The water should be poured in so that its level is about the same as the level of the grout around the exterior.

Improvements of the Springfield Street Railway.

The Springfield (Mass.) Street Railway is planning to expend \$465,000 on improvements to its lines during the next 15 months. These include a new car house and shops to cost \$100,000, to be erected at the corner of Hooker and North Main streets, in Springfield, new rails, new extensions, double tracks, special track work and new cars.

The new rails to be used will be 9-inch grooved girder rails weighing 126 pounds to the yard. These will be laid in many places to replace the present 80-pound T-rails. Over 30,000 chestnut ties have been ordered for spring delivery, which will be used under the new rails.

Plans and specifications are now being prepared for the new cars which will be ordered. These will include seven 14-bench double-truck cars, nine long cars for the Springfield-Worcester line, eight 30-foot closed cars, with double trucks, and a long double-truck flat car.

News of the Week

German Commission Inspecting Electric Railways.

A commission of engineers and railway experts representing the German government is in this country investigating the electric railway development and especially the single-phase system. The party includes: Councilor Wettfeld, confidential adviser to the minister of public works, Prussia; Dr. Walter Reichel, professor of the Berlin Polytechnic Institute; Dr. Frederick Jordan, manager of the Lahmeier Electric Company; Dr. E. Frischmuth, manager of the Siemens-Schuckert Company; and Dr. Philip Pforr, managing director of the railway department of the Allgemeine Elektricitäts Gesellschaft of Berlin. They have inspected the plant of the Westinghouse companies at East Pittsburgh, Pa., the electrified line of the New York New Haven & Hartford Railroad, the Pittsburg & Butler Street Railway and the Indianapolis & Cincinnati Traction Company, which are all operated by the single-phase system.

Boston & Northern Asks Freight Rights.

By filing petitions for local rights in 14 cities and towns in the district north of Boston, the Boston & Northern Street Railway has just taken a step toward the development and operation of trolley freight lines. The places in which petitions have been filed are in the district between Malden and Lowell on one side and Malden and Lawrence on the other. No steps have yet been taken to establish the trolley freight system in the Newburyport, Salem, Lynn or Haverhill districts, though it is believed these will follow later if the plans now being put under way succeed.

The places petitioned comprise about one-third of the territory covered by this company in Middlesex, Suffolk and Essex counties. No petition has yet been filed in Malden, but the towns of Melrose, Wakefield, Reading, North Reading, Andover, North Andover, Middleton and Danvers, Wilmington, Tewksbury and Dracut have already been petitioned, as have Lowell and Lawrence.

Andover has unanimously denied the petition, while North Reading has unanimously granted it. The company will wait till all cities and towns are heard from and then carry the matter to the railroad commission.

It is hoped in time, when the Boston Elevated Railway, which has petitioned for the freight rights in Boston, has instituted an express service, that the Old Colony Street Railway and the Boston & Northern may send cars from the mill cities on the north to the mill cities on the south of the state without change of cars.

Organization of Chicago Board of Supervising Engineers.

The board of supervising engineers in charge of the rehabilitation of Chicago's street railway systems, in accordance with the franchise extension ordinances passed by the city council in February, has recently adopted a plan of organization for the engineering, inspecting and auditing required in connection with the work. The main features of the plan are as follows:

The chief engineer is responsible for the preparation of the plans and specifications and is given the requisite authority and assistance to prepare them, subject to the approval of the board. He is also to inspect the work, or cause it to be inspected, during its progress, and cause to be kept a complete record of construction and expenditures.

The organization is as follows:

Chief Engineer—B. J. Arnold.

Assistant Chief Engineer—George Weston.

Division Engineer in Charge of Track and Roadway—R. F. Kelker, Jr.

Division Engineer in Charge of Electrical Transmission and Distribution—E. N. Lake.

Division Engineer in Charge of Power Stations, Substations and Buildings—Not yet assigned; special engineer in this division, R. A. Sanborn.

Division Engineer in Charge of Cars and Car Routing—W. Thorn.

Division Engineer in Charge of Tunnels—Not yet assigned.

Chief draftsman, in Charge of Drafting Department—F. W. Steeg.

Auditor, in Charge of Division of Accounts—L. R. Acton.

New York Commission Investigates Transportation Service.

On September 16 the New York public service commission held the first of the public hearings at which the transportation companies will be required to show cause why they should not be compelled to make various increases in service, as specified in the commission's resolutions appointing the hearings. At the first hearing Oren Root, Jr., general

manager of the New York City Railway, was called upon to show why the company should not greatly increase its service on Broadway, Madison avenue and Fourth avenue.

Mr. Root said that the company had found it impossible to live up to its schedules on account of the congested condition of the vehicle traffic, and that the number of cars allowed to pass a given point is determined by the crossing policemen, not by the company. He said that an increase in the number of cars operated would increase the seating capacity of the cars, but would not help the service, and that although the company had plenty of extra cars during non-rush hours, an order to run more cars would be of little avail as long as the present condition of congestion in the streets continues.

On September 17 the commission intended to hold a hearing with regard to an order directing the Brooklyn Rapid Transit Company to cease handling ashes on its lines between 6 a. m. and 8 p. m., but at the request of George D. Yeomans, counsel for the company, the hearing was postponed for a week. Mr. Yeomans said that the ashes were removed under a contract with the city, and as the board's order would practically nullify the contract the corporation counsel should be represented at the hearing.

The commission has fixed a hearing for September 27 to inquire into the reasonableness of an order to the Union Railway of the Bronx to increase its service from 25 to 100 per cent, the maximum increase of cars to be put on in rush hours. The commission also ordered the Coney Island & Brooklyn Railroad to install additional equipment, which the officials state will cost \$1,250,000.

Hearings have been called for Thursday and Friday to give the Interborough Rapid Transit Company an opportunity to show cause why it should not increase its service on the elevated and subway lines for an hour and a half before and after the rush hours. It is expected that these hearings will be followed next week by the issuance of orders directing the companies to make the increases which have been discussed.

New York Rapid Transit Affairs.

Paul D. Cravath, general counsel for the Interborough Metropolitan Company, went to Albany last Saturday and discussed the recent investigation of the company by the public service commission with Governor Hughes. It is stated that the officials of the company believe that the investigation as conducted by William M. Ivins for the commission has caused erroneous impressions not to the company's credit and that the purpose of Mr. Cravath's visit to Albany was to explain more of the company's side of the case and to suggest some changes that should be made in the public service act in justice to the corporations.

Mr. Ivins has stated that Jacob H. Schiff of the banking firm of Kuhn, Loeb & Co. would be called upon at one of the hearings next week to testify with regard to some of the deals in connection with the formation of the Metropolitan Securities Company.

It was reported this week that President Shonts of the Interborough Metropolitan Company had written to the public service commission making a tentative proposition to sell the Belmont tunnel to the city, stating that the city should own all of the river tunnels and bridges.

The company has expended over \$7,000,000 for the tunnel and has not as yet been able to secure a franchise for its operation. However, the story that the company had opened negotiations for a sale of it to the city was denied, both by Mr. Shonts and by the commissioners.

The citizens of Brooklyn continue to be agitated over the reports that the public service commission will not advertise for bids for the Fourth avenue subway to Coney Island, for which plans were approved by the old rapid transit commission, and for which the board of estimate has appropriated \$23,000,000. It was stated that the board of estimate would take some further action on the matter this week.

The Allied Civic Bodies of Brooklyn, representing 27 civic organizations, held a mass meeting on September 12 and, after a number of indignant speeches, addressed a set of resolutions to the commission, urging it to proceed at once with the advertising for proposals for the construction of the subway.

Report on Brooklyn Tunnel.—Chief Engineer Rice of the New York public service commission on September 13 submitted a report on the status of the rapid transit subway under the East river from the Battery to Brooklyn. He denied the rumors to the effect that the tunnel was unsafe because some portions of the tubes had been reinforced with an inner lining of steel and concrete, and said that despite the large number of obstacles encountered the subway is safe and has been well built. He said that piles had been placed under a portion of the tunnel merely as an additional safeguard. Mr. Rice fixes the time of beginning operation early in November.

To Discontinue Mail Service.—The Philadelphia & Easton Railway of Doylestown, Pa., has notified the government that it will discontinue handling United States mail on its cars after April 1, when its contract expires. The company claims it is not receiving adequate compensation.

Wreck on the Lake Shore Electric.—A limited car on the Lake Shore Electric Railway was wrecked near Genoa, O., on September 19. As the car was passing the siding one truck split the switch, overturning and ditching the car. The reports are that two people were killed and 30 injured.

New York Central Ordered to Put Wires Underground.—Commissioner O'Brien of the New York department of water supply, gas and electricity has notified the New York Central & Hudson River Railroad that it must put its high-tension transmission wires between Spuyten Duyvil and Ninety-sixth street underground.

Permission to Attack Interborough-Metropolitan Charter Denied.—Justice Hendrick of the New York supreme court on September 13 denied an application made by Attorney-General Jackson for permission to begin action against the Interborough-Metropolitan Company to vacate its charter and to annul the corporate existence of the company.

Chicago Traction Situation.—Officials of the Chicago Railways Company have issued a notice to the holders of the securities of the Chicago Union Traction Company and its underlying companies informing them of the postponement of the time for accepting the ordinance. The notice declares that if the ordinance is not accepted the company will lose heavily.

Accident in Boston Elevated Power House.—On September 17 the grounding of an armature of a 2,700-kilowatt generator in the Central power station of the Boston Elevated Railway, Boston, Mass., tied up the central city lines for about 15 minutes. The short-circuit was of sufficient violence to set fire to adjacent woodwork. The damage to station and generator is placed at \$1,000.

First Car Ready for Trip Through Belmont Tunnel.—It is announced that the first car will be operated through the Belmont tunnel under the East river, New York, at Forty-second street, some time next week. One of the New York & Queens County Railroad cars was taken to the mouth of the tunnel in Long Island City on September 15, ready to make the trip from Long Island to Manhattan.

To Increase Devilstrip in Toledo.—General Manager Beilstein of the Toledo Railways & Light Company has held a number of conferences with the public service board of the city with regard to increasing the strip between track centers on its city line. With the present large interurban cars entering the city in many cases there is practically no clearance between cars, and where the track is rough the cars often scrape. It is desired to increase the devilstrip so as to allow six inches clearance between the widest cars.

Delinquent in Reports to Commission.—It is reported that the Ohio electric roads and the state railroad commission are having trouble on account of the annual reports required by the commission, which demands the actual construction cost and tangible value of interurban property. Some of the roads have not kept this information in accessible form. The reports were to have been filed by June 30, but because of the difficulty in securing the information the time was extended to September 15. It is stated that some of the roads have not yet reported.

Controversy in Philadelphia.—John B. Parsons, president of the Philadelphia Rapid Transit Company, has addressed a letter to the Retail Merchants' Association of Philadelphia regarding the controversy which has arisen over the payment by the company, as provided in its new contract with the city, of a fixed sum in lieu of the maintenance of street paving, removing snow and license fees of cars. Mr. Parsons says that the company desires to settle the matter fairly and honestly and asks the association to suggest a plan which will bring about this result.

Indiana Commission Without Jurisdiction over Street Crossings.—The Indiana railroad commission on September 16 denied the petition of the town of Ft. Branch to compel the Evansville & Southern Indiana Traction Company to protect its crossings with streets in cities and towns with electric lights, on the theory that the commission has no jurisdiction over such crossings. The opinion given by Commissioner McAdams is in part as follows: "If the petition in this case referred to the physical condition or manner of operation of the respondent's line in any particular, except those especially excepted by statute, we would gladly sustain the same. But the petition does not proceed upon that theory and could not,

from the nature of the relief sought. The petition seeks to have the company provide artificial lights at street crossings, when its cars pass, and it may be conceded upon the record that this is necessary for the security of the public who travel the streets. We believe that under the statute the commission has the authority to require the protection of 'a wagon road crossing,' as named in the statute, but we do not believe that 'a wagon road crossing,' as used in the statute, refers to streets in cities and towns."

Reports to Indiana Commission.—The Indiana railroad commission is sending out letters of instruction to the interurban roads of the state, advising them that under the new law they will be required to make an annual report to the commission on or before June 30, 1908. They are also advised that said reports are to be made in conformity with the system of accounting recently promulgated by the American Street and Interurban Railway Accountants' Association. This sort of report will be required of the Indiana interurban roads until a system is formulated by the interstate commerce commission, when the reports will be made under the provisions of that law.

National Association of Railway Commissioners.—The nineteenth annual convention of the National Association of Railway Commissioners will be held at Washington, D. C., beginning at 11 a. m. on Tuesday, October 8. The meetings will be held in the courtroom of the interstate commerce commission. The programme includes reports on the following subjects: Construction and operating expenses of electric railways; grade crossings; railroad taxes and plans for ascertaining fair valuation of railroad property; amendment of the act to regulate commerce; powers, duties and work of state railway commissions; railroad statistics; uniform classification; legislation; safety appliances; delays attendant upon enforcing orders of railway commissions; rates and rate making; demurrage and reciprocal demurrage.

To Examine Books of Columbus Railway & Light Company.—The Columbus, O., city council on September 16 passed an ordinance directing the city clerk to employ an expert accountant to examine the books of the Columbus Railway & Light Company. The franchise contract between the company and the city provides that eight tickets shall be sold for 25 cents whenever the annual gross receipts from fares within the city shall amount to \$1,750,000. The company is now giving seven tickets for a quarter. The city council has taken exception to the methods of accounting employed by the company and seeks to show that the city is entitled to the lower fare. The company officials have expressed their willingness to have the books examined, but oppose the city's claim that the receipts of the Central Market Street Railway, which has been acquired since the franchise was granted, should be included.

San Francisco Strike Practically Abandoned.—The strike committee of the San Francisco street car men's union on September 12 virtually put an end to the strike of the motor-men and conductors formerly employed by the United Railroads, which began on May 5 of this year. The committee issued an order removing the restriction against riding on the company's cars, which has been imposed on all labor union members since the strike began. Although the strike is still in effect officially its practical effects will be removed by this order, for heretofore, although the cars have been running on the old schedules, large numbers of union men have refrained from riding and have either walked or traveled in buses. An official of the United Railroads states that the company now has 1,600 platform men in service, which is practically the number of men on duty before the strike was declared, and that from 50 to 75 applications for positions are being received daily.

Geary Street Line Granted Permit.—The San Francisco board of supervisors on September 3 granted a temporary permit to the Geary Street Park & Ocean Railroad to operate its railway line on condition that 10 per cent of the gross receipts be paid to the city. The company's franchise has expired and it has operated under a permit from the city, paying the city 5 per cent of its gross receipts until May 5 of this year, when operation was suspended on account of the carmen's strike. Before renewing operation it was necessary to secure a permit from the city. The new permit is revocable at the pleasure of either the mayor or the board with one day's notice, and it is explicitly provided that the permit shall in no way be considered as a franchise. The company is to keep the space between the tracks and for two feet on either side in good repair. An amendment to the effect that the company be required to promise a \$3.00 wage to trainmen for eight hours' service failed of adoption, the members of the board in general holding that the city should not interfere on one side or the other in a matter of industrial dispute.

Construction News

FRANCHISES.

Chicago, Ill.—The Calumet Electric Street Railway, which operates about 80 miles of suburban street railway in the southern part of Chicago, has applied to the city council for a renewal of its franchise, which expires in about five years. If a new franchise is granted the company will at once perfect plans for the rehabilitation and extension of its lines; but no extensive work can be undertaken until a long-time franchise has been secured.

Cleveland, O.—The county commissioners have granted a franchise to the Cleveland Brooklyn & Elyria Railway to operate its line in Cuyahoga county. The road will run from Cleveland to Elyria and from thence south to a point not yet announced.

Dayton, O.—The Dayton Street Railway Company, which proposes to build a new line from the Philadelphia road at Salem avenue to the southeast corporation limits of the city, has applied for a franchise.

Detroit, Mich.—The citizens, at an election on September 7, voted against granting temporary franchises to the Detroit United Railway for 11 proposed extensions within the city.

Evansville, Ind.—The Grand Central Traction Company, which proposes to build from Indianapolis to Evansville and Terre Haute, Ind., has applied for a franchise to enter Evansville.

Findlay, O.—The Cleveland & Indianapolis Interurban Railway, which proposes to build an electric line from Norwalk, O., to Bluffton, Ind., has been granted a franchise in Findlay. C. F. Jackson of Norwalk is one of those interested in the company and it is stated that practically all of the right of way has been secured. Surveys have been made by the Riggs & Sherman Company of Toledo.

Lebanon, Mo.—The city council on September 9 granted a franchise to the Carlyle & St. Louis Railway for the operation of its line in Lebanon.

Memphis, Tenn.—The railroad committee of the city council has voted in favor of granting a franchise to the Clarksdale Collierville & Covington Interurban Railroad for an entrance to the city, including a large amount of city trackage. This company was incorporated several weeks ago to secure a city entrance for the Lake View Traction Company, which proposes to build to Clarksdale, Miss. R. F. Tate, Memphis, is interested.

Neapolis, O.—The county commissioners have granted a franchise to the Toledo & Delphos Electric Railway over the streets of Neapolis and the county roads. The company is a subsidiary of the Toledo Wabash & St. Louis Railroad and is building a line between Toledo and Delphos, paralleling the Wabash Railroad.

Pensacola, Fla.—The Pensacola Electric Company has secured a franchise for the laying of a double track in Garden street and a single track in other streets to Goulding. The Garden street line must be in operation by September 1, 1908, and the Goulding line by September 1, 1909, both lines to be for passenger traffic only.

Redding, Cal.—The city council has granted a new franchise in place of one which had expired to the Redding & Red Bluff Electric Railway, a subsidiary of the Northern Electric Company of Chico, Cal., which proposes to build from Redding to Red Bluff, Cal., 33 miles.

Steubenville, O.—General Manager G. O. Nagle of the Wheeling (W. Va.) Traction Company recently applied to the Jefferson county commissioners at Steubenville, O., for a 49-year franchise for a double-track extension from Mingo Junction to Brilliant, O.

RECENT INCORPORATIONS.

Appalachian Interurban Railroad.—Incorporated in North Carolina to construct an interurban electric road from a point in eastern Tennessee to the seaboard at Southport, N. C. When completed the line will afford a means of communication with the coast for the manufacturing interests in the western part of the state and the coal fields of the southern districts.

Bath (N. Y.) Electric Service.—Incorporated in Maine to build an electric railway in Bath. Capital stock, \$100,000. Incorporators: Luther H. Leber, Frederick M. Dayton of Buffalo, N. Y., and Arthur A. Lozier.

Danville & Southeastern Railway, Danville, Ill.—Incorporated in Illinois to construct an electric railway from Danville to a point in the southeast corner of Georgetown township, Vermilion county. Capital stock, \$10,000. Incorporators: W. H. Carnahan, B. E. Bramble, George M. Mattis, Charles Zilly and C. E. Cox, all of Champaign, Ill.

Elkins (W. Va.) Power Company.—This company has been incorporated in West Virginia for the purpose of building power plants and electric railways in Taylor, Randolph and Barbour counties, West Virginia. Capital stock, \$75,000. Incorporators: Stephen B. Elkins, Henry G. Davis, N. I. Hall and J. T. Davis of Elkins and R. C. Kearns of St. Louis.

Grand Rapids, Mich.—Two companies soon to be incorporated to build interurban lines in Michigan are reported as follows: Chicago Grand Rapids & Bay City Railway and the Grand Rapids Alma & Saginaw Electric Railway.

TRACK AND ROADWAY.

Alton Jacksonville & Peoria Railway, Jerseyville, Ill.—J. M. Rhoads, secretary, writes that this line will extend from Alton to Jacksonville, Ill., 66 miles, by way of Godfrey, Jerseyville, Carrollton, White Hall and Roodhouse. Tracklaying and overhead catenary construction have been completed from Alton to Godfrey, six miles. Construction of the remainder of the line is to begin about October 15. A. O. Auten, president; W. R. Heagler, chief engineer.

Asheville (N. C.) Rapid Transit Company.—Contracts for the building of two and one-half miles of city track will be placed by this company within the next four or five weeks. It is stated that the company also is planning the installation of several amusement features for next season's business. General manager, C. E. Van Bibber, New York City.

Bay Counties Electric Railroad.—Work on this line was begun last week about two miles east of San Rafael, Cal., from which point construction will proceed in both directions. It is stated that the bridge work has been completed along the line between Napa and Petaluma and the grading can now proceed without delay. Many cuts and fills are to be made in order to eliminate curves and reduce the grade to the minimum. Bonds for the construction of the road have been sold in the east and its rapid construction is now assured. R. M. Hotaling, San Francisco, is president.

Belvidere (Ill.) City Railway.—It is announced that this company, which is owned by the Elgin & Belvidere Electric Company, Chicago, has decided upon several improvements to the city lines. A practically new line will be built from the Chicago & Northwestern tracks to the fair grounds terminal and the tracks on West Lincoln avenue will be replaced with new 70-pound T-rails with ties embedded in concrete. The road from the railroad tracks to the bridge also will be reconstructed.

Boise (Idaho) Traction Company.—It is reported that this company has secured the right of way and made surveys for extending its lines from Boise to Barber Dam and Table Rock. I. W. Anderson of Spokane is president.

Boston & Northern Street Railway.—Announcement is made that contracts for building a nine-mile single-track electric railway from Lowell to Lawrence by way of Andover will soon be let by this company.

British Columbia Electric Railway, New Westminster, B. C.—This company has awarded a contract to J. B. Bright for an extension of its Vancouver & Lulu Island line from Eburne to New Westminster. Grading was started August 1 and the line is expected to be completed by January 1. It is reported that the company is also preparing to let a contract for the construction of a line between New Westminster and Chilliwack.

Brooklyn Rapid Transit Company.—Work on this company's new electric line in Livingston street, from Flatbush avenue to Court street, is rapidly nearing completion and it is planned to have it in operation by October 15. The line was built to relieve the traffic congestion in Fulton street. It was announced last week at a hearing before the public service commission on the application of the Brooklyn Union Elevated Railroad for permission to issue a \$20,000,000 mortgage, that the company will have ready within a week its plans for an elevated structure on the Flatbush avenue extension, to connect the present elevated lines in Brooklyn with the Manhattan bridge over the East river.

Chatham Wallaceburg & Lake Erie Railway, Chatham, Ont.—This company, which recently has completed a line to Lake Erie, is now contemplating an extension northward to Wallaceburg. R. E. Kizer, general manager, Chatham, Ont.

Chihuahua, Mex.—Ten miles of rails have been delivered for the reconstruction of the local street railway line, which is being converted to an electric line, and for its extension to Nombre de Dios.

Columbus Marion & Bucyrus Railroad, Delaware, O.—A second grading force has been put to work on the Marion end of this line from Marion to Bucyrus, O., 18 miles, an extension of the Columbus Delaware & Marion Railway. A force of men has been at work on the Bucyrus end of the line for some time. George Whysall, general manager.

Columbus, O.—Application has been made to the state board of public works for a lease of the towpath along the canal from Lancaster to Nelsonville, 33 miles, by the Logan & Athens Construction Company, for the purpose of building an electric railway. The Scioto Valley Traction Company already has a terminus at Lancaster and has made surveys for an extension of its line to Athens. It is stated, however, that representatives of other interests made the present application. Pending investigation no action was taken by the board.

Conestoga Traction Company, Lancaster, Pa.—It is reported that this company has decided to extend the Columbia & Donegal line from Marietta to Elizabethtown, Pa. H. W. Crawford, chief engineer.

Dallas (Tex.) Interurban Electric Railway.—This company, which is to build an interurban line from Dallas to Greenville and Sherman, Tex., about 73 miles, including 30 miles of street railway in Dallas, now contemplates its extension to Terrell and Forney, Tex. A proposition has been made by the company, which includes the purchase by citizens of the two cities of \$100,000 of its preferred stock, the providing of a right of way 100 feet wide and the donation of a site for terminal facilities. A committee has been appointed to report on the matter. D. D. Waggoner, Dallas, is president.

Decatur, Tex.—M. J. Healy and L. J. Polk are promoting an electric railway from McKinney, Tex., to Mexico, but at present they propose to make Decatur the western terminus.

Elgin, Ill.—Bruce Payne of Chicago, Smith Youngs of Youngsdale and others are interested in a proposed interurban line from Elgin to Sycamore, Ill., for which much of the right of way has been secured. As now planned the line will run west from Larkin avenue in Elgin to a point near the Elgin Country Club, then south to Youngsdale, and from there follow the section line directly to Sycamore, reducing the distance about six miles from that of the present steam roads. It will take about two years to build the line.

Eugene & Eastern Electric Railway, Eugene, Ore.—A committee of business men of this city has been appointed to raise \$60,000 to assist in the construction of this proposed interurban line which eventually will connect Eugene and Portland, Ore., extending down the Willamette valley. It is stated that its purpose is to form a corporation to complete the project of an electric line already begun by A. Welch and associates of Portland. The line will cross the Willamette river west of Junction City. The shops, terminal grounds, etc., are to be located at or near Eugene.

Ft. Dodge Des Moines & Southern Railroad, Boone, Ia.—It is announced that this company, which is now operating its cars between Des Moines and Kelley and between Des Moines and Ames, Ia., may later extend the line to Jefferson by way of Lohrville. J. L. Blake, general manager, Boone, Ia.

Ft. Worth, Tex.—The reports of a merger of the two projected electric railways from Ft. Worth to Mineral Wells, Tex., have been denied by the persons interested. One line is projected by G. R. Turner of New Orleans and the other by J. W. Beardsley of Mineral Wells. The American Engineering Company of Indianapolis, Ind., has the contract for the preliminary work in connection with the latter line.

Grand Central Traction Company, Indianapolis, Ind.—This company, which was recently incorporated with a capital stock of \$250,000, to build 251 miles (including branches) of interurban road in Indiana, with city systems in Bedford and Bloomington, has completed a portion of the survey. The line will connect Indianapolis, Terre Haute and Evansville, the present survey from Indianapolis including Trafalgar, Nashville, Bedford, Mitchell, Orleans, West Baden, French Lick and Jasper; and from Terre Haute to about seven miles east of Bloomington, passing through Saline City, Patricksburg, Spencer and Ellettsville. The road and equipment will cost about \$7,000,000 and it is announced that as soon as the necessary stock has been subscribed construction work will be begun and pushed as rapidly as possible. Nathan P. Carter of Indianapolis is chief engineer.

Helena & Butte Electric Railway, Helena, Mont.—Work on the proposed electric railway from Helena to Butte, Mont.,

will be started this fall on that portion of the line between Helena and Corbin, the new copper camp in Jefferson county, about 20 miles south of Helena.

Illinois Traction Company, Champaign, Ill.—Following its plan for shortening the distance of its interurban line between Springfield and Peoria, Ill., a tract of land has been purchased in Ridgely. By its use the cars running out of Springfield to Peoria will go by way of North Ninth street, instead of East Monroe street, as heretofore, which will save about one mile. A further reduction is contemplated by the completion of the line now under construction between Lincoln and Mackinaw, which will probably be completed within 30 days and afford a direct line from Springfield to Peoria, instead of going by way of Decatur and Bloomington, as formerly.

Indiana Columbus & Eastern Traction Company, Cincinnati, O.—It is stated that negotiations are pending between this company and the commissioners of Defiance county regarding the joint construction of a new bridge over the Auglaize river at Second street in Defiance. The company has a franchise for the operation of its line over the present structure spanning the river, but it is now believed by engineers that the bridge is not of sufficient weight to carry the cars and that with the present traffic a new bridge would have to be built within a few years. If the negotiations under way are carried through a four-span 80-foot concrete structure will replace the present steel bridge.

Kansas Traction Company, Coffeyville, Kan.—It is stated that work has been started on the construction of the interurban electric line which will connect Independence with Kansas City, Kan., by way of Lahunta, Neodesha, Altoona, Chanute, Iola, Ottawa, Baldwin, Lawrence, Tonganoxie and Bonner Springs. The line will be 160 miles long. The Midland Construction Company has been organized to build the line. F. B. Shirley of Coffeyville is president.

Lebanon Valley Street Railway, Lebanon, Pa.—An extension to the Lebanon Valley fair grounds, about half a mile, is said to be one of the improvements contemplated by this company next year. The company has signified its willingness to build the line if the fair association will agree to furnish amusement features for the park, making it a permanent pleasure resort.

Marietta, O.—It is stated that over 50 per cent of the right of way has been secured for the proposed line from Marietta to Bellaire, O., by way of Matamoras.

Millersburg, O.—It is stated that Cleveland and Chicago capitalists are interested in a proposed interurban line from Millersburg to Beach City, O., by way of Wilmot. At Beach City a junction with the Northern Ohio Traction & Light Company's line could be made, thus making through connections with other points on this road. It is stated that a route has been surveyed over private right of way covering a distance of 25 miles between the points named.

Norwich Colchester & Hartford Traction Company, Norwich, Conn.—At a recent meeting of this company, which proposes to build an interurban line from Norwich to Hartford, by way of Colchester, the following directors were elected: Costello Lippitt, Clinton E. Stark, Lucius Brown, Henry W. Tibbitts of Norwich, and John R. Backus of Colchester, Conn. For a portion of the distance in Norwich the cars will operate over the tracks of the Consolidated Railway, branching off at Thames square on to its own tracks, following the Norwich and Colchester turnpike over private right of way to Colchester and from thence following the general direction of the Colchester and Hartford turnpike. The line will touch Yantic, Fitchville, Bozrahville, Colchester, Westchester and other mill villages along the line. By its construction the distance from Norwich to Hartford will be reduced 10 miles from that of the present steam road. A general express and freight business will be developed in connection with the regular passenger business. Costello Lippitt, Norwich, Conn., is president.

Ohio & Southern Traction Company, Columbus, O.—This company has just completed its seven-mile line from Columbus to the Hartman stock farm, south of the city.

Ogden Rapid Transit Company, Ogden, Utah.—This company has begun operating cars over its line to North Ogden and to the hot springs, a resort near Ogden. A consignment of new 41-foot cars lately received from the east will be used on the hot springs line.

Oquawka, Ill.—George W. Jamieson of this city, who is promoting an interurban railway between Oquawka and Monmouth, Ill., is now getting estimates on the probable cost of the line. This is a revival of a project taken up last year and later abandoned because of the inability to sell the bonds.

The present activity of those interested is believed to indicate that sale of the bonds is now assured.

Paducah Southern Electric Railroad, Paducah, Ky.—As announced in a previous issue, the Southern Construction Company has engaged the American Engineering Company of Indianapolis to survey routes for this interurban line, to be built from Paducah to Mayfield and Hickman, Ky. Two routes have been surveyed, one terminating at Jackson, Tenn. The road will touch many points along its route at present not reached by railroads. The company will solicit freight business and make connections with steamboats and steam railroads at Paducah, Ky., and Joppa, Ill. H. M. Loving of Paducah is interested.

Finleyville, Pa.—It is reported that M. J. Hayden, T. M. Hayden, H. D. Hayden and S. E. Wilson will apply on October 1 for a charter for an electric railway from Finleyville to Bentleyville, Pa.

Raleigh (N. C.) Electric Company.—This company has recently placed contracts for the construction of about $4\frac{1}{2}$ miles of new track.

Redlands & Oak Glen Electric Railway.—It is announced that work on this proposed interurban line from Redlands to Oak Glen, Cal., will be started in about two months. It is planned to have the road in operation to Oak Glen in time for the summer travel to the mountains. A hotel for the accommodation of tourists is to be built as soon as the road is in condition to haul the material. C. S. Chesnut and Robert H. Dunn are promoting the railway.

Russellville, Ark.—Right of way for the 10-mile interurban railway which is to be built from Russellville to Dover, Ark., is said to have been secured and a terminal for the line donated at Dover. A bonus of \$15,000 also has been raised. The Southern Construction Company, Pine Bluff, will construct the line, which, it is stated, will cost about \$200,000. Adam J. Robinson of Pine Bluff is president.

St. Joseph Excelsior Springs & Lexington Railway.—S. S. McIntire, secretary, writes that this company, recently incorporated, proposes to build an electric line from Excelsior Springs to Vibbard, Mo., six miles. Grading is to begin by December 1. Contracts have not yet been let. Three small bridges will be required. It is expected to use the Strang gasoline-electric motor car or some modification. G. P. Lingefelter of Denver, Colo., is president.

St. Joseph (Mo.) Railway Light Heat & Power Company.—This company will soon proceed with the construction of its proposed extension to Savannah, the cost of which will be about \$300,000. Right of way has been secured for a single-track line one mile long from the north city limits of St. Joseph to Krug park.

San Diego & Arizona Railroad.—A contract for grading this road from San Diego to the Imperial Valley and Yuma, Ariz., has been let to Rendall, Frazier & Co. of San Diego, and work is to begin at once. John D. Spreckels, president, states that as soon as the right of way is cleared additional contracts will be let.

San Diego (Cal.) Electric Railway.—Announcement is made that this company intends either to construct a new line or to acquire by purchase the Los Angeles & San Diego Beach Railway for the purpose of having connection with Pacific Beach and La Jolla. Property in the Moreno district in California has been acquired by the Spreckels interests, and it is believed the projected line is for the purpose of developing this section.

Sapulpa, I. T.—E. C. Reynolds and associates, who have a franchise for an electric railway in this city and an extension to a connection with the Midland Valley Railroad at the Sapulpa oil fields, have begun work on its construction. The line must be completed within six months.

Shore Line Electric Railway.—Plans for the layout and proposed method of construction of an electric railway from Ivoryton through Essex Center to Old Saybrook, Conn., were laid before the railroad commissioners on Wednesday, September 11, for their approval. A certificate of necessity was granted by the judge of the superior court a few weeks ago.

Southern Light & Traction Company, Natchez, Miss.—The work of relaying its tracks with 90-pound Trilby rails has been started by this company, preparatory to the paving of the city streets in Natchez. A feature of the improvement will be the laying of the ties in concrete.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.—C. C. Reynolds, general manager, is reported to have announced that the Crawfordsville division of the Indianapolis & Northwestern Traction Company, now a

division of the Terre Haute Indianapolis & Eastern, will be extended west from Crawfordsville, Ind., to Danville, Ill., next spring, a distance of about 45 miles. Mr. Reynolds stated that work would begin as soon as good weather opened up after the winter. Preliminary surveys have been made and right of way will be obtained this fall. The line from Indianapolis to Brazil is now nearly completed.

Texas Traction Company, Dallas, Tex.—This company, which is building the Sherman-Dallas interurban line, has placed an order with the R. B. Godley Lumber Company of Dallas for over 3,000 Idaho red cedar poles. Shipments will begin at once.

Trinidad (Colo.) Electric Railroad.—President Frank P. Read of St. Louis, Mo., has announced that this company will build an extension to Cokedale, eight miles west, and to Hastings, 18 miles north of Trinidad. The city lines will also be extended to cover several streets through the south side residence district. Work is to be started as soon as the bonds are disposed of.

Washington Baltimore & Annapolis Electric Railway, Baltimore, Md.—Tracklaying on the new single-phase line from Washington, D. C., to Baltimore, Md., has been completed between Naval Academy Junction, near Odenton, to the District of Columbia line, 20 miles, and for about five miles between the junction and Baltimore, leaving about 15 miles yet to be laid. Much of the bridge and culvert work in the vicinity of Baltimore has been completed. At the Washington end the overhead work is still to be completed. The main line from Washington to Baltimore will be double track and 80-pound rails will be used. The Annapolis Washington & Baltimore steam road, from Odenton to Annapolis, 14 miles, is being electrified and the track is being relaid with 80-pound rails. The Roberts & Abbott Company of Cleveland has the general contract.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—The Salamanca-Olean division of this company's line was opened on September 3. Work on the Bradford-Carrollton line, which when completed will connect the above-mentioned line, is progressing satisfactorily. It is planned to have the road in operation this fall. W. R. Page, president.

POWER HOUSES AND SUBSTATIONS.

Consolidated Railway Company, Hartford, Conn.—This company has commenced work on the improvements on the Common street power station. The principal improvements consist in the construction of a new six-foot concrete intake tunnel, by which water for condensers and station use will be taken from the Connecticut river. Work on the foundation for a new generating unit also will be commenced shortly.

Huntsville (Ala.) Railway Light & Power Company.—General Manager Francis N. Lawton is reported to have stated that plans have been drawn for an extension to the power house which will double its capacity. This extension is to provide power for the lines which are being extended.

Illinois Traction System.—This company is making extensive changes in the transmission lines and in the substation arrangements. A duplicate high-tension line is being built between Riverton and St. Louis. It is expected that numerous additions to the power equipment and the transmission line will be of material assistance for the winter traffic. According to reports the company has also decided to erect a depot and substation at Mackinaw, Ill., and plans and specifications are being drawn for the new building. Another substation will probably be erected in the neighborhood of Armington.

Marquette County Gas & Electric Company, Ishpeming, Mich.—It is reported that this company will purchase a 500-kilowatt turbine for the lighting service and a new reciprocating engine and generator for the railway service. A 350-horsepower Babcock & Wilcox boiler will also be installed. It is expected that these additions to the power equipment will meet the heaviest traffic conditions.

Southern Pacific Railroad, Oakland, Cal.—It is reported that the Southern Pacific Railroad has ordered two 5,000-kilowatt Westinghouse-Parsons turbo-generators for their new Oakland power plant, to supply power for the proposed electrification of their local lines. There have also been ordered 12 Parker boilers and the Worthington condensers for the new plant.

United Railways, St. Louis, Mo.—This company is reported to have purchased from the Connecticut Mutual Life Insurance Company a piece of vacant ground at the east side of Fourth street, between Market and Walnut streets. It is understood that the United Railways acquired the property to build a downtown substation.

Personal Mention

Mr. W. B. Voth, heretofore chief engineer of the Sheboygan (Wis.) Light Power & Railway Company, has been appointed superintendent of the company.

Mr. O. R. Sturzinger, master mechanic of the Toledo Port Clinton & Lakeside Railway, at Genoa, O., has been appointed general superintendent, succeeding Mr. H. C. Warren, resigned to become general manager of the Toledo & Indiana Railway.

Mr. J. A. Killingsworth has resigned as general manager of the St. Thomas Street Railway, owned and operated by the city of St. Thomas, Ont., to accept a position with the Pere Marquette Railroad.

Mr. C. C. Hurin has been appointed district traffic agent of the Illinois Traction System at Springfield, Ill., succeeding Mr. C. H. Clark, resigned to accept a position with the St. Louis & San Francisco Railroad.

Mr. Charles W. Calkins has been appointed superintendent of the Cohoes (N. Y.) Railway, succeeding Mr. Thomas J. Mulcahey, resigned. The Cohoes Railway is operated by the United Traction Company of Albany, N. Y.

Mr. Harry Vance, claim agent for the Illinois Traction System at Springfield, Ill., has resigned, effective at once, to engage in other business in Cincinnati, O. Mr. S. W. Johns, heretofore district traffic agent at Decatur, Ill., will succeed Mr. Vance.

Mr. J. T. Burke, who has heretofore been connected with the Southern Pacific Railroad, has been elected president of the Peninsular Railroad and the San Jose-Los Gatos Interurban Railway of San Jose, Cal., succeeding O. A. Hale, deceased.

Mr. H. C. Warren, heretofore general superintendent of the Toledo Port Clinton & Lakeside Railway, with headquarters at Genoa, O., has resigned to become general manager of the Toledo & Indiana Railway, with office at Toledo, succeeding Mr. E. E. Darrow, who resignation to engage in engineering work in New York City was announced in our issue of last week.

Mr. Fred H. Fitch, who recently retired as general manager of the Pittsburg (Kan.) Railway & Light Company, that the property having been purchased by



Fred H. Fitch.

the Joplin & Pittsburg Railway, will sail for an extended tour of southern Europe early in October, accompanied by his wife. Mr. Fitch has been actively engaged in street railway work for the past 20 years. He began his career in 1887 as a civil engineer, being engaged successively by the Metropolitan Street Railway of Kansas City, Mo., the Kansas City Cable Railway and the Chicago City Railway. In 1894 and 1895 he promoted and constructed a line from Carthage to Carterville, Mo., which was later absorbed by the Southwest Missouri Railroad, at which time he became manager of the latter company. In 1899 he was chosen general manager of the Sioux City Traction Company, and under his management the five different companies at Sioux City were consolidated. In 1900 and 1901 he promoted and constructed the Denison & Sherman Railway, Denison, Tex. In 1903 he was elected president of the Electrical Installation Company of Chicago. In 1905 he, with some Carthage, Mo., associates, purchased the electric railway lines at Pittsburg, Kan., since which time he has been active in the development of those properties. He is succeeded by Mr. P. P. Crafts, mention of whom was made in a recent issue.

Mr. C. R. McKay, electrical engineer and superintendent of lighting of the Toledo (O.) Railways & Light Company, has been appointed chairman of the committee on lightning arresters of the Central Electric Railway Association. Mr. McKay presented a paper on "High-Tension Lightning Pro-

tection" before the association on September 27, 1906, which was published in the Electric Railway Review of October, 1906.

Mr. E. E. Darrow, who has resigned as general manager of the Toledo & Indiana Railway, graduated from the engineering department of the University of Michigan, class of 1892, and soon after leaving college entered electrical engineering work as general superintendent of the Edison Company of Cincinnati, where he remained for six years. He then became construction engineer for the Cincinnati & Columbus Traction Company and the Cincinnati Newport & Covington Railroad, remaining with these companies four years. In 1902 he was appointed chief engineer of the Toledo Bowling Green & Findlay Traction Company. In 1905 Mr. Darrow resigned to become general manager and engineer of the Toledo & Indiana Railway.

Mr. H. H. Lunsford, whose photograph is presented herewith, as announced in the Electric Railway Review of September 7, 1907, was recently appointed superintendent of the Shreveport Traction

Company, Shreveport, La., to succeed Mr. J. T. Porter, resigned to engage in the electrical construction business. Mr. Lunsford began his railway career in 1894 with the Shreveport Belt Railway, which has since been merged into the Shreveport Traction Company, and with the exception of a short period of employment in the transportation department of one of the steam railroads of that section, he has been continuously connected with that company, as motorman, conductor and trainmaster, until his present appointment as superintendent.



H. H. Lunsford.

Mr. J. C. Huffman, who, as previously announced in the Electric Railway Review, has resigned as electrical engineer of the Oneonta & Mohawk Valley Railroad, Oneonta, N. Y., has accepted a position with the Canadian Westinghouse Company, Limited, with headquarters at Hamilton, Ont. Mr. C. S. Stanton, who succeeds Mr. Huffman as electrical engineer of the Oneonta & Mohawk Valley, has been connected with that road in various departments ever since the beginning of its construction six years ago.

Mr. C. L. Rogers, superintendent of the Uxbridge & Blackstone Street Railway at Uxbridge, Mass., has been appointed superintendent of the Worcester & Blackstone Valley Street Railway, with entire charge of the operation of the line from Worcester to Millville. Following the plan of centralizing under one management the roads on the line from Worcester to Woonsocket, Mr. Rogers also will operate the portion of the Woonsocket Street Railway, a leased line of the Rhode Island Company, from Millville to Woonsocket.

Mr. C. F. Handshey, heretofore trainmaster of the Wabash Railroad at Decatur, Ill., has been appointed general superintendent of transportation of the Illinois Traction System, with headquarters at Springfield, Ill., effective on September 15. Mr. Handshey has been connected with the Wabash in various capacities since 1886. In 1902 he was appointed assistant chief dispatcher and one year ago became trainmaster of the ninth and thirteenth districts. The position to which he has just been appointed is a new one on the Illinois Traction System.

Mr. Charles N. Black has resigned as vice-president, general manager and chief engineer of the Metropolitan Street Railway, Kansas City, Mo., to accept the position of vice-president and general manager of the United Railroads of San Francisco, succeeding George F. Chapman, deceased. Mr. Black leaves Kansas City on Saturday, September 21, for the Pacific coast. He came to Kansas City in June, 1902, as engineer for Ford, Bacon & Davis of New York, who had been employed as consulting engineers for the reconstruction of the street railway and lighting properties in that city. For the next three years he was in charge of this work and then severed his connection with Ford, Bacon & Davis and accepted a position as general manager and chief engineer of the Metropolitan Street Railway, which position he has held until the present time. Prior to coming to Kansas City

he was associated with Ford, Bacon & Davis for a number of years and had charge of construction work in various parts of the country.

Mr. A. H. Ford, who, as announced in last week's issue of the Electric Railway Review, has been elected president and general manager of the Birmingham (Ala.) Railway Light & Power Company, succeeding Mr. Robert Jemison and Mr. J. A. Emery, has resigned as manager of the operating department of Ford, Bacon & Davis, New York, and as president of the American Cities Railway & Light Company, which positions he has held for three years. Mr. Ford's portrait was published in last week's issue. Previous to 1893 he was in the steam railroad business in the treasury and auditing departments. From 1893 to 1900 he was secretary and treasurer of the New Orleans Traction Company and from 1900 to 1904 was manager of the New Orleans & Carrollton Railroad Light & Power Company.

Mr. L. H. Conklin, whose appointment as general superintendent of the West Penn Railways, Connellsville, Pa., was announced in a recent issue, was born in Brooklyn, N. Y., on December 7, 1872. He received his education in the public schools of that city and the Pratt Institute of Brooklyn, from which he is a graduate. Previous to entering electric railway work Mr. Conklin obtained valuable practical experience in the service of several gas, electric and other industrial companies and for four years conducted a general contracting business. His connection with electric railway work dates from 1904, when he became associated with Mr. A. M. Young, then president of the Connecticut Railway & Lighting Company, and organizer and owner of several other railway and industrial companies. At this time his headquarters were at Waterbury, Conn., and as engineer he had charge of all of the engineering work in connection with Mr. Young's various railway enterprises. Among these was the building of the Fairmont & Clarksburg Traction line, now operating a 43-mile line between Fairmont and Clarksburg, W. Va. In March of this year Mr. Conklin resigned to become superintendent of lighting with the West Penn Electric Company, which position he has held until his recent appointment as general superintendent of the entire West Penn system, which includes the following properties operating in Fayette, Westmoreland, Allegheny and Washington counties: The Latrobe Street Railway, Pittsburg McKeesport & Greensburg Railway, West Penn Electric Company, Westmoreland Heat Light & Power Company and several minor lighting properties.



L. H. Conklin.

Obituary.

Ferman J. Stout, general manager of the Lake Shore Electric Railway, Norwalk, O., died in a hospital in Toledo, O., on September 14. He was taken suddenly ill about a month ago and was obliged to undergo an operation, from which he never recovered. Mr. Stout was born November 16, 1858, at Deerfield, Mich., and entered railway service in 1873 as freight brakeman on the Lake Shore & Michigan Southern Railway. Until 1900 he was connected with steam railroad operation, until March, 1893, as freight conductor, passenger conductor, trainmaster and general yardmaster of the Lake Shore & Michigan Southern. From March 1, 1893, to September 1, 1895, he was superintendent of transportation of the Wheeling & Lake Erie and the Toledo Belt railways. From September 1, 1895, to April, 1900, he was general superintendent of those roads. In May, 1900, he was appointed general manager of the Toledo Fremont & Norwalk Electric Railway, with headquarters at Fremont, O., which position he held until 1902, when the Everett-Moore roads were merged into the Lake Shore Electric Railway, when he was appointed superintendent. In April, 1903, he was appointed general manager, with headquarters at Norwalk, where he has since resided. Mr. Stout was a member of the standardization committee of the Central Electric Railway Association.

Financial News

Brooklyn Rapid Transit Company.—A hearing on the application of the Brooklyn Union Elevated Railroad for approval of an issue of \$20,000,000 bonds was held by the New York public service commission, first district, on September 12. T. S. Williams, vice-president of the company, testified that despite the cost of electrifying and of other improvements, the present interest charge upon the Brooklyn Union Elevated company was \$200,000 less than the total interest charge that was paid by its constituent companies before the properties were electrified. "Are you willing to swear that the present indebtedness of the Brooklyn Union Elevated company was incurred legitimately for actual property received and held by the company?" asked Commissioner McCarroll. "I am," replied Mr. Williams.

Centralia & Central City Traction Company, Centralia, Ill.—Announcement is made of the purchase of the controlling interest in this company by E. R. List and G. E. Hubbard of Centralia. Until a little over a year ago the line was operated by horse power and was known as the Centralia & Central City Street Railway, operating 3½ miles of track. In July of last year the road was reorganized by St. Louis capitalists and converted for electrical operation, power being furnished by the Centralia Gas & Electric Company. The majority of the stock is now held by Centralia interests, and it is stated that extensions to Junction City and South Centralia, which have been contemplated for some time, are now practically assured.

Citizens' Railway & Light Company, Ft. Worth, Tex.—This company has been formed as a consolidation of the properties of the Citizens' Light & Power Company of Ft. Worth, Tex., the Arlington Heights Street Railway, operating between Ft. Worth and Arlington Heights, and the Ft. Worth & Rosen Heights Street Railway, operating a street railway from Ft. Worth through North Ft. Worth to Rosen Heights. The new company has \$1,000,000 capital stock and \$511,000 of first mortgage 20-year 5 per cent bonds outstanding. The authorized bond issue is \$1,000,000. In the year ended July 31, 1907, the gross earnings of the properties were \$236,126, the operating expenses and taxes were \$176,613, and the net earnings were \$59,513.

City & Elm Grove Railroad, Wheeling, W. Va.—John A. Howard has purchased control of the stock of this company. The controlling stock was owned by Henry Schulbach, Fred J. Park, Andrew Hamilton and N. E. Whitaker. It is reported that Mr. Howard will purchase also practically all of the other outstanding stock.

Connecticut Valley Street Railway, Greenfield, Mass.—At the annual meeting of stockholders of this company on September 16, the following officers were elected: President, F. E. Pierce, Greenfield; secretary and treasurer, D. P. Abercrombie, Jr., Turners Falls; superintendent, J. A. Taggart, Millers Falls; assistant superintendent and engineer, C. W. Clapp, Northampton. The following directors were chosen: Chairman board of directors, R. C. Crosby, Brattleboro, Vt.; George C. Averill, Brattleboro; D. P. Abercrombie, Sr., Turners Falls; E. C. Crosby, Brattleboro; W. A. Clark, Northampton; B. E. Cook, Northampton; M. A. Coolidge, Fitchburg; C. W. Clapp, Northampton; Warren M. King, Northampton; F. E. Pierce, Greenfield; Isaac Cheenery, Montague; J. A. Taggart, Millers Falls; H. L. Williams, Northampton; D. P. Abercrombie, Jr., Turners Falls. Earnings for the year ended September 30, 1907, were as follows:

Gross earnings from operation.....	\$173,622.15
Operating expenses	115,250.45
Net earnings from operation.....	\$ 58,371.70
Charges and deductions from income.....	36,172.67
Net divisible income	\$ 22,199.03
Dividend paid	9,718.00
Surplus for year	\$ 12,481.03
Number of revenue passengers carried.....	3,596,001
Per mile of main railway operated.....	79.186
Number of car-miles run.....	905,301
Gross income per mile of main track.....	\$3,823.49
Operating expenses—percentage of gross income.....	66.25
Gross earnings per car-mile.....	0.192
Operating expenses per car-mile.....	0.116

Davenport & Suburban Railway, Davenport, Ia.—This company, which operates eight miles of track to Suburban Island

Park, has filed amended articles of incorporation reducing its capital stock from \$1,400,000 to \$10,000.

Manchester (N. H.) Traction Light & Power Company.—At the annual meeting of stockholders on September 13 it was voted to increase the number of directors from 12 to 15. The following were elected directors: Walter M. Parker, W. Parker Straw, J. Brodie Smith, Roger G. Sullivan, Charles M. Floyd, William A. Tucker, S. Reed Anthony, Philip Saltonstall, George H. Hood, Stillman F. Kelley, Robert H. Hallowell, Billings P. Learned, Frank S. Streeter, Albert O. Brown and Edwin F. Jones.

New Orleans (La.) Railway & Light Company.—In declaring a quarterly dividend of five-eighths of 1 per cent on the preferred stock, E. C. Foster, the president, has made an official statement in which he says: "The company's books show for the seven months ending August 1, 1907: Gross earnings, \$3,532,903; operating expenses, \$1,864,880; net earnings, \$1,668,023; taxes, interest and fixed charges, \$1,170,472; surplus, \$497,551; estimated surplus for August, 1907, based on 1906, \$18,000; making a total surplus for eight months of 1907 of \$515,551. Of the above surplus \$250,000 was paid in dividends on April 15, 1907, and on July 15, 1907, and the balance of surplus, less the present October dividend of 62½ cents per share, has been devoted to betterments and improvements, and the board has authorized the purchase of 65 additional cars to provide for the increasing business. The company took possession of the properties on July 15, 1905, and has expended in betterments and improvements to August 1, 1907, \$3,863,501. It has also spent \$210,432 in the acquisition of additional stock of its constituent companies. Money conditions have been such that the company, in common with other large business enterprises, has found it difficult to borrow capital required for improvements and extensions. The company, having public duties to discharge, has not deemed it wise to declare a full dividend at this time, but has considered it more prudent to devote a very large part of its surplus to improving and developing the property."

Pacific Traction Company, Tacoma, Wash.—A trust deed to secure an issue of \$2,000,000 bonds has been filed.

Schuylkill Railway, Girardville, Pa.—The gross receipts of this company for June, July and August, 1907, were \$63,964.91. Operating expenses for the same period, including taxes and insurance and extra expense of \$1,581.49 for park, were \$31,624.97; net receipts, \$32,339.94; interest charges, \$17,125; net receipts above charges, \$15,214.94. From April 17, 1905, when the road was purchased, to September 1, 1907, gross receipts were \$476,329.81; operating expenses, \$248,438.34; net receipts, \$227,891.47; interest charges, \$157,833.32; net receipts above charges, \$70,058.15.

Springfield & Northeastern Traction Company, Lincoln, Ill.—An issue of \$1,500,000 of 5 per cent bonds, of which \$800,000 bonds are outstanding, has been authorized. Principal and interest of the bonds are guaranteed by the Illinois Traction Company, which controls the majority of the \$1,500,000 capital stock. The bonds are dated December 1, 1906, and are due on December 1, 1936.

Syracuse Lake Shore & Northern Railroad, Syracuse, N. Y.—A certificate of an increase of capital stock from \$2,250,000 to \$3,500,000, of which \$1,000,000 will be preferred, has been filed.

ELECTRIC RAILWAY EARNINGS.

Chicago & Milwaukee Electric Railroad Company.			
August—	1907.	1906.	
Gross earnings	\$122,679	\$107,089	
Operating expenses	45,732	35,615	
Net earnings	76,947	71,474	
January 1 to August 31—			
Gross earnings	674,284	536,387	
Operating expenses	282,646	212,894	
Net earnings	391,638	323,493	
United Railways Company of St. Louis.			
August—	1907.	1906.	
Gross earnings and other income.....	\$ 956,240	\$ 897,651	
Expenses, taxes and depreciation.....	610,161	568,400	
Net earnings	346,079	329,251	
Charges	232,506	231,732	
Net income	113,573	97,519	
Fiscal year from Jan. 1 to Aug. 31—			
Gross earnings and other income.....	7,185,731	6,748,837	
Expenses, taxes and depreciation.....	4,710,133	4,254,758	
Net earnings	2,475,598	2,494,079	
Charges	1,851,327	1,854,345	
Net income	624,271	639,734	

Manufactures and Supplies

ROLLING STOCK.

Cleveland Electric Railway, Cleveland, O., will probably be in the market soon for 300 cars.

Chicago Union Traction Company, Chicago, Ill., is building six work cars in its own shops.

Aurora Elgin & Chicago Railroad, Wheaton, Ill., it is reported, will buy about 10 cars for city service.

Milwaukee Northern Railway, Port Washington, Wis., under construction, is in the market for a snow plow.

Lewiston Augusta & Waterville Street Railway, Lewiston, Me., is reported to have placed its order for 12 new cars.

Spokane & Inland Empire Railroad, Spokane, Wash., is reported to have bought eight more electric locomotives from the Westinghouse Electric & Manufacturing Company.

Raleigh Electric Company, Raleigh, N. C., has placed an order with the Southern Car Company for three semi-convertible cars, equipped with General Electric motors and Lord Baltimore trucks.

New Orleans Railway & Light Company, New Orleans, La., has been contemplating the purchase of new equipment for some time, as previously reported in the Electric Railway Review. At a recent meeting of the board of directors the purchase of 65 new cars was authorized.

Marion Bluffton & Eastern Traction Company, Bluffton, Ind., was reported in the Electric Railway Review of September 14 to be in the market for two 15-bench open cars and two trailers for interurban service. R. F. Cummins, general manager, writes that the contract may not be placed before the first of next year.

SHOPS AND BUILDINGS.

Aurora Elgin & Chicago Railroad, Wheaton, Ill.—The company has secured an option on a building on Chicago street, Elgin, Ill., and is planning to remodel it for use as a waiting station.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—As previously mentioned in the Electric Railway Review, this company is building a passenger station in Michigan City and a car house 107 by 200 feet. The station is constructed of paving brick, with tile roof.

Nashville (Tenn.) Railway & Light Company.—This company has begun work on the enlargement of its transfer station.

Ohio Electric Railway Company, Cincinnati, O.—This company, which recently took over the Indiana Columbus & Eastern Traction Company, will begin construction within a few weeks on its \$50,000 station at Springfield, O.

Springfield (Mass.) Street Railway.—H. C. Page, general manager, writes that the reports that his company has completed its plans for new car houses are incorrect. He states that the buildings will not be erected until next spring.

TRADE NOTES.

Greensboro Air Brake Company, Greensboro, N. C., has been incorporated by Samuel L. Trogden, Neil Ellington and W. Z. Brown. The company will manufacture air brakes. Capital stock, \$125,000.

National Brake & Electric Company, Milwaukee, Wis., is building a foundry at Larkin street and Bellevue place, Milwaukee. It will be one of the finest west of Pittsburg and the cost is estimated at \$50,000.

Boston Safety Switch Company, Portland, Me., has been incorporated with a capital stock of \$100,000, to manufacture safety switches, etc. J. M. Gibbs, president, Boston, Mass.; M. W. Baldwin, treasurer, Portland, Me.

Conley Frog & Switch Company, Memphis, Tenn., previously mentioned in the Electric Railway Review, has completed its plant and operation will begin at once. Crosses, switches, switchstands, rail braces, etc., will be manufactured.

Julian C. Smith has resigned as general superintendent of construction for Dodge & Day, Philadelphia. Mr. Smith has obtained controlling interest in the Atlantic Engineering & Construction Corporation, Norfolk, Va. The name of the company will be changed to the Atlantic Company, Incorpo-

rated, and it will do a general engineering and contracting business throughout the southern seaboard states.

American Locomotive Company, 111 Broadway, New York, has received bids for the construction of the new power house at its Brooks plant. The building will be 192 feet long and 165 feet wide. It will be constructed of iron, brick and stone.

H. B. Ives Company, New Haven, Conn., will hereafter directly solicit inquiries and business for the New Haven trolley wheel. The company has been the sole manufacturer and owner of patents covering this wheel for the past five years, but has not marketed it.

Richard W. Western, formerly general manager for Charles F. Johnson, the second-hand equipment dealer, has opened offices at 910 Citizens' building, Cleveland, O. Mr. Western will cover the entire electric railway field and has made many excellent connections.

Second-Hand Machinery Company, Kansas City, Mo., has been organized by Ralph B. Coleman, Edward R. Royer and George B. Wandering, to purchase and sell second-hand electrical and steam machinery for power stations. The company's offices are at 448 Sheidley building.

Hocking Valley Fire Clay Company is the name of a new Ohio corporation formed to make fire, paving and building brick. The company's plant, which is to be located at Nelsonville, O., is now under construction. The plant is to consist of 16 kilns. A. Magoon of Logan, O., is president.

Stewart Hartshorn has just returned from his annual business and pleasure trip abroad. The Stewart Hartshorn Company, East Newark, N. J., manufacturer of shade rollers under that name, is known all over the world, and, as the company states, "are in use wherever cars are run."

Indianapolis Switch & Frog Company, of Springfield, O., whose plant was completely destroyed by fire a few months ago, has a large gang of men engaged in rebuilding the structure. It has been announced that the new plant, which will be modern in all its details, will be completed within 30 days.

J. G. Ellendt Company, 1 Madison avenue, New York, has been organized to engage in consulting engineering and contracting on reinforced concrete work. The members of the company are: J. G. Ellendt and O. L. Griffith, formerly with the Concrete Engineering & Supply Company, and C. E. Tirrell.

Edward Laterman, well and favorably known in the steam road field, has joined the forces of the O. M. Edwards Company of Syracuse, N. Y., as one of its representatives in the eastern territory, with headquarters in New York City. He will look after the company's business in both the electric and steam road fields.

American Car & Foundry Company, St. Louis, Mo., has appointed Jay W. Lawler superintendent of the iron and foundry department of its St. Charles plant. Mr. Lawler is the oldest son of James G. Lawler, superintendent of the St. Charles car works, and was formerly superintendent of the foundry department of the Madison (Ill.) car works.

Railway Steel-Spring Company, general offices 71 Broadway, New York, has decided to erect one of the largest and best equipped spring works in the country at some point in the vicinity of Chicago. The exact location of the new plant has not yet been fully determined, but the fact that there will be a new plant has been formally and officially decided upon.

Allis-Chalmers Company, Milwaukee, Wis., recently sold to the Cuba Railway Company, with headquarters in New York City, a No. 4 "K" Gates crushing plant for use at Camaguey, Cuba. This machine will be mounted on masonry foundation and fitted with smooth head and concaves. The product to be crushed is limestone reduced to 2½-inch product. It is expected that this plant will be used successively on the several divisions of the road, situated, in each instance, between the quarry and the right of way, parallel to which boilers, bins and crushers are arranged so that the product may be readily dumped into cars for distribution along the line.

Westinghouse Electric & Manufacturing Company's suit against the Prudential Insurance Company of America, charging the latter with infringement of Nolan patent No. 582481, granted May 11, 1897, in the generator manufactured by the Bullock Electric Manufacturing Company, has recently been decided by the United States circuit court for the district of New Jersey. The Nolan patent in suit relates to a very simple, inexpensive and efficient means for fastening the laminæ of the cores of electrical machines together and to the casting by which they are supported, and whereby the armature can be readily taken apart and put together. The laminæ are

clamped between a cylindrical flange at one end of the casting and a ring fitting over the other end of the casting. This ring is held in place by a small fastening ring interposed between it and a small shoulder on the casting. A shoulder is provided upon the outer face of the clamping ring for holding the small ring from flying outward. This is generally termed the spring ring method of clamping armature laminæ. Judge Lanning in this opinion holds that claims two and four of the Nolan patent are valid and cover the construction found in the Bullock generator used by the Prudential company, the construction being a substantial copy of that shown in the Nolan patent and that used by the Westinghouse company.

Westinghouse Air Brake Company, in the fiscal year ended July 31, showed net sales of \$11,230,400, as compared with \$9,774,984 for the previous fiscal year. Expenses were \$6,985,337, as compared with \$6,533,285 for the preceding year, and the net earnings \$4,245,072, a gain of \$231,961. There was charged off for the special depreciation fund \$393,243, leaving a surplus of \$3,851,839 available for dividends. The directors of the company at a special meeting held in Pittsburg recommended an increase in capital stock from \$11,000,000 to \$14,000,000, and the payment of a stock dividend of 25 per cent. Quarterly dividends of 2½ per cent and 2½ per cent extra were also declared.

R. W. Marshall & Co., 95-97 Liberty street, New York, make a specialty of purchasing outright released motors, armatures and controllers of every type. These are overhauled and put into first-class condition in their New York shop, which is specially fitted up for this work. Armature and field coils, after being rewound, are impregnated by the Passburg vacuum process, making them absolutely impervious to moisture, and the high voltage necessary to puncture the insulation makes the windings practically indestructible when used on the regular electric railway circuits. This firm has in stock at all times various types of second-hand motors, armatures, controllers, etc., for immediate shipment, which it has purchased and put into condition quite equal to new equipment.

ADVERTISING LITERATURE.

Wickes Brothers, Saginaw, Mich.—The monthly stock list of boilers, engines, dynamos, motors and machinery has been received.

Dean Electric Company, Elyria, O.—An attractive postcard, showing the factory buildings under construction in Elyria, is being mailed to the trade. When the new buildings are completed the facilities of the Dean plant will be doubled.

Tropical America.—The announcement is made by the Tropical American Publishing Company, of 18 Frankfort street, New York, N. Y., that the first number of Tropical America is in preparation. The magazine is to be devoted to Mexico, South America, Central America and the West Indies. The editor is G. M. L. Brown.

Stover Motor Car Company, Freeport, Ill.—"Motoring by Rail" is a fine little booklet about Stover motor cars. The many advantages of motor cars for railroad service are told in an interesting manner. One of the illustrations shows the patented Stover transmission which enables a Stover motor car to run 40 miles an hour in either direction.

The J. G. Brill Company, Philadelphia, Pa.—"Brill's Magazine" for September contains the usual illustrations and descriptions of the different types of cars now being built at the various Brill plants. The handsome new terminal station of the Hamilton Cateract Light & Traction Company at Hamilton, Ont., and the new spring shop of The J. G. Brill plant in Philadelphia are also shown.

Sprague Electric Company, New York, N. Y.—Bulletin No. 230 is entitled "The Electric Equipment of a Modern Factory." It is a description of the application of the company's products in the plant of the F. Wesel Manufacturing Company, Brooklyn, N. Y. Bulletin No. 103 is devoted to electric dynamometers for testing gasoline engines. Direct-current motor equipment for linotype machines is made the subject of Bulletin No. 231. An elaborate catalogue has also been received, devoted to electric motor equipments for printing shops.

"The Curtis Steam Turbine-Generator" is the title of a large pamphlet, No. 4531, issued by the General Electric Company, Schenectady, N. Y., that is perhaps the most complete publication sent out by a turbine manufacturer. The pamphlet is very attractive and will be found of especial interest to engineers on account of the information given with regard to superheat, vacuum, economy, etc., and the details of construction and operation of all parts of the Curtis apparatus. Under the heading of "Economy" detailed tests are given of 9,000-kilowatt, 5,000-kilowatt, 2,250-kilowatt and

1,000-kilowatt turbines, which show some very high efficiencies. The advance made by this type of turbine is illustrated by the maker's claim that nearly 1,000,000 kilowatts capacity of Curtis steam turbine generators have been sold. Attention is called to the flat efficiency curve giving high efficiency at overloads and light loads, the simplicity of design, the low maintenance and the economy in space. This publication seems to be typical of the recent desire to have such information written by and to engineers and the following synopsis of its contents will show the wide field covered: Advantage of vertical shaft type, economy of space, building materials and steam, clearances, flow of steam, balance, lubrication, the construction of buckets, governors, foundation, low-pressure turbines, vacuum, regulation, parallel operation, ventilation, economy. The pamphlet is well illustrated with detail views of a variety of turbines.

ELECTRIFICATION OF THE BALTIMORE & ANNAPOLIS SHORT LINE.

Rapid progress is being made on the work of electrifying the steam road of the Baltimore & Annapolis Short Line Railroad, which has been absorbed by the Maryland Electric Railways. J. G. White & Co. of New York has the contract. The road will be double-tracked and various changes are being made which will shorten the line from Baltimore to Annapolis to about 26 miles. Between Cliffords and Camden the Baltimore & Ohio tracks will be used. Power will be obtained from the Consolidated Gas Electric Light & Power Company at Westport, Md. Two trolley wires will be used.

S. B. Brown, superintendent, Annapolis, Md., who states that the road should be in operation by November 1, is quoted as follows:

Eighty per cent of the electrification of the road is completed. The poles have been erected along the Patapsco river and other points along the line, and wires have been strung for several miles. The company expects the first cars to arrive soon and no time will be wasted in getting them thoroughly equipped and ready to be placed into service. The cars will be of the high-speed type and geared to run 50 miles an hour.

The cars will be 56 feet long and will seat 62 persons. They will be of the Pullman type and have double windows. The trimmings will be of mahogany, highly polished, while the metal work will be of black bronze. The curtains will be of Pantasote. Each car will be equipped with 30 lights. Clusters will be suspended from the center, while individual bulbs will be placed on the sides. The seats will be rattan upholstered.

The cars will contain full-sized vestibules and will have a separate compartment for the motorman on the left side. The framing and floors will be of steel. Each car will have two platforms, with side and center doors. They will be built so as to run either singly or in trains.

All the equipment necessary to complete a car has been finished by the builders. The trucks were built by the American Locomotive Works, the cars by the Southern Car Company, High Point, N. C., and the motors by the Westinghouse Electric & Manufacturing Company.

On September 11 the Indiana Union Traction Company established through service between Indianapolis and Bluffton, Ind.

Since the writing of the article on "Track Improvement at Atlantic City," which was published in the Electric Railway Review, September 14, 1907, page 324, two more 10-wheel locomotives of the same weight have left the track at the switch mentioned in the article, passing over the pavement in the grooves made by the first derailed locomotive. Careful examination showed that the depth of the grooves in the pavement was not increased by the two additional derailments.

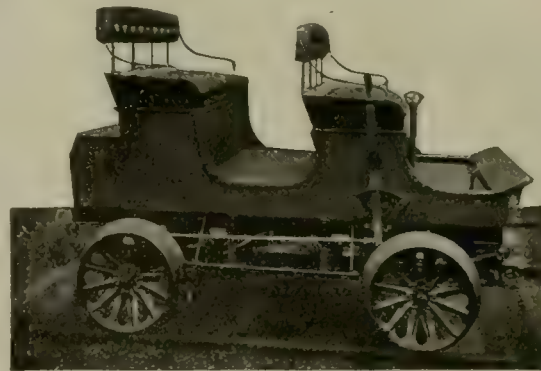
The South Side Elevated Railroad commenced service September 20 on its new Kenwood extension. A five-minute service will be maintained during rush hours, and a 10-minute service the remainder of the time. The new branch is built along the embankment of the Chicago Belt Railroad from Fortieth street and Indiana avenue, east to Lake avenue, and extends south to Forty-third street. The old Congress street terminal of the South Side Elevated Railroad is again in use, part of the express service being taken care of at this station.

A NEW GASOLINE MOTOR CAR.

Railway officials will learn with interest that the Stover Motor Car Company of Freeport, Ill., is now building a gasoline motor car which has been designed especially for the use of general managers, superintendents, engineers of maintenance of way, roadmasters and others having inspection of track and line as part of their duties. The car has two seats, each of which will comfortably accommodate three men.

Power is furnished by a two-cylinder horizontal opposed motor, designed and built in accordance with modern automobile practice. A great advantage claimed for a motor of this type is that it can be run with practically no vibration. It is vibration that causes loose wire connections in the ignition system, and shakes nuts and bolts loose from the mechanism. The motor has other modern features of design, such as mechanically operated valves, both intake and exhaust, mechanical oiling system, which attends to the lubrication of all bearings in the motor without care or attention except to see that the reservoir of oil is kept filled. The water circulation pump is also positive in its action, as it is driven by chain and sprocket.

A feature of the car to which special attention is directed is the transmission, which is so devised that the car can be driven in either direction at any speed desired up to a guaranteed speed of 40 miles per hour. There is but one lever con-



Stover Gasoline Motor Car.

trol on the transmission, and this is conveniently set at the right hand of the driver, who, by throwing the lever forward, drives the car forward, or by throwing it backward drives the car backward, and the same speed can be obtained in either direction.

The motor and the transmission are mounted independently on the frame and as the connection between the two shafts is flexible binding or friction is avoided. The transmission shaft, which is an extension of the engine shaft, carries two friction cones, one of which, when thrown in contact with the driven wheel on the jack shaft, drives the car forward and the other drives the car backward. Transmission from the jack shaft to the rear axle is by means of chain and sprocket. Extra heavy chain is used, which has $\frac{5}{8}$ -inch rollers. The simplicity of this design and construction can be readily seen and appreciated. The contact surfaces are made wide and the wear, after long and continuous service, is said not to be perceptible; the manufacturers will guarantee that the contact surfaces will not need to be replaced inside of a year under any conditions of regular service. The frame is made of pressed steel channels with cross sections riveted and bolted; lock nuts are used on all bolts.

The body of the car is made entirely independent of the frame, and can be readily removed by taking out four bolts, which secure it to the frame, thus making the motor and transmission very accessible. The ignition apparatus is located under the driver's seat. Two independent sets of ignition are provided so in case of failure of one set the other can be relied upon. The gasoline supply tank, which holds sufficient fuel to drive the car 150 miles under ordinary conditions, is under the front seat. An extra supply tank can be carried on the rear of the car.

Space for tools and supplies is provided for in boxes built in the floor of the car in front of both seats; these boxes are easily accessible. The entire space underneath the rear seat and extending back of it is inclosed but left free for the accommodation of baggage, coats, instruments and tools.

The axles are two inches in diameter, running in Hyatt roller bearings. Roller thrust bearings are also provided on the transmission shaft. The wheels are made of pressed steel $\frac{1}{4}$ -inch stock and 20 inches in diameter. The speed of the car is under the control of the operator at all times and is governed by two levers mounted on a rigid post, placed con-

veniently near the front seat. One lever governs the amount of gasoline and air being admitted to the motor and the other times the ignition. Strong and effective brakes are also provided on the rear wheels operated by foot pedal from the driver's seat.

The president of this company is D. C. Stover, who has had an extensive experience as a manufacturer all his life and has been the moving spirit in a number of large and successful enterprises, among which are the Stover Manufacturing Company, which Mr. Stover states has the largest factory in the world building windmills, and the Stover Engine Works, builder of stationary gasoline engines. Mr. Stover claims the distinction of having built the first gasoline car that ever ran on a railroad.

The Stover Motor Car Company, which was organized last year, has just recently moved into its new factory, which is of modern construction. The main building is 120 by 200 feet, three stories high, and contains the machine shops, assembling room, paint shop and woodworking department. In a separate wing of the building, 80 by 120 feet, is the testing room for the motors. The company has installed entirely new machinery for the economical production of all parts of the cars and the entire plant represents an outlay in capital of \$100,000. The men associated with Mr. Stover in this new enterprise have all had long experience in production and selling departments of this or kindred lines of business. M. Mowbray is secretary of this new company and has the active management of the business. He has been identified with railroad supply interests for the past 10 years and enjoys a wide personal acquaintance among railway officials.

BLACK ENAMELED WIRE.

The method of insulating magnet wire by using a single or double covering of silk or cotton has many serious drawbacks, especially with the smaller sizes. In the case of cotton

affected by heat than either cotton or silk and will carry a current that would cause silk or cotton to become charred and destroyed. The enamel will withstand a temperature of 500 degrees F. with only a slight reduction in its elasticity. If the winding is not disturbed the insulation is fully as effective as before the heating. It is claimed that ordinary excessive humidity that causes the breakdown of silk or cotton insulation has no effect on Black Enameled wire. It is not claimed that the insulation is perfect when immersed in water, but immersion tests made give a sufficiently high insulation for all ordinary purposes.

The decreased amount of insulation on enameled wire means a considerable saving, as the silk used for insulation costs from \$8.00 to \$11 per pound, and in the fine sizes, the insulation being a large part of the weight, the cost per pound is very high. The relatively lower cost and the decrease in area and the increased amount of wire possible to wind on a given sized magnet would be sufficient reason for its use even if its insulation were not superior to silk or cotton covering.

NEW CARS FOR NORTHERN INDIANA.

The Chicago South Bend & Northern Indiana Railway Company is receiving 10 large interurban passenger cars of the type shown in the accompanying illustration. The Terre Haute Indianapolis & Eastern Traction Company also is receiving 15 cars of the same general description. All of these cars are being furnished by the Cincinnati Car Company of Cincinnati, O.

Following are the general dimensions of the cars:

Length over bumpers.....	61 ft. 6 in.
Length over vestibules.....	60 ft. 2 in.
Center to center of bolsters.....	38 ft. 6 in.
Height of car from rail to under side of sill.....	3 ft. 7 in.
Height of car from bottom of sill to top of roof sheathing.....	9 ft. 6 in.



Interurban Cars for Northern Indiana.

and to a less extent silk the space occupied by the insulation in comparison with the copper is a serious factor which increases rapidly as the size of the wire diminishes, thus reducing the effectiveness of the magnet winding. When cotton or silk insulation is dry it is a non-conductor, but in a moist atmosphere there is considerable leakage which is liable to put the magnets completely out of service.

Numerous attempts have been made to develop an insulation which would afford a continuous, tough, elastic film upon the wire having a high dielectric strength and at the same time be as thin as possible. The insulation should be able to stand the ordinary handling which magnet wire must undergo in manufacturing operations, but it should be permanent and inert to as great a degree as possible toward changes and conditions which are met in practice, such as increase in temperature and conditions of high atmospheric humidity; be able to resist the action of ordinary gases or corrosive agents.

The Western Electric Company has been using for four years a wire of its own manufacture known as Black Enameled wire. It is claimed that this wire is much less

Height of car from rail to top of trolley plank.....	13 ft. 4 in.
Height of car from floor to ceiling in center.....	8 ft. 8 in.
Width over sills.....	8 ft. 7½ in.
Width over sheathing.....	8 ft. 9 in.
Width over grab handles.....	8 ft. 9 in.
Width over all (crown mold).....	8 ft. 10½ in.

The weights of the cars and parts are approximately as follows:

	Pounds.
Car body, including all accessories.....	40,325
Air brakes.....	1,500
Body electrical equipment.....	1,675
Truck electrical equipment (motors, gears, etc.).....	27,400
Baldwin heavy M. C. B. trucks, per pair.....	11,400

Total82,300

The cars are divided into three compartments—main passenger compartment seating 43, a smoking compartment seating 20 passengers and a baggage compartment.

The passenger cars for the Terre Haute Indianapolis &

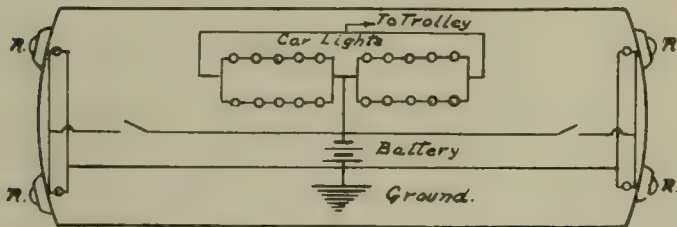
Eastern are mounted on M. C. B. Baldwin Locomotive Works trucks and are equipped with four Westinghouse No. 121 90-horsepower motors, geared for high speed. Westinghouse unit-switch multiple-unit control is provided, and Westinghouse automatic air brakes with American automatic slack adjusters complete the electrical equipment. The cars are provided with an arc headlight and a very heavy pilot. It is intended to eventually run these cars in trains and for this purpose the multiple-unit control and Van Dorn couplers are provided.

The 10 cars of the Chicago South Bend & Northern Indiana Railway Company are like the above cars except in the electrical equipment. These are provided with four No. 73 75-horsepower motors and General Electric type M multiple-unit control. The Lintern system of signal and classification lights is used on all of these cars.

The Cincinnati Car Company is also making shipments during the present month of a number of semi-convertible two-compartment cars to the Eastern Pennsylvania Railways Company, at Pottsville; five 30-foot double-truck cars to the Consolidation Railways Company, New Haven, Conn.; and one three-car train composed of 55-foot single-compartment passenger cars to the Northern Electric Company of California. These cars are going through to destination on their own wheels.

LINTERN CAR SIGNALS.

The chief obstacle which has stood in the way of the use of electricity for classification and rear-end signals has been the uncertainty of continuous current supply. Ob-



Wiring Diagram for Car Lighting and Lintern Signal Lamps.

viously, any system which makes use of current from the trolley must have an auxiliary source of current to supply the lamps in case the trolley wheel leaves the wire or the current fails. The Lintern system, by means of an ingenious method of wiring and an auxiliary battery of dry cells, provides a method of electrical operation which possesses many advantages over oil lamps as a method of rear-end signaling. Once installed the electric lamps entail practically no main-

signal circuit being connected to the car-lighting circuit and the other side to ground. The battery, consisting of two groups of dry cells, eight cells to a group, is connected as shown.

With normal voltage on the lighting circuit, the signal lamps derive their current from the lighting circuit without assistance from the auxiliary battery. Should the pressure rise above normal in the lighting circuit, current in the signal circuit will continue at normal pressure, owing to the fact that the internal resistance of the battery will be overcome by the increased pressure, and a portion of the current from the lighting circuit will flow through the battery to ground, incidentally preventing depolarization of the cells. Should the voltage in the lighting circuit fall below normal, the battery will keep the signal lamps at normal illumination. Likewise, if the trolley current fails altogether, the battery will furnish all of the current necessary for the signals, and is able to do this for several hours should the necessity arise. It will be seen that the auxiliary battery used with the Lintern system acts in a manner very much similar to a storage battery booster on a railway circuit, the battery floating on the line at all times and maintaining practically constant voltage at the lamps.

In the type of signal lantern used the case is made of spun copper and is weatherproof and practically dustproof. The lanterns are attached to the car vestibule near the roof and contain one two-candlepower lamp each. As the lamps are connected in multiple they are independent of each other. Each lamp has a four-inch red semaphore lens, although any other color of lens may be supplied should the lanterns be used for classification purposes. The dry cells used with the Lintern system are made with a heavy zinc casing, with the negative connection running the full length of the casing and soldered to the bottom and sides. Each cell is set in a double casing which is filled with melted paraffin, and the whole group is placed in a strong wooden box. As polarization is prevented by the method of connection the cells will remain active as long as the zinc lasts and there is any moisture in the cell. When they begin to dry out, which ordinarily should not be the case inside of a year, they may be re-energized by adding a weak solution of sal ammoniac, which will restore the cells and keep them active until the zinc is entirely consumed.

NEW CARS FOR NASHVILLE.

The J. G. Brill Company is delivering 15 double-truck cars to the Nashville Railway & Light Company. These cars are of the semi-convertible type and are 42 feet long over the bumpers, 8 feet 1 1/4 inches wide and 11 feet 4 5/8 inches high, having cross seats for 28 and longitudinal seats for 16 people. The cross seats are reversible and have high backs. All of the seats are of rattan.

The car body weighs approximately 37,000 pounds, and



New City Cars for Nashville, Tenn.

tenance expense, are convenient to operate and are absolutely reliable.

The accompanying illustration shows the method of connection for the Lintern car signal as installed on the cars of the Illinois Traction System by the Ohio Brass Company, Mansfield, O. For cars operating in both directions the cars are provided with two rear-end signals on each end. The two-candlepower lamps which light the signals derive current both from the car-lighting circuit and from the auxiliary battery, as shown in the diagram, one side of the

fully equipped with motors, trucks, controllers, etc., it weighs 34 tons. Destination signs of the Hunter illuminated type are used and a Mosher arc headlight is attachable to either end of the car. The motor equipment comprises four GE-90 motors controlled by two K28 controllers. The National Brake & Electric Company's straight air brakes, type AA4, are installed. These cars are mounted on Brill trucks and are provided with cast-iron wheels and inside hung brakes with the motors outside hung. The fenders are of the Nashville Railway & Light Company's own standard.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:

United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 13

CHICAGO, SEPTEMBER 28, 1907

WHOLE No. 231

TABLE OF CONTENTS.

Editorial:

—Normal Copper Prices	355	Annual Meeting Colorado Electric Light, Power and Railway Association	378
—A Car for the Doctor.....	355	Receivers Appointed for the New York City Railway.....	378
—Growth of Traffic in New York.....	355	Decision of Massachusetts Commission on Proposed Lines Out of Boston	379
—The New York City Railway Receivership.....	356	Convention Bulletin No. 4.....	380
—Rehabilitation in Chicago.....	356	Steam Locomotive Versus Electric Locomotive.....	380
—Automatic Devices in Power Plants.....	357	Piping and Power Station Systems—L.V. By W. L. Morris, M. E. (Illustrated)	381
The Selby Hill Tunnel of the Twin City Rapid Transit Company (Illustrated)	358	News of the Week:	
Fall Meeting Central Electric Railway Association.....	362	—New York Public Service Investigation.....	382
Report of Committee on Fire Insurance.....	363	—Handling of Crowds Commended Editorially.....	382
Report of Committee on Standardization (Illustrated).....	364	—Committees of Directors in Philadelphia.....	382
Street Cars in Wales.....	365	—Special Train to Atlantic City Convention.....	382
Single-Phase Catenary Line Construction. By G. D. Nicoll (Illustrated)	366	Construction News:	
Report of Express Committee—With Reference to Handling Express Business on Interurban Lines	367	—Franchises	384
1,200-Volt and Commutating-Pole Direct-Current Railway Motors (Illustrated)	368	—Recent Incorporations	384
Annual Reports:		—Track and Roadway	385
—American Railways Company, Philadelphia, Pa.....	370	—Power Houses and Substations.....	386
Meetings of American Street and Interurban Railway Association Committees	371	Personal Mention	386
New York Street Railway Association.....	371	Financial News	387
The Collection and Registration of Interurban Fares. By B. A. Frankel	375	Manufactures and Supplies:	
Freight and Express Rates. By Frank Walsh.....	375	—Rolling Stock	388
Rehabilitation Progress in Chicago.....	376	—Shops and Buildings	388
		—Trade Notes	389
		—Advertising Literature	389
		The Novi Railway Lamp (Illustrated).....	390
		Interpole Magnets for Lifting (Illustrated).....	390

Now that the price of copper has again reached a normal and reasonable point there should be renewed activity in electrical projects that have been temporarily abandoned on account of the high price of materials, of which copper is the most important. The fact that aluminum can in many ways be substituted for copper has not had a very great bearing on the case during the high price of copper that prevailed a short time ago. It is the practice of the aluminum manufacturers to follow the price of copper rather closely, advancing the price of aluminum from time to time as copper advanced. Although much attention has been paid to finding substitutes for copper, it is only in a few isolated cases that there has been much success along this line. If some good substitute can be found for copper for one or two of its large present uses, and the aluminum business expands with the expiration of the basic aluminum patents, it ought never again to be possible to take advantage of a heavy demand for conducting material and force the price of copper above its real value.

Normal Copper Prices.

A little more than a year ago the Milwaukee Electric Railway & Light Company completed its magnificent terminal station and office building in the business district of Milwaukee. As described in the Electric Railway Review for July 15, 1906, page 373, this very complete station contains headquarters for the company surgeon. His accommodations comprise a miniature hospital with complete facilities for treating any emergency case. Lately the resources at the call of the chief surgeon have been increased by the equipping of a hospital car for use in times of accident. This hospital on wheels is kept ready at all times for emergency calls, it having been found advisable from both humane and operating viewpoints to send physicians and hospital facilities to an injured passenger rather than bring the patient to the city on an ordinary passenger car. With these objects in view the car, which comprises an ordinary short closed body mounted on single trucks, has been carefully equipped with three stationary stretchers and supports for a swinging one, an equipment of surgical instruments and supplies, electrically heated pads, and large basins in which water can be electrically heated. Such refinements in electric railway operation as hospital cars may not often be called into use, but their serviceability in emergency would seem to speak well for their more general adoption.

A little more than a year ago the Milwaukee Electric Railway & Light Company completed its magnificent terminal station and office building in the business district of Milwaukee. As described in the Electric Railway Review for July 15, 1906, page 373, this very complete station contains headquarters for the company surgeon. His accommodations comprise a miniature hospital with complete facilities for treating any emergency case. Lately the resources at the call of the chief surgeon have been increased by the equipping of a hospital car for use in times of accident. This hospital on wheels is kept ready at all times for emergency calls, it having been found advisable from both humane and operating viewpoints to send physicians and hospital facilities to an injured passenger rather than bring the patient to the city on an ordinary passenger car.

A Car for the Doctor.

With these objects in view the car, which comprises an ordinary short closed body mounted on single trucks, has been carefully equipped with three stationary stretchers and supports for a swinging one, an equipment of surgical instruments and supplies, electrically heated pads, and large basins in which water can be electrically heated. Such refinements in electric railway operation as hospital cars may not often be called into use, but their serviceability in emergency would seem to speak well for their more general adoption.

With these objects in view the car, which comprises an ordinary short closed body mounted on single trucks, has been carefully equipped with three stationary stretchers and supports for a swinging one, an equipment of surgical instruments and supplies, electrically heated pads, and large basins in which water can be electrically heated. Such refinements in electric railway operation as hospital cars may not often be called into use, but their serviceability in emergency would seem to speak well for their more general adoption.

In its report for 1906 the board of rapid transit commissioners of New York City hazards estimates as to the future growth of population and traffic which may be expected. During the year 1906 there were carried by street railways in the borough of Brooklyn 389,555,025 paid passengers, representing 278 rides per inhabitant. Of the total the elevated lines carried 32 per cent and the surface lines 68 per cent. Over 60 per cent of all the passengers were carried to and from Manhattan. From 1901 to 1906 the number of surface riders increased 27 per cent, while the mileage of single track increased less than 2 per cent, and the car-mileage about 11 per cent; in the same period population increased less than 18 per cent. Travel on the elevated roads in Brooklyn in five years has nearly doubled, while there was an increase of 11 per cent in the miles of single track operated and of 60 per cent in car-mileage. The board estimates that facilities will have to be provided for the transportation of 560,000,000 paid passengers in Brooklyn in 1911 and of 800,000,000 in 1916. The total paid traffic in Manhattan and the Bronx in 1906 was 818,273,413, an increase of about 41 per cent in five years. Of this traffic the surface lines carried about 52 per cent and the elevated and subway lines 48 per cent. Applying the rate of increase which prevailed from 1901 to 1906, it is estimated that the total paid traffic in 1911 will be about 1,153,000,000, and in 1916 about 1,626,000,000. Many statistics of interest are presented concerning the

Growth of Traffic in New York.

Of the total the elevated lines carried 32 per cent and the surface lines 68 per cent. Over 60 per cent of all the passengers were carried to and from Manhattan. From 1901 to 1906 the number of surface riders increased 27 per cent, while the mileage of single track increased less than 2 per cent, and the car-mileage about 11 per cent; in the same period population increased less than 18 per cent. Travel on the elevated roads in Brooklyn in five years has nearly doubled, while there was an increase of 11 per cent in the miles of single track operated and of 60 per cent in car-mileage. The board estimates that facilities will have to be provided for the transportation of 560,000,000 paid passengers in Brooklyn in 1911 and of 800,000,000 in 1916. The total paid traffic in Manhattan and the Bronx in 1906 was 818,273,413, an increase of about 41 per cent in five years. Of this traffic the surface lines carried about 52 per cent and the elevated and subway lines 48 per cent. Applying the rate of increase which prevailed from 1901 to 1906, it is estimated that the total paid traffic in 1911 will be about 1,153,000,000, and in 1916 about 1,626,000,000. Many statistics of interest are presented concerning the

traffic in the subway in 1906. The smallest number of passengers in one month was 8,555,795 in August, and the largest was 15,609,516 in December. The heaviest traffic was at the Brooklyn bridge station, where over 19,500,000 passengers purchased tickets, or twice as many as at any other single station on the road. The heaviest daily travel was on December 24, 1906, when 605,246 passengers were carried. The probabilities of future growth which the estimates suggest point to definite problems which must be met before many years pass.

THE NEW YORK CITY RAILWAY RECEIVERSHIP.

The receivership of the New York City Railway cannot be blamed to the investigation of the public service commission; but undoubtedly the publicity given to the presentation before the commission of a condition of virtual bankruptcy which had existed for years precipitated the appointment of receivers. To what extent these proceedings will involve the allied companies in New York only the future will show.

As no statement of liabilities has been made yet, the full extent of the deficit of the New York City company is not publicly known. The estimates from unofficial sources run as high as \$25,000,000. This figure is based on a probable readjustment of assets. The complaint of the Pennsylvania Steel Company and the Degnon Contracting Company, on which the receivership proceedings were founded, contains considerable information touching the commitments and credit of the New York City Railway. The latter company has expended more than \$20,000,000 in extensions, improvements and additions for the benefit of the leased, owned and controlled lines. While these expenditures have bettered the owned and controlled lines and have enhanced the value of the leased properties, they exceeded the resources of the company. Thus it appears that the New York City Railway has entered into contracts for electrification amounting to more than \$4,000,000 and that the liabilities incurred on this account cannot be met. The company has no funds with which to pay for equipment that will be delivered shortly and it cannot meet judgments for damages that will be entered against it. The company also has a floating debt of \$2,000,000 which is overdue, but cannot be paid, and there are other obligations to the amount of several million dollars which are payable on demand. The complaint sets forth that the only method by which the company can meet its obligations is by the continued maintenance and operation of the system as a whole. Suits against its properties or revenue would embarrass and cripple it. The complaint also states that during the last year the lines owned or leased carried about 400,000,000 passengers and the average number of persons employed by the company and its controlled and allied railways exceeds 6,000. As the roads operated comprise practically the entire street surface system of the county of New York, and efforts to provide funds have been unsuccessful, and the operation of the system as a whole is of vital importance to the public, the court was urged to take the property into its custody.

No surer way of preserving the existence of the Interborough-Metropolitan Company could have been conceived than the sacrifice of the New York City Railway to the overwhelming conditions which seemed to beset the properties. The New York City Railway has a lease for 999 years on the Metropolitan Railway, which in turn leases the Third Avenue Railroad. The New York company guaranteed dividends on the Metropolitan stock and the Metropolitan guaranteed a disbursement on Third Avenue stock. It is probable that both of these dividends will now be passed. This step undoubtedly will lead to some action by the protective committees of Metropolitan stockholders.

Inquiry turns upon the effect which the receivership will have on the investigation by the public service commission. The receivership will reveal facts that will relieve the

commission of its self-imposed task of determining the precise relations of the companies which are interwoven in the Interborough-Metropolitan Company, but it is announced that the commission will prosecute an inquiry as to the causes for the insolvency, the creation of agreements to pay rentals which were not earned and of the wholesale charges of overcapitalization and overborrowing. As the books of the Interborough-Metropolitan Company and the Metropolitan Securities Company have been opened to the commission, the necessity for the threatened legal proceedings by the commission to cause these books to be produced no longer exists.

The attitude of the public and the public service commission indicates that the inquiry will not end until the conditions which brought about the present situation have been thoroughly unveiled. With the conditions as favorable to traffic as they are in New York the street railway system should be prosperous. The profit from the enormous traffic should be large enough to overcome the operating handicap which arises from the fact that travel very largely terminates in one small area; but operating conditions alone have no just part in the causes of the bankruptcy. The recent reports of a decline in traffic, accompanied by increased service and resultant higher expenses for the surface lines, are merely incidental to the causes which underlie the difficulties. Those causes undoubtedly lie in the cumulative abnormal overcapitalization of past years.

REHABILITATION IN CHICAGO.

The report of President T. E. Mitten of the Chicago City Railway to Mayor Busse of Chicago shows that commendable progress has been made in the rehabilitation of the properties of that company. That the task is a large one will be appreciated by those familiar with the street railway situation in Chicago. Much of the railway property has been in poor physical condition. That the traffic is now as large as can be comfortably handled by the lines if they were in first-class physical condition is evident from casual study. With the elevated roads operating to their full capacity the prospects are that the normal growth in traffic will more than keep pace with the increased facilities afforded by new track and more and better equipment on the surface lines.

The rehabilitation work is now progressing in almost every department; about 1,500 men are employed in track-laying operations; two car houses are being pushed to completion and plans are under way for three more to be completed within the 3-year limit. The present work affecting power is largely in the nature of substation construction. At the start there was naturally some delay in all these matters because the board of supervising engineers found it necessary to frame a comprehensive scheme of rehabilitation and development before anything tangible could be accomplished. However, it is expected that at the close of the present season 35 miles of track will have been relaid according to the specifications of the board of engineers. This track mileage is about a third of the total mileage that the ordinance requires shall be laid by the Chicago City Railway in the three years commencing on February 1, 1907. This difficult part of the work, therefore, is well under way, with every prospect of completion within the required time.

When the car houses now under construction are finished car storage for 780 surface cars will have been provided. The two new car houses, together with the three additional houses that are already planned for, will furnish storage room for approximately 1,500 cars. The new car houses provide ample room for systematic and economical car cleaning, inspection and repairing, besides providing excellent facilities for the car men when off duty. Since the rehabilitation movement has been under way, the Chicago City Railway has purchased 800 new cars, and over 550 of these, or similar cars, are already in operation, and contracts have been made

for 350 more for early delivery. During this same period the Chicago Union Traction Company has added about 100 new cars to its equipment.

Extensive preparations are under way by the Chicago City Railway to provide all its own power as soon as a new power station, for which plans are nearly ready, can be completed.

It is hoped that the use of the pay-as-you-enter cars will have a tendency to accelerate the movement of passengers as well as to decrease accidents and increase the revenue. As passengers boarding the cars do not have to wait until all the outgoing passengers are off the platform, there should be a material decrease in running time from this reason alone.

Continuation of the rehabilitation should place the system in such physical condition that with the best methods of operation a larger traffic can be handled than is possible with present equipment and methods.

AUTOMATIC DEVICES IN POWER PLANTS.

The use of a considerable number of automatic devices is a characteristic feature of recent large power plants. From the boiler room to the outgoing lines the handling of large outputs demands more and more the use of auxiliary labor-saving apparatus. Even in a very large station the labor cost per kilowatt-hour seldom falls below 20 or 25 per cent of the total operating expense, so that any saving in attendance which can be effected without sacrificing the certainty of the service deserves careful study. It is no small problem, however, to decide just how far automatic devices should be relied upon in moderate or low capacity installations. The cost of supplying a plant with remote-control switchboard mechanism, for instance, is liable to be prohibitive in a station where the initial expense must be cut to the lowest figure consistent with reliable service. The question for the majority of plants—for it is the exceptional few stations which are of such enormous capacity that auxiliary equipment of all sorts is economically adaptable—is one of elimination rather than of multiplication. At the same time it is worth while to consider how far the automatic equipment of large capacity stations can be utilized to advantage in the smaller plants.

In very large plants the small motor has become a valuable aid to operating flexibility, and in no respect more so than in the handling of high-tension oil switches. Direct-current circuit-breakers are now in service on the motor-operated plan, and the setting of one of these after a partial or complete short-circuit on the feeders supplied through it is simply a matter of closing an auxiliary switch contact. The simple methods of hand operation of circuit-breakers may not meet the requirements all the time, but the bulk of the work on a circuit of a few hundred amperes maximum capacity can be taken care of by hand manipulation. Excessive current demands on a single feeder, reaching from 1,000 amperes upward, furnish conditions more likely to justify the expense of installing motor-operated circuit-breakers. As for the high-tension oil switch, say, from 11,000 volts up, the use of motor-operated apparatus is unquestionably a safer course than the installation of manually handled switches, regardless of the size of the plant.

There is no good reason why the use of automatic indicating devices should not be as extensive in small as in large stations. In some of the latter pilot lamps have been employed with great advantage to show when high and low tension switches are opened and closed, what exciter motors are in operation, what busbar combinations are in effect and what feeder arrangements are in use. In the operation of extensive bench boards with remote control, pilot lamps are a most important auxiliary equipment, but even in plants where the switching arrangements are simpler there is a real field for

the use of such indicators. The duties of individual employees are highly specialized in the larger stations; in the smaller ones they are so much more varied that the attendant needs even more automatic assistance to caution him against making mistakes. Errors in handling the apparatus are naturally more costly in stations of great capacity, but even in the small plant every possible mental distraction that can be avoided in times of emergency is a gain in operating security. Minor economies can also be insured by the use of pilot lamps on auxiliary lighting and power circuits.

Automatic recording devices are helpful in the economical operation of large plants, but it is a question how far these should be duplicated in small installations. The use of recording wattmeters on individual generator circuits in small stations is less of a necessity than the provision and maintenance of an accurate totalizing instrument between the generator and the outgoing sections of the busbars. In small plants, where the cost of coal is, say, from \$3.50 per ton upward, it is safe to say that the intelligent use of a carbon dioxide recorder will be well worth the cost of installation. Recording voltmeters, feedwater and flue thermometers, and ammeters are excellent substitutes for elaborate logs of instrument readings, but in the small plant there is generally plenty of time for such readings to be taken by the attendants. Individual cases must decide the use of automatic recording devices in competition with routine reports from the men on the operating shifts.

Whatever may be the total capacity of the station, there is no question about the desirability of installing automatic starting apparatus in connection with motor-driven pumps which supply circulating water to condenser suction wells, or which relieve subsewer sump pits of their accumulated drainage water. A positive water supply is worth all it costs in the way of automatic apparatus. Similarly, the use of automatic valves or electrical connections which will start a second step bearing pump in a vertical shaft turbine installation in case one pump fails is a valuable practice. Circuit-breaker, low water in boilers, and thermostat alarms, together with extension bells or pneumatic whistles on the telephone system, are also important features in the way of power plant routine auxiliaries, low enough in cost to be independent of the size of the station. Automatic engine stops have been successful in small plants, as well as in larger installations, and in this connection the motor-driven steam valve has received attention. In plants where the main boiler room header is located parallel and close to the fire wall between it and the engine room it is sometimes feasible to carry valve spindles through the wall so that the different header sections can be cut off in case of trouble, without going into the boiler room. The remote controlled valve of course accomplishes this, but in small plants the cost of the motor outfit can be saved by the simple expedient suggested. There will be a sacrifice in the speed of closing, but it will still be possible to isolate a burst section of piping without personal danger.

The public service commission of New York City has just given out a table which includes all accidents from August 4 to August 31 on transit lines within New York City. The general list of accidents is as follows:

Persons injured in car collisions.....	145
Persons injured in collisions with vehicles.....	465
Persons struck by cars.....	405
Persons injured boarding cars.....	641
Persons injured alighting from cars.....	1,263
Employees injured	641
Derailments	33
Injuries on stairways.....	26
Other accidents	1,881
Total	5,500

Of these 159 are classed as serious accidents, in which 42 people were killed.

THE SELBY HILL TUNNEL OF THE TWIN CITY RAPID TRANSIT COMPANY.

The Twin City Rapid Transit Company, operating street and interurban car lines in and between the cities of

was substituted in 1898 it was found that the electric cars could not climb the 16½ per cent grade which existed on Selby Hill. A counterweight system was then devised, which consisted essentially of a cable and counterweight in a conduit beneath the street surface and grip cars which were



Selby Hill Tunnel—Retaining Walls Extending from West Portal.



Selby Hill Tunnel—Selby Hill Before the Improvement.

St. Paul and Minneapolis, Minn., has recently placed in service a concrete subway which greatly reduces the grade and enables the company to give better and more frequent

used to draw the cars over the grade. A description of this counterweight device appeared in the Street Railway Review of May 15, 1898. This method was found to be unsatisfac-



Selby Hill Tunnel—Sheeting, Waling Timbers and Cross Struts in the Trench.

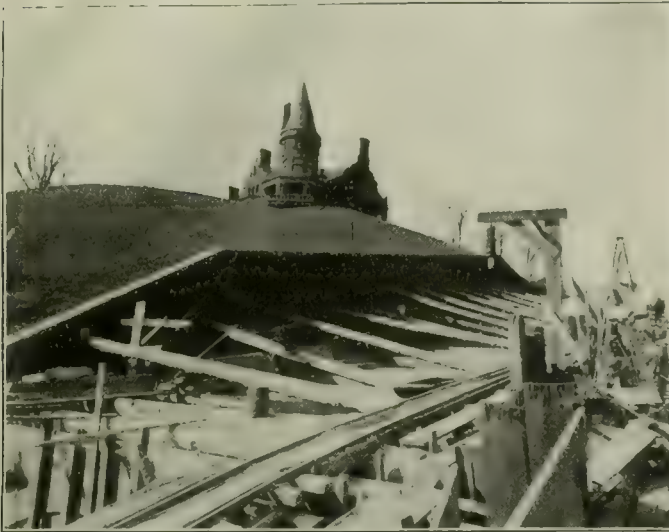
service on several of the more important urban lines and the Selby-Lake interurban line. This line with many others in St. Paul was originally operated by cables but when electricity

tory when the traffic increased, because it was impossible to avoid delays in the operation of the counterweight system. In March, 1905, the company obtained certain concessions

from the city of St. Paul in settlement of some long-standing disputes and at the same time agreed to construct the subway in the interest of better service.

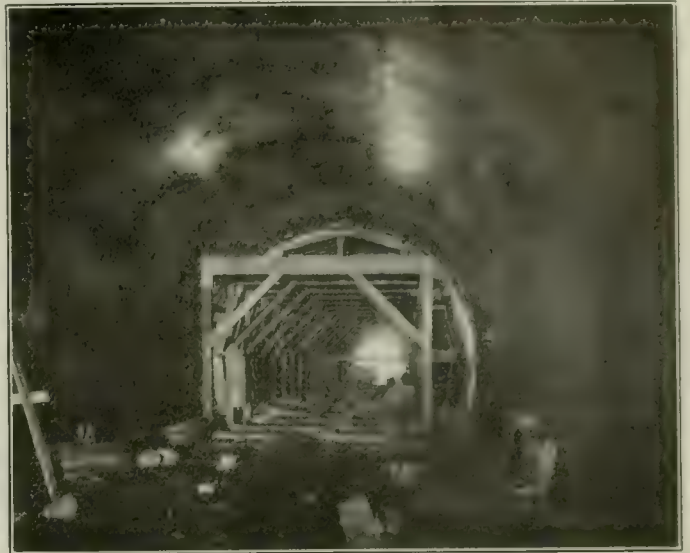
In order to reduce the grade a point was chosen some distance past the summit of the original grade at which the

approach, 920 feet is the arch covered section or tunnel and 315 feet is between retaining walls forming the west or upper approach. The grade of the tracks in the improvement is uniformly 7 per cent and the alignment is straight except



Selby Hill Tunnel—Falsework and Braces for Masonry Retaining Wall.

west or upper end of the improvement was to begin, the lower end being at the intersection of Selby avenue and Third street at which the old grade began. The summit of the old



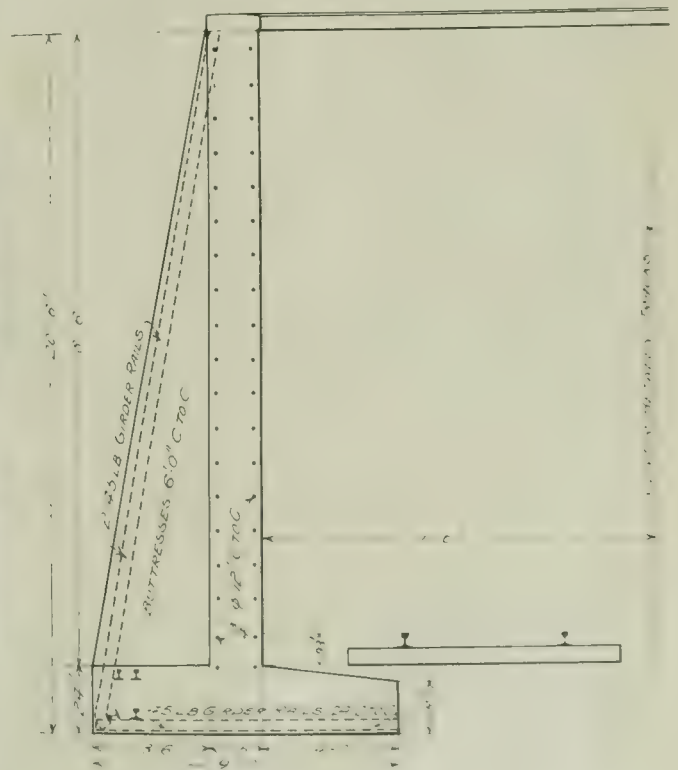
Selby Hill Tunnel—Interior of Tunnel, Showing Bents Supporting the Forms.

where Selby avenue turns into Third street at the east approach. Here an 11-degree curve, having an intersection angle of 41 degrees 4 minutes, was used. When the work of construction was begun the traffic was removed entirely from the street and the cars were operated over a detour track built



Selby Hill Tunnel—Falsework and Trolleys for Handling Concrete.

grade now lies almost directly over the center of the tunnel about 50 feet above the invert. The total length of the improvement is 1,700 feet, while the length of the subway from end to end of masonry walls is 1,479 feet. Of this distance 244 feet is between retaining walls forming the east or lower



Selby Hill Tunnel—Cross Section of Retaining Wall.

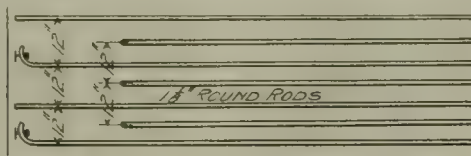
through Farrington avenue, Rondo street and South street a distance of about $\frac{1}{2}$ mile.

Description of Subway.

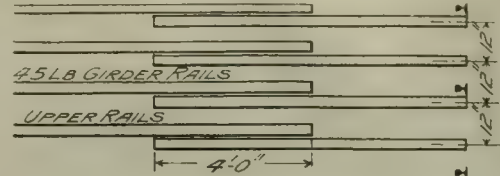
The concrete retaining walls built along the approaches on either end vary in height from 3 feet to 20 feet 6 inches.

Under heights of 8 feet 7 inches these were designed as plain gravity walls, while above that height the walls were of rectangular section, supported on slab footings and reinforced in both wall and footing, as shown in one of the accompanying engravings. Buttresses 2 feet thick, spaced 6 feet center to center, were placed along the rear of the walls. The top of the retaining walls and parapet walls over the portals of the tunnel are $\frac{1}{2}$ foot above the grade of the street and an iron picket fence 6 feet high is placed along the top of these walls to afford public protection. The covered portion of the

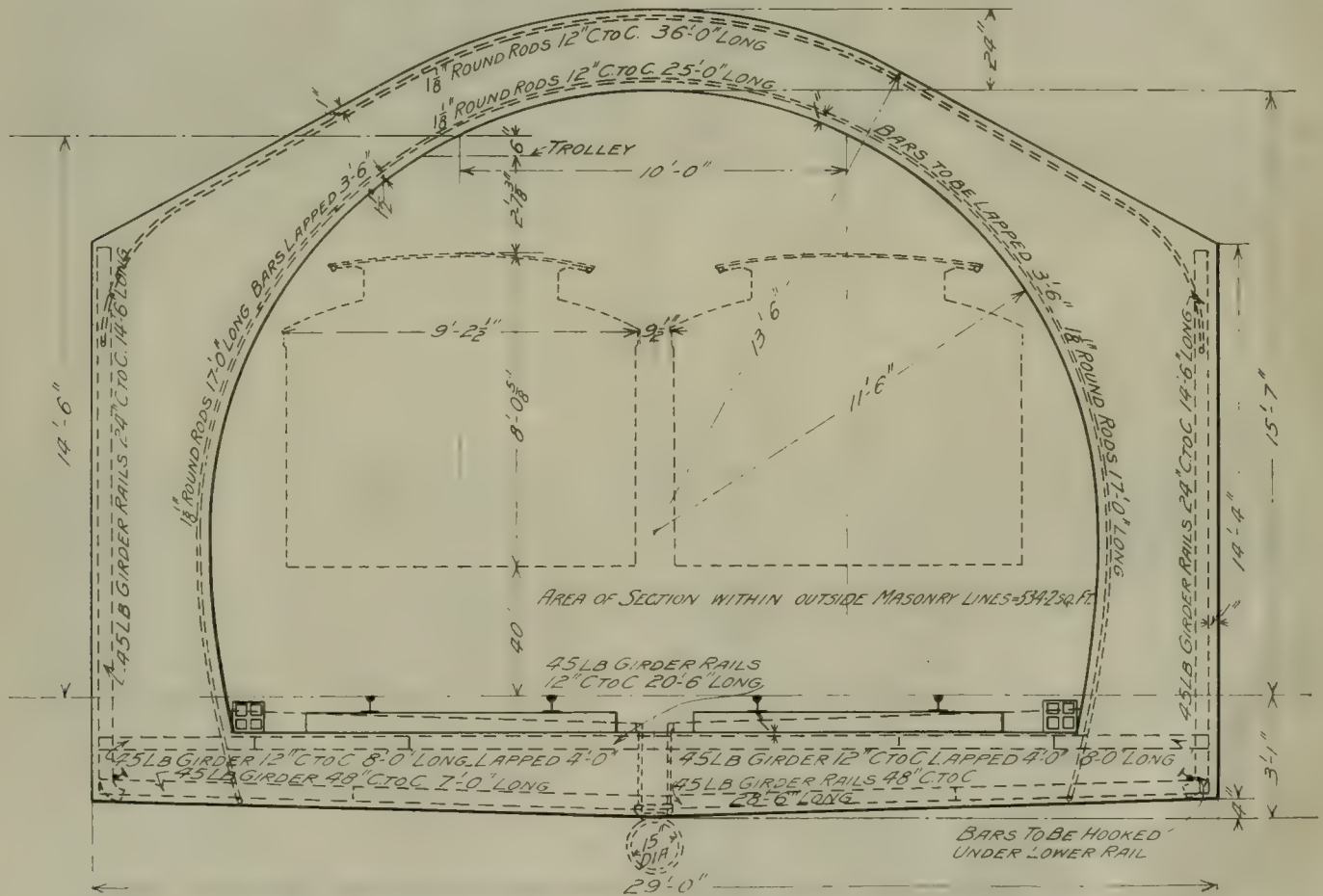
the outer surface with 45-pound girder rails $14\frac{1}{2}$ feet long and spaced 24 inches center to center. These rails are bent under a longitudinal rail placed in the lower outer corners of the invert, as shown in accompanying engravings. The reinforcement along the interior surface of the side walls consists of $1\frac{1}{8}$ -inch round rods, spaced 12 inches center to center. This reinforcement extends around the entire intrados of the arch, a lap of 3 feet 6 inches being allowed at the splices. The outer surface of the arch ring is reinforced with $1\frac{1}{8}$ -inch round rods spaced 12 inches center to center. The interior



PLAN OF REINFORCEMENT FOR ARCH RING



PLAN OF REINFORCEMENT FOR INVERT



Selby Hill Tunnel—Cross Section of Tunnel and Plan of Reinforcement.

subway is a circular arch with a diameter of 23 feet. The clearance allowed at the center of the tracks is 14 feet 6 inches and the total center height of the tunnel is 15 feet 9 inches. The invert of the tunnel is flat, being 26 inches thick at the center and 22 inches thick at its intersection with the side wall. This section is increased to 37 inches at the center and 33 inches at the side. It is reinforced along both the top and bottom surfaces with 45-pound girder rails. The bottom reinforcement, which is placed $1\frac{1}{2}$ inches from the lower surface, consists of rails spaced 4 feet center to center. One rail 28 feet 6 inches long and two rails 7 feet long were used, the 7-foot rails practically doubling the reinforcement nearest the side walls. The reinforcement of the top of the invert consists of 45-pound girder rails 28 feet long and spaced 12 inches center to center. The side walls are reinforced along

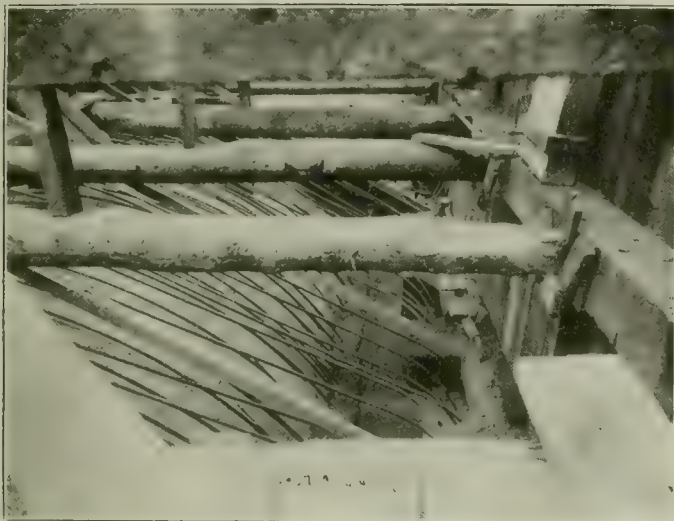
surface of both the arch ring and the invert was carefully pointed after the removal of the forms, an excellent finish being obtained. In order to provide for the drainage of surface water a 15-inch drain pipe was placed below the center of the invert and drain connections provided at intervals along the tunnel. These drain connections consist of troughs extending across the floor and covered with iron gratings. The seepage water back of the walls is also drained into this central drain by means of 4-inch lateral pipes placed every 20 feet on each side of the tunnel. The central drain connects with the city sewer system. In the floor on each side of the subway is a tile conduit of four ducts for electric wires and cables. Connections are made from these ducts through conduits in the concrete to the trolley wires and electric lights. Openings into these ducts are provided at the ends and center

of the tunnel. The tunnel is lighted with 32-candlepower lights placed along the center of the arch at intervals of 10 feet. Refuge bays or depressions about 10 inches by 2 feet by 6 feet in dimension are placed at intervals along the side walls on alternate sides of the tracks. Eighty-pound standard T-rails, laid upon creosoted oak ties, constitute the track structure. The rails are double-spiked with screw spikes throughout and the ties and rails are embedded in the concrete floor to within 2 inches of the top of the head of the rail.

At the east approach to the tunnel the character of the soil, which was found to be soft mud and peat, required the placing of 2 feet of concrete beneath the ties, which were also embedded in concrete in a similar manner to the track of the main tunnel. The retaining walls in this approach rest upon piling driven to a solid foundation.

Construction.

It was found desirable to construct the subway entirely in an open trench, and in order to accomplish the work in this manner it was necessary to do considerable sheeting. The material excavated was principally coarse sand contain-



Selby Hill Tunnel—Forms and Reinforcing Material for Crown of Arch.

ing a small percentage of rock and gravel. Sheeting timbers 4 by 6 inches, varying in length from 20 to 25 feet, were driven in advance of the excavation. As the trench was deepened waling pieces 12 by 12 inches were placed longitudinally across the sheeting timbers on both sides of the trench and transverse struts of rough timbers 12 to 14 inches in diameter were placed between these waling pieces to act as braces across the trench. The waling timbers were spaced at intervals of 6 feet along the sheeting and the transverse struts were placed at 6-foot intervals along the waling timbers. Where the trench was deeper than 25 feet a second row of sheeting was driven inside the first row. Along the south side at the deepest part of the work was a stone retaining wall rising about 12 feet above the original street surface. This retaining wall was almost directly above the south side wall of the tunnel and during the construction of this portion it was necessary to support the retaining wall by means of heavy timbers and struts, as shown in one of the accompanying illustrations. Heavier sheeting timbers were also used along this section of the trench.

Because of the heavy side pressures carried by the sheeting and struts and the character of the material it was impossible to remove the struts so that the side walls might be built without first transferring the side pressures to some reliable brace, and in order to overcome this difficulty a system of building the tunnel in longitudinal sections was devised by Charles R. Shepley, resident engineer, in charge of the

construction. The scheme also simplified the difficulties of centering the arch. Coincident with the construction of the invert, concrete posts 4 by 4 feet, reinforced with 45-pound rails, were built against the sheeting at intervals of 6 feet. These concrete posts were located between the rows of cross struts, the lower waling pieces becoming embedded in the posts. These posts were built to a height of 11 feet and allowed to set for about a week until thoroughly hardened. Bracing timbers were placed between opposite posts across the trench.

Falsework for the forms of the side walls and arch of the tunnel was then built on top of the invert. This falsework consisted of a 6 by 8 inch sill, resting upon the surface of the invert, two vertical posts 6 by 8 inches and a cap 8 by 12 inches steadied by knee braces attached to the vertical posts. These bents supported the arch forms by means of posts or struts 6 by 6 inches, which in turn supported longitudinal stringers 6 by 8 inches. Upon these stringers rested the ribs bearing the form boards. These ribs were of plank 12 by 12 inches, cut to conform to the curve of the arch. The boards used for forms were 1-inch T. and G. dressed flooring. The ribs were spaced 2 feet apart and the bents 6 feet apart opposite the vertical posts. When the concrete in the posts had set the lower row of transverse struts or cross timbers was removed and the pressure on the sheeting transferred to the concrete posts. The inside forms for the side walls were then built to a height of 5 feet and the concrete placed to this height. The sheeting was used to make the outside forms. The walls then inclosed the lower end of the concrete posts. After this concrete had become satisfactorily hardened the second row of cross struts was removed and their load transferred to the concrete posts. The arch forms were placed in a similar manner as before and the arch completed to a height of 11 feet. When this second section had hardened the ribs and forms for the arch ring were placed and the arch was completed in the usual manner. The forms were kept in place at least two weeks before removing.

Two No. 2½ Smith concrete mixers were used, one being placed at either end of the trench. The concrete was carried to place by means of buckets handled by an overhead trolley system which was operated by machinery. The excavation required the removal of about 43,000 cubic yards of earth and 2,100 cubic yards of rock. The structure contains 10,300 cubic yards of concrete, in which about 12,000 barrels of cement were used, the composition being 1-3-5 for retaining walls, side walls and invert and 1-2-4 for the arch ring. Aggregate, which was of broken stone thoroughly screened, was required to pass a 2-inch ring. The steel rods used had an ultimate tensile strength of 55,000 to 65,000 pounds per square inch.

The work of repaving the street, putting in permanent gas mains and electric conduits and other changes which constitute city improvements amounted to about 30 per cent of the cost of the work. The trench during the construction was kept free from seepage water by means of a 6-inch centrifugal sewer pump.

The subway was designed and built under the direction of George L. Wilson, M. Am. Soc. C. E., engineer of the Twin City Rapid Transit Company. George J. Grant of St. Paul was the contractor and Charles R. Shepley resident engineer in charge of the construction. Work was commenced in November, 1906, and finished in August, 1907. The total cost of the improvement was \$500,000.

The Illinois Traction System is making extensive preparations for handling the large traffic expected in connection with the coming state fair at Springfield, Ill. It is planned to use every available car and to run trains in sections, with two or more cars to a section.

During the Knox county fair at Vincennes, Ind., last week the street railway system of the Vincennes Traction & Light Company was taxed to the extent of its equipment to handle the crowds. On Thursday, September 19, the company handled 25,655 passengers in 13 cars, without an accident.

FALL MEETING CENTRAL ELECTRIC RAILWAY ASSOCIATION.

The first fall meeting of the Central Electric Railway Association was held on September 26 at the Chittenden hotel, Columbus, O. President H. A. Nicholl presided. There were about 100 members and guests present. The president in his introductory remarks expressed the deep regret of the association at learning, since the last meeting, of the deaths of F. J. Stout, general manager Lake Shore Electric Railway, and A. W. Anderson.

It was announced that a special Pullman car for the benefit of Central Electric Railway Association members would be attached to a train leaving Indianapolis at 7 p. m. on October 13, running through to Atlantic City without change. Application for space should be made to Secretary Milholland.

F. D. Carpenter (Western Ohio Railway), chairman of the committee on train rules, introduced and offered the standard code of interurban rules that that committee had prepared. In the selection of these rules, which later will be printed and distributed, on application to the secretary, the committee had eliminated all rules of a local nature, believing that in this way the standard rules would be more readily adopted. Individual roads could easily insert rules necessary for the local peculiarities.

The rule committee report was accepted. The members of this committee are: F. D. Carpenter, chairman, Lima, O.; C. N. Wilcoxon, Cleveland, O.; C. D. Emmons, Ft. Wayne, Ind.; C. A. Baldwin, Anderson, Ind.; F. J. J. Sloat, Dayton, O.

Catenary Construction.

G. D. Nicoll, electrical and mechanical engineer Indianapolis & Cincinnati Traction Company, Rushville, Ind., read a paper describing the catenary construction used on the Rushville line. The paper will be found elsewhere in this issue. When questioned, Mr. Nicoll said that no special method was used for staggering the trolley wire because the natural oscillation of the car body tended to make the bow wear over a surface from 8 to 16 inches wide. The pressure of the bow against the trolley was 15 pounds and this had been found sufficient to maintain good contact even though the height of the trolley wire above the rail varied between 16 and 22 feet. The contact piece comprised a strip of oak about forty inches long and $\frac{1}{2}$ inch thick, carrying a rubbing surface or contact piece made up of a sheet of copper 16 inches long and 6 inches wide, placed in the center, with aluminum contact pieces at the ends completely covering the bow of wood. The copper contact piece had life up to about 4,000 miles. It was lubricated with grease placed in two $\frac{1}{4}$ -inch longitudinal grooves along its upper surface. The cost for renewal was less per car-mile than would be the cost if trolley wheels were used. The area of contact was a line four inches long, through which the 150 kilowatts required by the high-speed cars were easily carried.

With regard to the trolley wire the wear was inappreciable and no difficulty had been experienced by expansion and contraction in varying degrees in the messenger and trolley wires. Neither had there been any trouble occasioned by the messenger wire falling on the bracket arm and burning off. The trolley wire and messenger never had broken at the same time and neither except once or twice. No trouble had been experienced from electrolysis that might occur, due to the presence of the two dissimilar metals in the hangers and trolley wire. The trolley wire was adjusted on curves to make allowance for the superelevation of the track and Mr. Nicoll did not recall having heard of the trolley's leaving the wire during the past six months.

Insurance.

Henry N. Staats, chairman of the insurance committee, presented the report of that committee, which will be found elsewhere in this issue. Through the courtesy of Mr. Staats the report, as presented, will be printed for general distribu-

tion. C. D. Emmons, Ft. Wayne & Wabash Valley Traction Company, stated that by paying strict attention to the insurance problem he had found it possible to reduce the rates on some risks from \$1.47 to 90 cents.

Mr. Staats said that in Cleveland the insurance agents received 25 per cent of the premium as their commission. The Cleveland Electric Railway formerly had paid a rate of \$1.60, but due to careful attention to fire protection, such as the installation of sprinkler systems and due to competition, the old line companies had reduced this rate in some instances to 15 cents, which was below the actual cost.

J. C. Rothery (East Liverpool Traction & Light Company) last year had paid a rate of \$1.70 for insurance on a risk in West Virginia. This year for the same insurance, \$145,000, the rate had been raised to \$2.45 for no other reason than that last year a few hundred feet of hose stood the insurance test and this year it was not quite up to the requirement. It was the policy of the old line companies to place the premiums as high as possible and in some instances to evade payment if any loophole could be found.

Afternoon Session.

After the lunch period R. C. Taylor, chairman, read the report of the standardization committee, which will be found elsewhere in this issue. The report was accepted without discussion.

F. D. Carpenter suggested that it was advisable to have the rules for train operation of all associations as nearly alike as possible, and therefore after consideration, President Nicholl appointed C. N. Wilcoxon (Cleveland Southwestern & Columbus Railway) to represent the Central Electric Railway Association in the discussion of the report of the standard rules committee of the American Street and Interurban Railway Association at the Atlantic City convention.

Express.

In the absence of A. A. Anderson, chairman of the express committee, the report of that committee was read by J. F. Starkey, Indiana Union Traction Company. An abstract of this report appears elsewhere. The advisability of forming an interurban express company was discussed very thoroughly and the opinion seemed general that such a company would be a profitable venture if united action could be had. Several members stated that when they had first started express service on their roads it had been unprofitable, but due to diligence in soliciting business it was possible for the operating companies to initiate more traffic and obtain greater net receipts themselves than ordinarily would be possible if the business were turned over to an old line express company.

1,200-Volt Motors.

E. H. Anderson, railway motor design department General Electric Company, presented a paper, to be found elsewhere in this issue, which described and very thoroughly discussed the commutating-pole type of direct-current motor and its application to 1,200-volt service. This type of motor was illustrated and described in detail in the Electric Railway Review for June 29, 1907, pages 856 and 859. A general discussion of the applicability of the 1,200-volt motor for interurban service followed. Mr. Anderson stated that an order for four or five hundred 1,200-volt motors was being considered by the General Electric Company for use in the new Paris subway.

The Southern Pacific Railroad had ordered the GE-207 125-horsepower 600—1,200-volt motors for the electrification of its suburban and ferry terminal service at Oakland, Cal. The service here was very severe. Trains of six cars would be operated, of which four of the cars would be equipped with motors. The two center cars would be trailers with bus and control lines extending the length of the train. The complete train then would be made up as follows: Two cars, one at each end, equipped with motors, master controllers, air compressors and dynamotors for obtaining 600 or 1,200 volts, to

be used in lighting and control circuits; two cars with motor equipment only to be placed next to the end cars, and two trail cars to be placed in the center.

The type of motor which would be used, as earlier mentioned, had operated under test at 1,500 and 1,600 volts with no sparking and even when carrying three times the rated intermittent load there had been no severe sparking. At the later named load and 1,800 volts the motors would flash over, but not severely.

In dismissing the session President Nicholl announced that the next meeting would be held at the Claypool hotel, Indianapolis.

REPORT OF COMMITTEE ON FIRE INSURANCE.*

Each year papers have been carefully prepared and read embracing every subject that might aid the electric railway companies in establishing a greater degree of efficiency and at the same time reducing the operating expenses in many instances. Committees have been appointed to investigate and to search out the best approved methods for conducting the various departments connected with our vast and growing business. We have organizations for the purpose of co-operating along lines reaching out to every branch of our business. We have organizations of employers. We have organizations of employes. Each and every one of these associations helps to unify, strengthen and advance the interests of all concerned.

There is, however, one field that has not been cultivated, and to a very large extent has been overlooked. I refer to that of fire insurance. I am fully convinced that by unified action on the part of the Central Electric Railway Association and by co-operation with other associations having risks of a similar character, much good can be accomplished in the way of reducing insurance to a minimum cost.

There is no important branch of the electric railway business that has received less attention and that is more deserving of greater consideration than the insurance of our valuable interests against loss by fire. We pay annually in the aggregate hundreds of thousands of dollars to insurance companies. So far as I have been able to learn only a small per cent of this money is returned to the policyholders in the way of fire losses on electric railway properties.

The question arises in my mind: "How can we save for ourselves the major part of the money now being paid to insurance companies, whose only object is to make the largest possible profit for themselves out of the premium paid by us, and therefore their profit is at our expense?" It is a simple proposition, and I am confident that from one-half to two-thirds of the money now paid for insurance premiums by electric railway companies can be saved through co-operation with the American Railway Insurance Company.

After very careful consideration on the part of the executive officers of a number of the leading electric traction and electric light companies as to the best plan for producing the lowest cost of insurance it was decided that it was not only feasible, but advisable, for said companies to perfect their own organization and to surround themselves with the best methods for safeguarding their properties against loss by fire.

The American Railway Insurance Company has completed its organization with a capital and surplus of \$500,000, subscribed by individuals connected with electric traction and electric light companies. The officers and directors are among the most prominent connected with the traction and lighting business and represent 30 traction and lighting companies.

An inspection and survey bureau has been established with offices in the Citizens' building, Cleveland, O.

Expert underwriters have been employed and the services of experienced engineers have been secured.

The amount of each subscription has been fixed on a basis of 1 per cent of the gross earnings of each separate traction and lighting company for the year 1906. For example, if your gross earnings were \$1,000,000 your subscription will be \$10,000. By this method each electric railway or electric light company adds to the capital and surplus of the organization, and through co-operation the fund will be increased to an amount that will warrant our companies in time to carry their own insurance in their own organization.

The Electric Mutual Insurance Company and the Traction Mutual Insurance Company have been incorporated under the laws of Ohio and will co-operate with the American Railway Insurance Company in writing business. These companies, however, will be conducted on the plan of the factory mutual insurance companies, and this plan has proven most eminently

successful during the past 70 years.

Electric traction companies and electric light companies of the United States have found that it has been impossible to secure from what is commonly known as old line or stock insurance companies satisfactory rates of insurance, and for the following reasons:

(1) The stock companies are controlled by a limited number of stockholders. Their desire is to make as large an amount of money on their investment as may be possible. Therefore their prime object is to secure in every instance as high rate of insurance as can be obtained.

(2) The present method of stock insurance companies of paying from 20 to 25 per cent of the entire premium as commission to agents is a wrong principle. This commission is a strong inducement for the agents to accept undesirable properties in order to obtain their commissions. Through these methods good properties are compelled to help pay losses on undesirable properties.

(3) There is no sufficient reason for placing electric railway and electric lighting insurance in the hands of strangers, whose only object is to make the maximum amount of money out of their business.

(4) It is a part of wisdom for the traction companies and electric light and power companies to have their own insurance organization, in order that they may bring their insurance down to actual cost, and this can be accomplished by the united action of the traction companies and electric lighting companies in following out correct principles of underwriting.

Two years ago H. J. Davies, secretary of the Cleveland Electric Railway Company, mailed to every street railway company in the United States and Canada a letter requesting a report showing the amount of money paid for fire insurance for the 10 years from January 1, 1895, to January 1, 1905, the amount of losses sustained and the amount actually recovered from fire insurance companies. Reports were received from about 420 companies, and these reports show that there was paid for fire insurance premiums by said companies \$6,049,641.45, and there was recovered from insurance companies by fire loss \$1,673,336.27, leaving a balance to the credit of the insurance companies of \$4,376,305.18.

These figures prove beyond question that electric traction companies of the United States and Canada have been paying excessive rates of insurance, and some of the leading traction companies have felt the burden of this heavy taxation to such an extent that they have established an insurance fund and carry their own insurance. This plan has not proven entirely satisfactory for the reason that the insurance fund in many instances has been drawn upon to promote the various interests of the traction company along other lines.

There are a few companies, however, who have been eminently successful in carrying the major portion of their insurance under their own insurance fund. I refer to the United States Steel Corporation, the Pennsylvania Railroad Company and the Philadelphia Rapid Transit Company. The last-named company has for years set aside sums for this purpose until its insurance funds amount to \$1,600,000. The interest on this accumulation is sufficient to keep up this amount. No single loss can exhaust this fund, for the company has not \$1,600,000 worth of property in any one location, unless it be at its power plants, which are substantially fireproof, or at least certainly not subject to a total loss.

Not many electric light companies are able to do what the Philadelphia company has done. Several of them, however, may unite to carry their own insurance, and this is exactly what some of us are trying to do for the benefit of all of us.

The plan of organization and working of the American Railway Insurance Company, the Electric Mutual Insurance Company and the Traction Mutual Insurance Company has been approved and indorsed by the American Street and Interurban Railway Association and by the Central Electric Railway Association.

If these great associations will co-operate in establishing an insurance organization composed of their members, confining lines of insurance to their own properties and kindred risks, employ expert underwriters and skilled engineers to conduct their business, we will in a comparatively short time compel the so-called old line insurance companies to materially lower their basic rates of insurance. And, through our own organization, we will be enabled to carry a goodly portion of our insurance at actual cost, and at the same time build up a power by which we can hold down the reduced rates that may be given by other insurance companies.

I would therefore strongly urge that each member of the Central Electric Railway Association co-operate in this very important movement to bring about reduction in rates of insurance on the properties of electric railway companies.

*Read before the Central Electric Railway Association, Columbus, O., September 26, 1907.

REPORT OF COMMITTEE ON STANDARDIZATION.*

The standardization committee appointed by this association to investigate the subject of standards as applied to electric railway equipment presented to the association at the Indianapolis meeting, May 23, 1907, certain recommendations covering the subjects of brakeshoes and brakeshoe head and key, axles, journal boxes, flange and head of wheels, rail sections. (See Electric Railway Review, May 25, page 675.—Eds.)

The details of these recommendations were published in pamphlet form and mailed to the members of the association, so that ample time might be allowed for full investigation and consideration of these important subjects, and it is hoped that all of these matters will be given thorough and complete discussion at this meeting.

Your committee realized when it submitted its report on May 23, 1907, that a great many of the details (although fully considered and thoroughly discussed in committee) were absolutely arbitrary and would undoubtedly result in a spirited discussion by the members of this association. Your committee also realized that any recommendations affecting such important subjects must be of the most practical kind

print No. 75 of the Central Electric Railway Association dated May 7, 1907, with slight modification to meet the requirements of the General Electric Company and the Westinghouse company, manufacturers of railway motors, both of these companies agreeing that it is absolutely essential on the two largest axles to provide 50 inches between wheel hubs to accommodate motors from 150 to 250 horsepower.

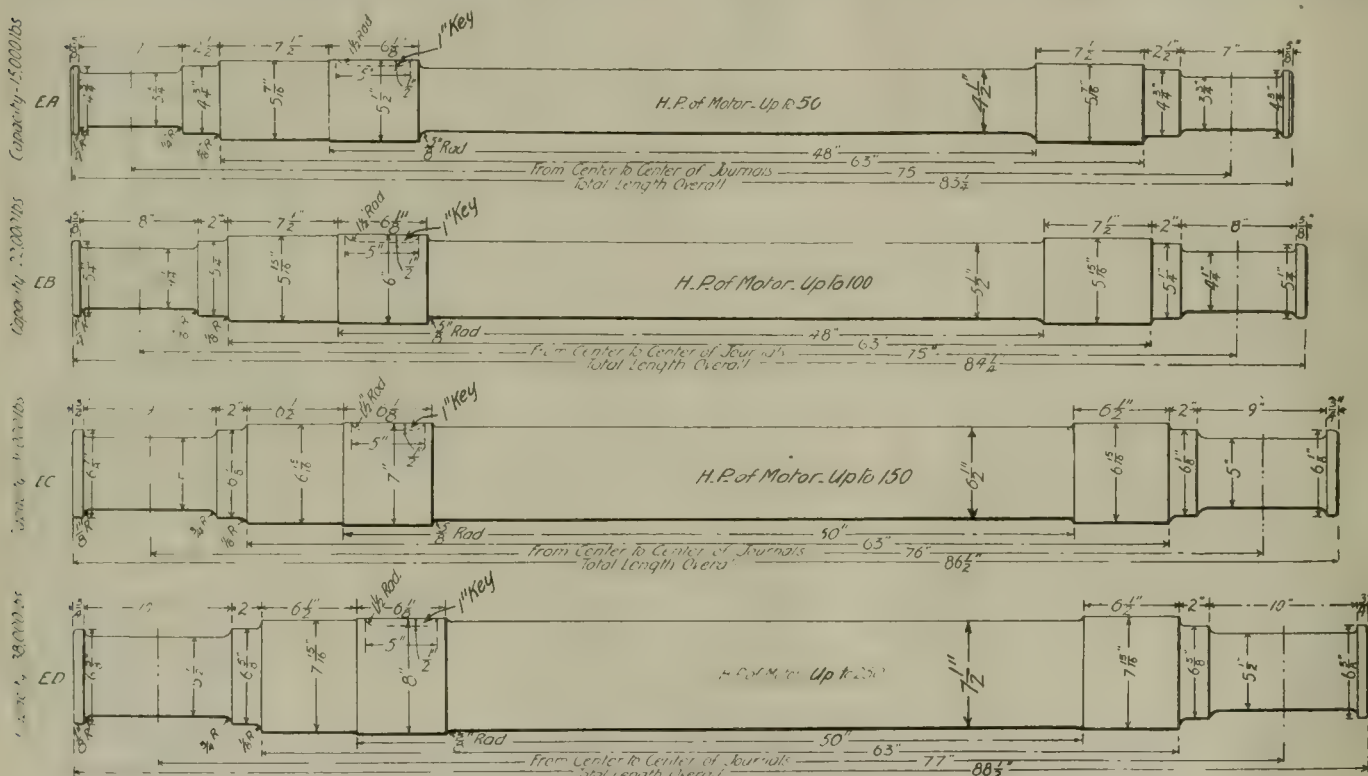
Axle EA has a standard 3¼ by 7 inch journal. It is designed to carry a load of 15,000 pounds per axle and accommodate motors up to 50 horsepower.

Axle EB has a standard 4 1/8 by 8 inch journal and is designed to carry 22,000 pounds per axle and to accommodate motors of 100 horsepower.

Axle EC has a standard 5 by 9 inch journal and is designed to carry 31,000 pounds per axle and may accommodate a motor of 150 horsepower.

Axle ED has a standard 5½ by 10 inch journal and is designed to carry 38,000 pounds and may accommodate motors of 250 horsepower capacity.

Your special attention is directed to all the dimensions of these axles, which were carefully considered by your committee and recommended only after a full discussion with each other and with the manufacturers whose product is



Central Electric Railway Association Standards—Axles for Various Loadings.

and commend themselves to the executive and operating officials of the electric railway properties comprising our association and also commend themselves to the manufacturers of the apparatus which we are attempting to standardize. With these facts in mind each member of your committee has exerted every effort to obtain the most complete information on the various subjects and the chairman of your committee by virtue of his membership on the standardization committee of the American Street and Interurban Railway Engineering Association, had the privilege of discussing the proposed standards in detail on July 26, 27 and 28 at Cleveland, O., with representatives of the General Electric Company, Westinghouse Electric & Manufacturing Company, Cast Iron Car Wheel Manufacturers' Association, Standard Steel Wheel Company, Schoen Steel Wheel Company, American Brake Shoe & Foundry Company, Columbia Brake Shoe Company, Symington Journal Box Company, The J. G. Brill Company, Pennsylvania Steel Company, Lorain Steel Company, William Wharton, Jr., & Co.

As a result of these investigations and discussions and as a result of the meeting of your committee held at Columbus, September 25, it is respectfully recommended that the following standards be adopted by this association:

The four standard axes recommended are shown on blue

affected by the dimensions. The dimensions, it will be observed, standardize at once the diameter and length of journals, diameter and length of wheel fits, diameter and length of gear fits, diameter and length of motor fits, and the length and width and depth of gear keys. These dimensions are consistent with the best practice of successful installation and if adopted will result in commendable uniformity of everything connected with an electric motor axle.

Brakeshoes, Brakeshoe Head and Key.

Drawing No. 76 of the Central Electric Railway Association, dated May 7, 1907, shows in detail the recommendation of your committee on brakeshoes, brakeshoe head and key. It will be observed that there are two shoes recommended, one with a flange to be used in situations where it is impossible to use a brakebeam; the other a shoe without a flange, which should be used wherever it is possible to do so. The design of the shoe head and key is identical, so far as its attachment to the shoe is concerned, with the M. C. B. standard. Either one of the shoes will fit this head. The flange shoe may be reversed by changing to the other wheel on the same axle. The flangeless shoe may be reversed on any wheel. The sketches show a pair of shoes designed for 33-inch wheels, but the radius and width of the rubbing surface may be modified for any diameter and tread of wheel used generally on electric roads. As the brakeshoes are an expensive item of maintenance on all railways the recom-

*Read before the Central Electric Railway Association, Columbus, O., September 26, 1907.

mended standards of this part of the equipment should find ready adoption and result in both mechanical and financial advantages.

Journal Boxes.

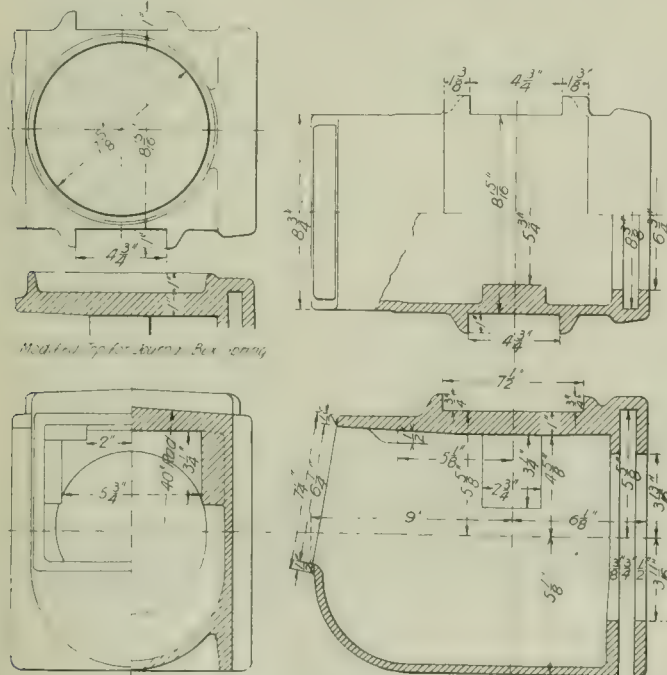
Drawing No. 78 of the Central Electric Railway Association, dated May 9, 1907, showing pedestal fit dimensions was submitted as your committee's recommendation. After conferring with the manufacturers of M. C. B. journal boxes your committee desires to substitute in place of drawing No. 78 a series of sheets, Nos. 79, 80, 81 and 82. These dimensions were worked out by Mr. Weston of the Symington Journal Box Company and are a modification of the M. C. B. journal box to electric trucks. It will be observed that these drawings standardize the exterior as well as the interior dimensions, and if adopted should result in decided commercial benefits to operating companies.

Section of Flange and Tread of Wheel.

Drawing No. 77, Central Electric Railway Association, dated May 8, 1907, shows details of recommended flange and tread of wheel. Before arriving at these details sections of new wheels and worn wheels were examined by your committee and it is believed the flange shown for T-rail construction will prove quite acceptable. Your committee, after further consideration, has decided to recommend a taper of tread 1 inch in 25 inches, instead of 1 inch in 32 inches, as previously recommended. It is believed that this taper will have a tendency to save flange wear.

Rail Sections.

These recommendations are also shown on drawing No. 77. It will be noted that both sections are T-rail, 7-inch, 91-pound, for city streets and 70-pound A. S. C. E. for interurban lines. Your committee is aware that due to municipal restrictions in many cities T-rail might not be permitted, and it is doubtful whether it would be possible to recommend a standard that would cover such cases. We have therefore recom-



Central Electric Railway Association Standards—Details of Box for 5 by 9 Inch Journals.

mended what is considered the best practice and has been successfully used in a great many of our largest cities.

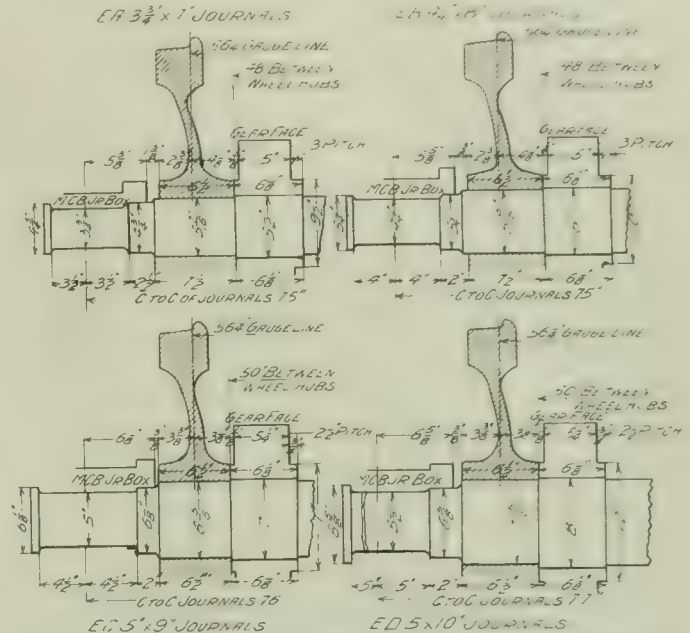
Wheel Hubs and Gears.

Drawing No. 82, Central Electric Railway Association, dated September 20, 1907, shows your committee's recommendation on gears, gear hubs and wheel hubs. This supplements your committee's previous report, as it seems quite proper and desirable that these dimensions should also be standardized. Your special attention is directed to the fact that all wheel hubs are the same length and that the distance from the gauge line to back of the hub is fixed for all standard axles, the diameter of the wheel hub has been designed to give 2 inches of metal all around the wheel fit, this design having special reference to steel centers or rolled steel

wheels, which at present seems to be the preferred practice on heavy passenger equipment.

Referring to gear hub dimensions. These have been made $6\frac{1}{4}$ inches long for all axles. Our axles drawing shows 1-inch key, 5 inches long for all gears. The design of the gear key seems to be undergoing at present a process of evolution and the motor manufacturers have signified their willingness to agree on the key dimensions. Your committee, however, is unanimous in the opinion that with solid gears, properly designed, the gear key may be dispensed with entirely, and with this fact in mind has proposed a diameter of gear hub, allowing in each case 2-inch thickness of metal around gear hub, so that the gear may be pressed on with sufficient pressure to do its work without a key.

In making these recommendations your committee has



Central Electric Railway Association Standards—Detail Dimensions of Gear and Wheel Hubs.

been greatly assisted in reaching its conclusion by many of the members of this association, as well as the representatives of the leading manufacturers of the country, and takes this opportunity of thanking all who have rendered their services and for their invaluable co-operation in the work of the committee.

Your committee also earnestly urges that final action may be taken on its recommendations by the association at this meeting, so that the progress of its work in the future may not be impeded by uncertainty or indecision. There is still much work to be done by your standardization committee and its subcommittees, and each member is encouraged to continue the work in the hope that as a result of their committee work some definite standards may be adopted which will give the very best results to the companies comprising this association.

R. C. TAYLOR.

Chairman Standardization Committee.

Street Cars in Wales.

United States Consul J. H. Johnson of Swansea, Wales, writes as follows with regard to the street railways of that city, which are operated by a London company: "The system in use is the overhead trolley, and the city is well covered with lines, which also run out for a distance of 12 miles into the suburbs. About one-third of the cars are of the double-deck type. The speed limit is 6 miles per hour in the city and 12 miles per hour in the suburbs. The fares amount to about 2 cents a mile. Most of the equipment is made in Wales, but the trucks, truck frames and the controller boxes of a number of the cars were made in the United States. Motor-men receive \$1.15 and conductors 97 cents a day of 10 hours. Inspectors are paid from \$7.29 to \$11.55 a week, and are on duty 12 hours a day. While most of the cars are equipped with woven-wire wheel guards, there is not a single car that carries a fender. This lack of safeguards against accidents seems to be general in this country."

SINGLE-PHASE CATENARY LINE CONSTRUCTION.*

BY G. D. NICOLL, ELECTRICAL AND MECHANICAL ENGINEER INDIANAPOLIS & CINCINNATI TRACTION COMPANY.

The object of this paper is merely to promote a general discussion relative to catenary construction for the operation of high-voltage electric railways. While there are some high-voltage direct-current railways under construction, I believe none is in commercial operation at the present time, and these remarks will bear particularly on line construction for alternating-current railways.

The introduction of the single-phase alternating-current railway motor brought about the possibility of delivering energy to the car equipments at high voltages, and decreasing the investment necessary in copper for the distributing system.

Current Collection.

It has also been a problem to collect the current for heavy equipments at high speeds with the ordinary type of wheel



Catenary Construction—Arrangement of Wires at Siding.

trolley, and considerable experimental work has been done to develop a current collector of the sliding type.

There is a difference of opinion among engineers as to whether the current collector should be of the under-running type or make contact with the conductor on the side or top. In this country, however, the general practice has been to use the under-running type of current collector with the trolley wire over the center of the track. In order to operate the sliding current collector successfully at high speeds, it is necessary that the trolley wire have a practically smooth and even surface, free from kinks that might cause the sliding current collector to break contact.

Double-Catenary Support.

Various types of catenary construction have been proposed for different classes of railway service. For trunk line railroads having two or more tracks, the double catenary will undoubtedly be used, the messenger wires being supported from steel bridges spanning the tracks. This class of construction has two messenger wires spreading at the points of support and converging at the center of the span, the trolley wire being supported from both messenger wires by means of hangers of various lengths; a tie also being used between the messenger wires at each trolley support. This type of construction has been used by the New York New Haven & Hartford Railway on its electrification near New York City. This type of construction is expensive and the cost of same is not warranted for the average interurban line of the middle west.

The Single Catenary.

The single catenary consists of a single messenger wire with the trolley supported directly underneath by means of hangers of various lengths. Different engineers have different ideas as to the best method of supporting the trolley wire from the messenger wire, also as to the number and length

of hangers used. The lines of the Indianapolis & Cincinnati Traction Company, with which the writer is particularly familiar, have single-catenary construction. The line from Indianapolis to Rushville was built in the fall and winter of 1904-05, and was, I believe, the first single-phase alternating-current railway in commercial operation using the catenary trolley construction and the bow or sliding trolley. On the portion of the line from Indianapolis to Rushville, the trolley poles are spaced 100 feet apart. From the experience gained on this portion of the line, it was decided to increase the distance between the trolley poles, so that on that portion of the line constructed during the year 1906, the spacing of the trolley poles was increased to 120 feet on tangent track; the distance between poles on curves depending on the degree of curvature. The shortest curve being one of three degrees, the poles are spaced 50 feet apart; the center of the poles being located 7 feet from the center of the track.

Bracket Details.

The trolley brackets are made of 2 by 2½ by ¼ inch angle iron, the outer end of the bracket being drawn into a loop to form a support for the messenger wire insulator. The loop in the trolley bracket is 16 inches long, allowing an adjustment of 8 inches each side of the center line of the track for staggering the messenger and trolley wires and for aligning the trolley wire due to the unevenness of pole diameters and adjustment of messenger wire on curves. The inner or pole end of the bracket arm is bent at right angles to the arm and is fastened to the pole by two through bolts; the outer end of the bracket arm being supported by a ⅝-inch brace rod.

The messenger wire is supported on an especially designed porcelain insulator, the insulator being cemented into a cast-iron base which is fastened to the bracket arm by means of four hook bolts. The messenger wire, which is composed of 7-strand steel cable having a nominal outside diameter of



Catenary Construction—Span-Wire Supported Curve.

⅞ inch, is supported in the grooves of the porcelain insulator and tied to it by a steel tie wire.

Wire and Messenger.

The trolley wire, which is of the No. 000 grooved section, is supported from the messenger wire by steel hangers, spaced 10 feet apart. Five different lengths of hangers are used, 12 hangers being used between two poles on a 120-foot span. The hangers are fastened to the messenger wire by means of a U-clamp and a through bolt, and to the trolley wire by a clamp that fits into the groove, this clamp being held by screws. On curves the trolley wire is held directly under the messenger wire by means of steady strains, one end of the steady strain being clamped to the bracket arm and the other end to the trolley wire; these steady strains being made of treated hickory.

The messenger wire is anchored every mile, a pole being set on the opposite side of the track from the trolley poles and well anchored. A ⅞-inch steel cable is stretched diag-

*Paper read before the Central Electric Railway Association, Columbus, O., September 26, 1907.

onally across the track and securely fastened to the messenger wire. Extra heavy wood strain insulators are placed in this anchor wire to insulate it from the poles, and the ends made up into turnbuckles so the anchor cable can be easily adjusted.

Section insulators are installed about every eleven miles; these section insulators being made of treated hickory. Connection is made to the trolley wire at each end of these section insulators by a knife-blade switch. Normally this switch is open but in case of trouble it can be closed and two sections of the line fed from one transformer station.

In towns span wire construction is used, extra heavy wood-break insulators being placed in the span wires. The messenger wire is fastened to the span wire by special clamps that permit of easy adjustment for aligning the messenger wire with the track, the same style and length of hangers being used on span construction as on bracket arm construction. Lightning arresters are installed three per mile, the ground connection being made to a galvanized iron pipe driven 10 feet into the ground. On private right of way the trolley wire is supported approximately 18 feet from top of rails.

In building this line both messenger and trolley wires were run out at the same time and both pulled to the same tension; an equalizer being used between the two wires. With the length of hangers noted above the trolley wire is supported at an almost uniform distance above the track rails, the successful use of the bow or sliding trolley at high speeds requiring this type of construction.

The insulation of these lines was designed to operate at 3,300 volts alternating current and no trouble has been experienced with this voltage. On several occasions the lines have been covered with sleet and wet snow, but no trouble has developed.

The operation of the bow trolley has proved very satisfactory with this type of construction, there being no difficulty in collecting current at speeds of 65 miles per hour.

REPORT OF EXPRESS COMMITTEE—WITH REFERENCE TO HANDLING EXPRESS BUSINESS ON INTERURBAN CARS.*

Inquiries were sent to 80 interurban roads of Indiana, Ohio and neighboring states, including members and non-members of the association, with a view to learning what roads have contracts with old line companies, and asking for opinions as to the advisability of entering into contracts with old line companies or of organizing an independent interurban express company. Interurban companies having contracts were asked for copies of same, or detailed information as to the terms of their contracts and compensation. Information and suggestions were solicited, the purpose of the inquiry being fully set forth.

Replies were received from 20 different interurban roads, giving information with reference to 23 properties, 4 of the companies operating under one contract. Replies were received from 17 interurban companies to the effect that they have no contracts with the old line companies.

Five interurban companies have received proposals for express contracts from old line companies as follows: The Wells-Fargo Company, three; the Pacific Express Company, one; and one company, name not given. The proposal received from the Pacific Express Company was offered on a mileage basis but was rejected, as the interurban company was unwilling to enter into an agreement on that basis, the interurban company offering to go into an agreement on the basis of 50 per cent of the revenue derived from such business. The interurban company referred to above as having received proposal from old line express company, name not given, rejected the proposition, preferring to act independently of the old line express companies.

One of the interurban companies declined a contract with the Wells-Fargo Company, assigning as a reason that, inasmuch as practically express service is given to a considerable quantity of small freight, and for a rate which is scarcely higher than freight rates, which rate seems to get for the traction lines more freight business than they could otherwise get, it would be unwise to enter into an arrangement with old line express company, as it would interfere with their business if this express service for small freight was continued.

Another one of the interurban companies rejected a proposition from the Wells-Fargo Company, believing that the organization of an interurban express company would be better than to go in with any of the old lines and thought it best not to handle any express business, only such as was handled in the regular way by their passenger combination

cars and regular baggage cars and freight cars. The third interurban company was offered a contract with the Wells-Fargo Company on a tonnage basis, which was not satisfactory to the interurban company.

One of the Ohio companies reports that it is now negotiating with the Adams Express Company, but is not yet in a position to divulge either the terms or the plans of the contract.

Seven of the interurban companies heard from favor the organization of an independent interurban express company. One of the companies gives no reason for such conclusion. Another favors the organization of an interurban express company for the reason that it has tried to make contracts with old line express companies, which companies refused in every instance to enter into any arrangement with the road.

Five interurban companies express themselves very decidedly in favor of contracting with old line companies, two of which companies are now operating under contracts and one of them assigning as a reason the fact (as he states), as the law in Indiana requires express companies to make delivery of express, and that by the handling of the business as freight, the interurban companies get away from the delivery proposition, and any matter handled as express, in connection with an old line express company, puts the responsibility of delivery on the express company.

Replies were received from four different companies having contracts with old line companies, two of them operating contracts in connection with two other interurban roads. These are as follows: The Iowa & Illinois Railway Company of Clinton, Ia. This company has a contract with the American Express Company, on a tonnage basis, for carrying its express between Clinton, Davenport, Rock Island and Moline. The terms of the contract are not given, for the reason, as the manager states, that it would be a breach of good faith with the express company. He states, however, that he considers his contract with the American Express Company a highly satisfactory one. The Evansville Suburban & Newburg Railway Company, operating between Evansville and Newburg and Evansville and Boonville, has a contract with the old line companies, names not given and rates or time of contract not stated. The Western Ohio Railway Company, the Dayton & Troy Electric Railway Company, the Springfield Troy & Piqua Railway Company and the Toledo Urban & Interurban Company, have a joint contract with the Pacific Express Company for a period of five years. The interurban companies receive 50 per cent of the gross earnings. The Columbus Delaware & Marion Railway Company has a contract with the Wells-Fargo Express Company, the Northern Ohio Traction Company has a contract with the American Express Company and the Lake Shore Electric Railway Company and the Cleveland Southwestern & Columbus Railway Company have a contract with the Wells-Fargo Company and the United States Express Company, all on a tonnage basis. The Ft. Wayne & Wabash Valley Traction Company has a temporary working contract with the United States Express Company on a percentage basis.

Conclusions.

The conclusion of the committee is, that although little has been done along the line of contracting with old line express companies, there seems to be a general opinion in favor of the same. For each company, or the few companies that operate connecting lines, to operate separate express companies, would make so many, that the work of auditing and getting at the proportion due the various companies would be immense. If, however, an electric express company could be organized, and all the electric railroads become members of it, they to exchange business with the old line companies at points wherever convenient, some additional revenue might be derived.

As one manager puts it: "The matter is one which depends largely on local conditions as to the advisable course to pursue, and furthermore, is one which requires careful investigation of costs and revenue to be derived from the service. It is a question of similar interest to that of the interchange of freight with steam roads, and into both must necessarily enter a question of policy, which would naturally be governed by not only the resulting revenue from and cost of the service, but also the effect it would have on interurban companies with the public, with the steam roads, and the laws bearing on both."

A. A. ANDERSON, Chairman Express Committee.

Tokio, Japan, has a population of 2,000,000. The Tokio Consolidated Railway Company owns and operates 90 miles of track and has 140 miles under construction. Current for lighting in Tokio is sold at a flat rate of \$3 per month for each 16-candlepower lamp.

*Abstract of report read before the Central Electric Railway Association, Columbus, O., September 26, 1907.

1,200-VOLT AND COMMUTATING-POLE DIRECT-CURRENT RAILWAY MOTORS.*

BY E. H. ANDERSON, RAILWAY MOTOR DESIGN DEPARTMENT, GENERAL ELECTRIC COMPANY.

In order to appreciate the development and reasons for the existence of a commutating-pole railway motor it is well to discuss in some degree some other developments. In the beginning railway motor designers had many difficulties to contend with.

1. The question of gearing was possibly foremost, whether it should be single or double reduction or possibly gearless. The usual railway motor has settled down to single reduction. When powers are small, as in the case of single car units, the motor is naturally provided with single-reduction gearing. Then again, for large locomotives and high speeds, obviously the motor should be of gearless construction, this being especially true in the light of what may be done with gearless bipolar motors of direct-current design.

2. Possibly insulation is next in order, various methods having been tried. The conductors have been covered with a variety of materials, but double or triple cotton-covered insulation has practically become standard. The slot insulation has been through various changes; for wire-wound machines it has settled down to a good varnished cambric with a protecting tape of cotton, although an all-asbestos insulation of armature coils is promising.

Where bars are used as armature conductors it is possible to insulate them entirely with mica. This type of insulation has been fully developed and may be considered as standard.

The field insulation has long been in a state of evolution, but is pretty well standardized on a basis of mica in metallic shells for the larger ribbon-wound field coils, and varnished cambric for the smaller fields wound with wire. Here also an all-asbestos insulation is promising.

3. The present method of lubricating the bearings with oil has resulted from a process of elimination; many forms of grease cups, oil cups, wicks, etc., having been tried; in fact, the preferred lubrication at one time was grease.

With the advent of interurban trolley roads came greater speeds, giving rise to many more car-miles per day, and complaints arose of short life of bearings, injury to armatures, etc. The methods of lubrication underwent many changes, but are now well established as wool waste and oil; no doubt a good solution of a difficult and important problem.

4. During this period of development the armature was changed from a smooth to a slotted core, and much thought was given to the size of commutator, number of segments, turns per coil, etc., in the effort to produce successful operation of the commutator.

With all forms of copper brushes there was most destructive sparking and enormous local currents in coils short-circuited by the brush during commutation.

The carbon brush was tried and found to be the greatest improvement yet discovered in producing successful commutation. The greater contact resistance decreased the local currents to reasonable values, yet the energy lost by the greater contact resistance in the main circuit was small. The carbon brush thus opened up possibilities in design not before thought of.

The inductance of coils was reduced by placing two in one slot instead of one, thus saving insulation and reducing the diameter of the armature. Later came the three coils per slot armature, this being the standard for many motors today.

As motors had to be built to fill a restricted space, not only for large power and small diameters, but with good commutation at higher potentials, it gave rise to the four and five coils per slot armature. Many coils per slot necessarily increased the slot width, and this in time called for a laminated field pole structure in order to limit eddy current losses. In the meantime the operator was demanding higher potentials, more work from the motors, and better commutation, and the commutation had not kept pace with other developments, in fact, was becoming more troublesome as compared with other difficulties, largely on account of higher operating potentials. Some means had thus to be adopted for radically improving commutation, and the following deals more particularly with this subject.

Armature Forces.

The armature in its simplest conception is a drum, divided into four sections for four poles; under a north pole is a broad distributed sheet of current running parallel to the shaft; under a south pole is also a broad distributed sheet of current, but in reverse direction.

This distributed armature current produces a magnetizing force which changes the distribution of the main flux in the pole faces. In the center of the pole there is no distributing effect, but in the center between poles there is the maximum magnetizing effect from the armature. This is where the conductors are commutated by the brush and the direction of the current reversed in passing from the zone of one pole to the zone of the next.

The magnetizing effect of the armature, being a maximum midway between poles, produces a flux through the air space to the frame. The conductors in motion cut this flux, producing a voltage in the coil to be commutated.

The combined result of armature and field magnetizing effect is to cause a flux to leak from the pole tip over into the armature just where the conductors are being commutated.

The two leakage fluxes are alike and add to produce voltage in the coil which is being commutated. Thus there is a potential between commutator bars, and when these are short-circuited by the brush a local current is caused to flow in the coil under commutation. This local current adds to the line current already there. Any conductor carrying current has lines of force interlinked about itself caused by the current in the conductor. The conductors, embedded in and surrounded on three sides by iron, have a good opportunity of surrounding themselves with a lot of leakage flux. The interlinkage of leakage flux is similar to the inertia in mechanics.

The combined current (line and local) has still greater interlinkage of leakage lines and becomes more difficult to reverse. The reversing has been done heretofore by the increasing resistance of contact between the brush and the commutator bar as the latter is passing out under the brush, the rate of change of current ever increasing. This causes the reactance or kicking voltage to become higher and higher. As the bar leaves the brush, the change in current in the coil becomes so rapid that an appreciable voltage is induced and arcs through the air from the bar to the brush, or vice versa, thus producing what is commonly known as sparking.

Commutating Pole.

The object is, then, to remove the sparking by counteracting one or all of its causes. Should we place midway between the main poles another coil, having the same magnetizing power as the armature, but so connected as to magnetize in the reverse direction to the armature, there would be nothing to cause a leakage flux from the armature to the frame. Then, again, should we further excite this coil so as to overcome and balance the combined effect of armature and field forces, commonly known as distortion and leakage of the main flux from the pole tip, we would annul this troublesome cause of sparking. After the above two effects are taken care of there remains a force necessary to produce a potential sufficient to reverse the current in the armature coil.

In order to produce this potential there must be such a density of flux as will generate this required voltage by the conductors cutting the flux in revolving. The width of such magnetic density should be sufficient to embrace the conductors commutated by the brush when running in either direction of rotation.

The commutating voltage produced by the flux of the commutating pole is the accelerating force required to change the direction of current in the armature coils one by one as they come under the brush. It must be sufficient to accomplish this in the time that the coil, being connected to two adjacent commutator bars, is under the brush. When the commutator bar leaves the brush the current is already reversed, flowing in proper direction, and is of the proper amount, so there is no tendency to spark. Commutation may then be said to be perfect.

As stated before, an armature coil embedded in iron is surrounded by a leakage flux, which is caused by the current in the coil and may be said to have magnetic inertia or momentum. This is similar in mechanics to a revolving shaft bearing a mounted flywheel. The voltage induced in the coil by the flux from the commutating pole may be likened to a constant counter torque; thus counter torque serving to slow down the revolutions, stop and cause an increase in speed in the opposite direction.

It is evident that there may be a particular armature current, speed of motor and flux from commutating pole wherein the above described conditions will obtain. It will also be appreciated that the voltage induced by the commutating pole flux will vary directly as the speed; furthermore, the time that the coil is under the brush is shorter as the speed is higher, and vice versa; also that the time required to reverse a current is inversely as the voltage. The conclusion is that the action is entirely automatic throughout the entire range of speed with the particular condition of current and commutating pole density.

The next question is: Can the action be automatic for varying current as well as speed? The commutating pole may

*Read before the Central Electric Railway Association, Columbus, O., September 26, 1907.

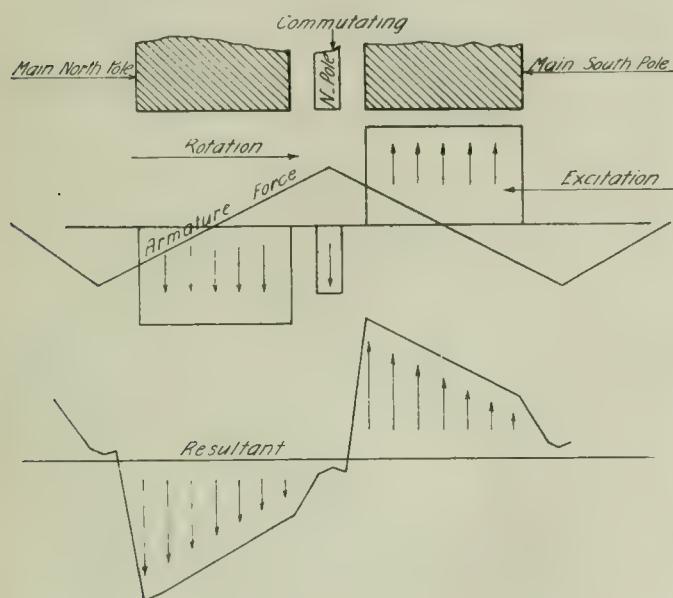
be excited by the main current of the motor, being connected permanently in series with the armature. The commutating pole flux will then vary almost directly as the current, which is the desired result. When the current is half, the commutating pole flux is half, and the commutating voltage corresponding thereto. Thus the action is entirely automatic for variation in current or speed, or both.

The relation between commutating pole density and current should be a straight line, rising and falling directly with the current.

It is well understood that an absolutely straight line between current and density cannot be obtained when a more or less saturated iron circuit carries the flux, but it can be approached sufficiently close for all practical purposes by careful design and experience in these matters. In a series motor the density of the whole iron circuit increases as the load comes on, and there is an increasing stability in commutation which serves to offset, partly, if not entirely, the lack of commutating-pole density on a heavy load. The combined effect is to produce perfect commutation at all loads.

Since the commutation is automatically taken care of for variations in speed and current, it is possible to change the voltage impressed on the motor through quite a range without sparking. This is thoroughly borne out by motors of 50 to 250 horsepower recently constructed in this country.

The only limitations in raising the voltage are: 1. Arma-



Commutating-Pole Motor—Diagram Showing Effect of Commutating Pole.

ture speed and strength of binding wire. 2. Volts between bars. 3. Insulation.

This brings us naturally to the question: What effect will this commutating pole have on designs for voltages higher than are now general for railway service?

Voltage Limitations.

Railway motor commutators before being connected to the armature winding are tested from bar to bar with 400 to 500 volts, alternating current, which means a maximum of 40 per cent more, so that actual jumping of current from bar to bar on a clean commutator would not occur at less than 500 volts per segment. An ordinary commutator of 111 segments and four poles would, under these conditions, be good for 13,000 volts between brushes. The actual jumping of current across side micas of a clean commutator is not the limiting condition.

The limiting condition is the voltage per bar which will maintain an arc already established. The allowable voltage per segment is largely dependent upon the condition of the commutator. The condition of the commutator depends upon the deteriorating tendencies, such as sparking and other causes, like poor carbon brushes, hard side micas, etc.

If the sparking is eliminated the etching of the commutator bars is largely reduced. The carbon brushes are required to carry only the line current, instead of the line and a large amount of local current; therefore the brushes are not disintegrated so rapidly. The carbon brush has less mica to wear off, because the bars are not burned away. The result is that the carbon brushes work better, and the commutator

stays in a very much better condition. The conclusion from the above is that much higher average volts per segment may be used with commutating pole motors than with motors not having commutating poles.

Dimensions.

The usual non-commutating pole railway motor, 40 to 50 horsepower, has a commutator about 9.5 inches in diameter, with 111 to 125 segments. The average potential between segments is approximately 18 volts. Large motors, operating on 650 volts normal, have 155 to 165 segments, and the average potential between segments is approximately 17 volts. If the average volts between segments on commutating-pole motors be assumed as 24, and the number of commutator bars per inch of circumference as 5, we have the following possible voltages on various sizes of motors and commutator diameters:

Horsepower.	Diameter of commutator.	Maximum volts motor.
40.....	9	850
75.....	11	1,040
100.....	13	1,230
150.....	14.5	1,370
200.....	16	1,510
250.....	18	1,700

The above may be said to apply only as far as tendencies are concerned. Not all these various voltages would be practical. It would be better, for various reasons, to adopt 1,200 volts as the higher standard.

The propositions requiring higher potential than 600 volts are usually 30 to 50 ton cars, with speeds of 40 to 60 miles per hour. These call for a motor of 75 horsepower or larger, so the sizes naturally fall where 1,200 volts can be made with reasonable cost.

The commutating-pole motor, on 600 volts, makes possible commutation and general operation in service many times better than that of the non-commutating pole motor. On 1,200 volts the commutation is decidedly better than with a non-commutating pole type motor on 600 volts.

The 1,200-volt motor requires proportionately more insulation than the present 600-volt motor. This extra insulation requires more diameter and more external dimension.

Theoretical Possibilities of Voltage.

We have the possibility of 1,200 volts per motor, the motor having four poles. Should the motor be bipolar and the speeds high enough to make the design possible, we may have 2,500 volts per motor. Then again, if there should be two windings on one core, a commutator on each, and these windings connected in series, we have the possibility of a 500-volt motor. Then again, should we have a double-track railway and the rail neutral, we might have 10,000 volts direct current between the two trolley wires.

It will be appreciated that more voltage means more insulation, more space, and more cost. It will also be seen that the control, car lighting and operation of auxiliary apparatus require special consideration.

Service Capacity.

The non-commutating pole motor has inherently a higher iron density, which serves as a compensating feature, improving commutation. The commutator pole compensates for armature reaction and takes care of troubles due to lack of compensating features; a lower iron density may therefore be utilized and lower iron losses obtained.

The absence of sparking makes the commutating losses very much less. The rating on the hourly basis may not be much greater than with the non-commutating pole motor. On account of core loss and commutator loss being considerably less, and these prominent features in heating, the commutating-pole motor has naturally a higher continuous rating; it is not only capable of taking large fluctuations of voltage and current, but will have a greater all day service capacity. This latter feature becomes more pronounced as the distance between stops is greater.

There are several ways of making use of higher direct-current potentials. The most prominent of these are the following:

- (a) City service, 600-volt trolley; maximum speed, 25 to 30 miles per hour; stops and schedules incident to city service.
- (b) Interurban service, 1,200-volt trolley; maximum speed, 50 to 60 miles per hour; few stops and high schedules.

The motors would be wound and insulated for 1,200 volts. Two motors would be connected in multiple, and the two groups of a 4-motor equipment handled in series and in parallel.

- (a) City service, 600-volt trolley; maximum speed, 25 to 30 miles per hour; stops and schedules incident to city service.
- (b) Suburban service, 600-volt trolley; maximum

speed, 30 to 60 miles per hour; stops and schedules incident to suburban business. (c) Interurban service, 1,200-volt trolley; maximum speed, 50 to 60 miles per hour; few stops and high schedule speed.

The motors would be wound for 600 volts with a relatively low armature speed and insulated for 1,200 volts. On a 600-volt trolley two motors are connected in multiple, and the two groups handled in series and parallel. On a 1,200-volt trolley two motors are connected in series; and the two groups of 4-motor equipment handled in series and parallel.

The armature speed and commutating features should be so designed that if one wheel slips and one motor has 1,200 volts or so across its terminal, its armature speed will be reasonable and the commutation good.

Interurban cars with four axles and four motors usually accelerate at 1 to 1.5 miles per hour per second; this requires about 100 to 150 pounds per ton, which is 5 to 7.5 per cent coefficient of traction. These are low coefficient values for interurban roads and are seldom met with; however, should slipping occur, the motor design should be such that no damage to equipment will result. In the city a dirty street may give a low condition of traction, but under these conditions the motors may be used in multiple or operated as any 4-motor equipment is now operated.

Advantages of Commutating-Pole Railway Motors as Compared with Non-Commutating Pole Type.

1. Sparkless commutation, even on heavy overloads.
2. Flashing at commutator largely reduced and probably eliminated.
3. Less wear on commutator.
4. Cleaner and safer motor because of reduced carbon and copper dust from brushes and commutator.
5. Marked reduction in heating of commutator.
6. Greater current density in brushes.
7. Increased life of brushes.
8. Increased efficiency and free running capacity because of lower core and commutator losses.
9. Possibility of successfully using higher voltages.
10. Greater facility in design of large motors, especially as regards commutation.
11. Possibility of increasing service capacity of motors by blowing.

ANNUAL REPORTS.

American Railways Company, Philadelphia.

The higher costs of labor and materials were factors which affected the operations of the subsidiary companies of the American Railways Company of Philadelphia in the fiscal year ended June 30, 1907. J. J. Sullivan, the president, states in the annual report that while the growth of earnings of the different subsidiary companies was eminently satisfactory, the increased cost of operation and maintenance at the high standard which the company has established amounted to nearly 18 per cent. This higher cost was caused by the advanced prices of electrical machinery and other supplies required in maintenance and operation, and by advances in wages. The income account, with comparisons with previous years, follows:

Year ended June 30—	1907.	1906.	1905.
Gross income	\$527,063	\$486,712	\$444,254
Expenses, taxes, interest, etc....	142,504	141,482	180,757
Net income	\$384,559	\$345,230	\$263,497
Dividends	304,392	251,385	234,742
Surplus	\$ 80,167	\$ 93,845	\$ 28,755

Gross earnings of the subsidiary companies during the year reached a total of \$2,855,320, an increase over the previous year of \$245,043, or 9.4 per cent. The total number of passengers carried amounted to 67,624,731, a gain of 6,517,323, or 10.66 per cent.

The report gives full particulars respecting improvements of the subsidiary companies. Concerning the improvements in Dellwood Park, which is on the Chicago & Joliet Electric Railway, Mr. Sullivan says: "It is thought that the park will be a valuable addition to the property of the company and will more than pay the interest on the large sum expended on improvements therein." The total spent during the year for new construction, equipment and real estate

amounted to \$918,914. The largest amounts were expended on the following properties: Scranton Railway, \$240,777; Altoona & Logan Valley Electric Railway, \$200,466; Dellwood Park Company, \$154,123.

Various matters of interest from a financial standpoint are discussed. In December, 1906, the company paid \$975,000 and interest, being the balance remaining unpaid on account of the purchase of the stock of the Scranton Railway in December, 1905. The money was borrowed to make this payment. The transaction, Mr. Sullivan says, has turned out to the best interests of the American Railways Company.

Reference is made to the authorized issue of \$2,500,000 of 5 per cent 10-year bonds, secured by a deposit of the Scranton Railway and Altoona & Logan Valley Railway stocks as collateral. The proceeds of these bonds will liquidate the debt remaining in connection with the Scranton Railway purchase and will enable the American Railways Company to build three large car houses, make some extensions and purchase additional cars and equipment.

The fire insurance fund shows an increase for the year of \$16,069. The market value of the securities held in this fund on June 30, 1907, was \$146,500. Mr. Sullivan states that all of the subsidiary properties are in a very satisfactory condition.

MEETINGS OF AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION COMMITTEES.

Secretary B. V. Swenson of the American Street and Interurban Railway Association has furnished the following report on the work of committees:

Modern Car Houses.

The committee on "Rules for the Construction of Modern Car Houses" held a meeting at the Hotel Belvidere, Baltimore, on September 19. Those present were: H. H. Adams, superintendent shops United Railways & Electric Company, Baltimore, chairman; L. H. Parker, engineering department Stone & Webster, Boston, Mass.; A. V. Porter, architect, New York City Railway Company, New York; Thomas Pumfrey, civil engineer International Railway Company, Buffalo, N. Y. There were also present C. H. Patton, Cleveland inspection bureau, Cleveland, O., and E. R. Townsend of Chicago, representing the National Fire Protection Association.

This meeting was really in the nature of a conference between the committees from the American association and from the National Fire Protection Association for the purpose of formulating a set of specifications governing the construction of modern car houses which are to be approved by both associations. A similar conference was held on May 21 of this year and at that time a set of specifications was practically decided upon, there being some points of difference between the committees from the two associations. At the conference last week these points of difference were all settled and it is expected that the American association committee will render a full report at the convention.

Public Relations and Municipal Ownership.

On Friday, September 20, a conference was held at the association headquarters, New York City, at which the work of the committees on "Public Relations" and "Municipal Ownership" was discussed.

Those present at this conference were: W. Caryl Ely, chairman of the "Public Relations" committee, and C. D. Wyman, chairman of the "Municipal Ownership" committee; William J. Clark, manager foreign department General Electric Company, and James H. McGraw, president McGraw Publishing Company. The reports of these two committees will be presented at the convention.

Insurance.

On Monday, September 23, the "Insurance" committee of the American association held a meeting at the association headquarters, New York City. Those present were: H. J. Davies, chairman, secretary Cleveland Electric Railway, Cleveland, O.; G. L. Estabrook, general manager East St. Louis & Suburban Railway, Philadelphia; and R. B. Stearns, general manager Chicago & Milwaukee Electric Railroad, Highwood, Ill. The committee met for the purpose of drawing up a report which will be presented at the convention. A conference was held with a large and representative committee from the large stock insurance companies. Matters of mutual interest were discussed at some length.

NEW YORK STREET RAILWAY ASSOCIATION.

The regular quarterly meeting of the Street Railway Association of the State of New York was held at Kingston Point, N. Y., on Saturday, September 21. The sessions were held in the Kingston Point park pavilion, which, because of its location on the banks of the Hudson river, made a comfortable and attractive meeting place. There were 73 members and guests in attendance, the largest number ever registered at a quarterly meeting of the association.

President T. W. Wilson called the meeting to order and at once requested the report of the committee on "Interurban Rules," of which J. E. Duffy, superintendent of the Syracuse Rapid Transit Company, was chairman.

Report of Committee on Interurban Rules.

Mr. Duffy, in submitting the report on behalf of himself and Messrs. M. Sheehan and M. J. Ryon, stated that though the appointment of the committee came at a late date and when its members were engrossed with business cares, it had examined carefully copies of rule books furnished by several of the different companies operating interurban lines in the state of New York and elsewhere and the standard code of rules as provided by the American Railway Association, which is the standard for operation of practically all of the steam railroads of the United States. As many of the interurban railways are developing a speed which is not exceeded by the steam railways and in view of the fact that many of the interurban railways have adopted many of the rules of the American Railway Association it was thought wise to recommend the adoption of the standard code of rules of the American Railway Association with such alteration as the committee deemed necessary to fit interurban conditions.

The report in detail was then discussed, each section being read as submitted by the committee and the members making suggestions for changes. These suggestions were principally as regards phraseology and related to the conduct and discipline of the employes while on duty, their methods of reporting accidents and similar points, but in the main the rules as finally adopted conform closely to those of the American Railway Association.

Considerable discussion was aroused over the use of the word engine in the rules, some of the members raising the point that as "motor" was the term in general use and as the employes were familiar with that definition, it should be used. The rules as adopted, however, provided for an engine as "a locomotive propelled by any form of energy."

The committee had made no recommendation under the heading of visible signals regarding the colors for "proceed" and "proceed with caution," suggesting that as the practice varied quite generally on the steam roads and for that matter also on the electric railways it might be well to leave the matter to the discretion of the various members of the association. But it was argued that standardization was sought and, after some discussion, red was adopted for "stop," green for "proceed" and yellow for "proceed with caution."

Under the section on bell cord signals the committee had recommended signals conforming to present street railway practice in the cities rather than to steam railway practice on the supposition that this would be wiser than to have the practice on interurban lines, many of which operate in the city also, differ from that on city lines. A number of members favored the adoption of signals corresponding to the standard code of the American Railway Association, and after more or less discussion the point was put to a vote, the motion in favor of steam practice being lost by a vote of 15 to 11. In connection with the section regarding train signals, which provides that all sections except the last shall display two green flags and in addition two green lights by night in the places provided for that purpose on the front of the motor, E. J. Ryon (Schenectady Railway) remarked that the American Railway Association committee on rules

last year changed the rule of carrying a green flag on the rear end of the train to the red flag. He asked in the event of a trolley car running as a unit carrying green flags on the front end to denote a section following, and green flags on the rear end to denote the rear of the train, if the train is standing on a single track, with the trolley pole down, whether there was any way to determine the rear end. Mr. W. R. W. Griffin (Rochester & Eastern Rapid Railway) remarked that the Rochester & Eastern overcame that by an addition to their electric headlight of a small white bullseye headlight alongside of it; they made their rules purposely to overcome that very difficulty. The bullseye was placed on the front end.

I. H. McEwen, of the Oneida Railway Company, said he would like to impress upon those present the importance from the point of view of train dispatching and safety of carrying the green flags in addition to the two green lights at night, for although signal lights may have been put up at night they might not be noticeable in the early dawn, and the use of both the flags and signals was a safety provision. Mr. Griffin remarked that the Rochester & Eastern provided both the flag and the light.

In connection with Section 91, "Unless some form of block signal is used, trains in the same direction must keep at least — apart, except in closing up at stations," Mr. Duffy remarked that there were two or three methods in use, some with a time limit and other a distance limit. C. Loomis Allen (Utica & Mohawk Valley Railway) remarked he could understand how it could be accomplished by a distance limit, but did not see how a time limit could be used. Mr. Allen thought that it was a dangerous rule. W. H. Collins (Fonda Johnstown & Gloversville Railroad) said that his limit was that the trains must keep at least a mile apart. Mr. Allen thought the rule should be stricken out, but E. S. Fassett (United Traction Company) did not agree that it was wise to strike it out. Mr. Griffin suggested that the rule should be made to read "a safe distance." Mr. Sheehan remarked that the rule could not be worked by distance, as a train frequently gets out of sight around a curve. If a time limit was put on it it would be better.

C. R. Barnes, electrical expert New York public service commission, remarked that he considered that rule the most important of any of the proposed rules, but he was unable to suggest a limit for adoption, whether it was a time limit or a distance limit, though in his opinion the time limit was safer than the distance limit, if one had any way of enforcing it. In addition, the rule was modified to its detriment by the words in the rule "unless some form of block signal is used." That meant that the block signal would supersede the precaution which should be taken by either the time limit or a distance limit. With the present equipment of railroads that rule is not practicable, either with the time limit or distance limit, and it is vitally important that some rule and means for its enforcement be adopted. The words "unless some form of block signal is used" should be left out of the rule, for the reason that there are some block signal systems in use on electric railroads which are not reliable enough for the purpose sought to be attained in this rule.

On motion of Mr. Allen the rule was stricken out.

The meeting then adjourned to partake of a buffet luncheon which was served at the pavilion through the courtesy of C. Gordon Reel and the Kingston Consolidated Railroad Company.

Afternoon Session.

At the afternoon session the rules were again taken up for discussion.

Mr. McEwen, in connection with paragraph 206, regarding the designation of trains in train orders by their numbers, remarked that the last sentence read "Other numbers and time will be stated in figures only." He said that that was a matter of serious thought with all railroad men at the present time, owing to the accident which had occurred in Illinois.

He said that the New York Central road was spelling out all numbers, and he thought it was a good plan. He remarked that it was for the association to say whether they would advocate the spelling out of these numbers.

J. H. Cain (Hudson Valley Railroad) remarked that both figures and words should be spelled out. He said that that system had been used on the Rochester & Eastern, and had been found to be very successful; for instance, if an order is given relating to train No. 30, the word "thirty" will be written out and the figures (30) will be put in parenthesis.

A motion was adopted that the sentence read "Other numbers and time will be stated in figures and words."

In connection with paragraph 208A, "A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, each office taking its proper address. When not sent simultaneously to all, the order must be sent first to the superior train." Mr. Barnes asked if that had been adopted by the American Railway Association. Mr. McEwen replied that the latest rule on this subject adopted by the American Railway Association was as follows:

208B. A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, and when practicable must include the operator at the meeting or waiting point, each office taking its proper address. When not sent simultaneously to all, the order must be sent first to the superior train. Copies of the order addressed to the operator at the meeting or waiting point must be delivered to all trains affected until all have arrived from one direction.

The committee stated that Section 208B would be added to its report.

At the conclusion of the consideration of the report of the committee on rules, Mr. Duffy stated that as he had said at the beginning of the report, it was not possible, in the brief space of time at the disposal of the committee, to report on the rules in such detail as the circumstances made desirable.

A motion was adopted that the committee be continued, to report further at a subsequent meeting, and to take into consideration the changes and suggestions made.

The following motion was then made: "That the rules as presented by the committee, as amended, be adopted by the association as a standard code of rules for interurban service." The motion was adopted.

Collection and Registration of Interurban Fares.

B. A. Frankel (Utica & Mohawk Valley Railway) then read a paper on the collection and registration of interurban fares, which is presented elsewhere.

The paper was discussed by N. P. Baker of the International Railway Company, who said that on the interurban line between Buffalo and Niagara Falls they had some 25 or 30 different fares, and their conductors carried nine or ten different forms of tickets, which made it very difficult to handle heavy traffic. He said that it was a difficult matter to get good conductors, competent to handle the people, collect the fares and keep the records clear. The former system had been to check the line up by special agents, which proved unsatisfactory. They have now taken two of their oldest conductors, men with good records, to act as inspectors of registration and the collection of interurban fares. These men check on an average between 100 and 110 conductors per day. He believed that treatment calculated to make the conductors feel the responsibility of their position had the effect of making them better men. He thought that conductors should be made to feel that they were filling important positions. The inauguration of the system of special public checkers, he said, had gotten rid of a good many of the undesirable men who had sought positions for the purpose of mulcting the company.

Mr. Clark remarked that in Syracuse, to facilitate the work of the conductors on the round-trip tickets on three different roads where the coupon is only good in the direction

designated, they had put a tint on all north and west bound tickets. It was found that this helped the conductor very considerably.

J. C. Collins said that on the Rochester & Eastern they credited the ticket sales account with the sales from the agents, and as the coupons come in they are credited to earnings for the day, and the difference between the two sides of the account represents the tickets that are outstanding in the hands of the public.

At this point telegrams of regret at their inability to attend the meeting were read from F. W. Stevens, chairman, and J. S. Kennedy, secretary, of the New York public service commission.

Freight and Express Rates.

Frank Walsh of Schenectady then read the paper on "Freight and Express Rates," which appears elsewhere.

The opening discussion on the paper was by C. H. Armatage, traffic manager of the United Traction Company, Albany, who spoke in part as follows:

Mr. Armatage's Discussion.

In the development of freight and express service on electric railroads, conditions existing and anticipated, the general merchandise and character of the products of the different industries along the line and through the territory the railroad serves are important factors which require careful and deliberate thought toward the progress and ultimate success of this modern method of transportation.

Managers of electric railways are constantly on the lookout for new sources of revenue, and in the installation of an express service on their individual roads, lose sight of the actual value of the service contemplated and given, and in their eagerness to secure business quote ridiculously low rates for the transportation of the different commodities offered, finding after a few months' operation their serious error, and attempt to increase the rates, which invariably meets with pronounced opposition, and jeopardizes the already established harmonious relationship existing between the company, the shipper and the receiver.

The value of an electric express service lies in the great saving of delay, the process of natural evolution, the frequency of its trips over short mileage routes, the speedy transportation of farm products and garden truck from the rural district to the cities, the filling of rush orders by telephone, the ability to make fast time and deliver at highway crossings or at store doors, all of which are elements of inducement and recognition to shippers and receivers and absolutely demand an adequate compensation for such valuable service.

The one item of expense in operating an electric express service, and which practically absorbs an enormous part of the net earnings, is that of wagon call and delivery.

Some roads have a practice of adding a certain per cent of their tariff rates to cover the expense of such delivery; other roads maintain a regular schedule of express rates covering call and delivery service.

I have personally visited several electric express companies operating in the New England states and find upon investigation that the cost of maintaining teams for delivery service consumes such a large proportion of the profits that managers are considering the cutting out of this item of operation.

It is a fact that the Connecticut Company, which is the holding company for the New York New Haven & Hartford Railroad electric properties, has eliminated this item of expense in several of the cities in which it operates and is now confining itself strictly to frequent service and co-operation with the shipper, feeling that such methods more than compensate their patrons for any advantage that might be gained in maintaining a call and delivery service by team.

Good sound judgment should be exercised in determining the character of freight and express matter handled. It does not matter whether consignments consist of feathers or lead with some shippers, who insist upon their rights as described in printed folders giving rates and information, and demand transportation of their goods accordingly.

Such shipments as wool, rags, paper, junk and such material, that not only block platforms, impede the work and fill the cars to the detriment of good paying freight, should be termed excepted articles and rated accordingly.

I think also that iron, steam piping (unless short lengths), heavy machinery, doors, sashes and lumber should be excepted and that household goods, such as stoves and furniture, unless properly boxed or crated, should be accepted for transportation only upon release from the consignee from all claim for breakage and damage in transit.

The handling of such goods should be well paid for, for the reason that it takes valuable time, and they invariably have to be carted to the very extreme of the delivery boundaries, and the teamsters in most every instance require assistance to unload them; this, of course, refers to such service requiring call and delivery.

I believe a rate classification in electric express business should be avoided if possible, if such rate classification is to be considered on the lines of the official classification, as used by steam roads. My experience has taught me that local agents do more guessing than they ought to, and in many instances such guessing, when shippers happen to make comparison, leads to charges of discrimination.

Steam railroads vary in their distinction of classes. Some classes are subject to certain rules. The agent does not take time or think it necessary to perfect himself on these rules and the result is that there is a conflict opened between the shipper and the carrier.

To avoid such contingencies on railroads having short mileage hauls I would recommend or suggest that flat rates be established, with the necessary exceptions, also a minimum rate to suit the locality and the conditions.

I am of the opinion that a first-class commercial agent attached to any electric express company who has the personality to reach the shipper and can offer a tariff which would be a compromise between the freight rates of steam roads and the express rates of regularly incorporated express companies in competition, would in a very short time produce astonishing results and materially increase the item of profit to the carrying company.

The phenomenal showing made by the United Traction Company is owing to our constant endeavor to please our shippers and to display a spirit of co-operation, which we are satisfied has had great influence on the growth of our business.

The suggestions, recommendations, or, you may say, ideas, as set forth in this document are based simply upon the conditions and circumstances that appear locally with our company.

Facilities, localities, length of haul, character of the products of the different industries offered for transportation, competition and numerous other things that arise from time to time, are to be taken seriously into consideration and treated according to existing conditions, to the end that the freight and express department of an electric railway becomes at once a valuable tributary to the revenue and income of the parent company.

Analysis of Freight and Express Earnings.

One member stated that in looking over the statistical reports of the different trolley lines he noticed that almost all of the lines that have attempted or that are handling freight, showed that the handling of freight was on a paying basis, and in some instances it was claimed to be practically a case of clear profit. He held the same opinion until a short time ago when he was able to get cost accounts of operating freight departments on several of the roads throughout the country, when it became very noticeable that the only items that were entered as making up the cost of handling freight were simply those that were visible, together with an arbitrary pro rata charge for several of the operating men without regard to the real proportion of business handled by them.

After looking these reports over he analyzed the same account on his home road, and discovered the same practice to be in vogue there, consequently in the year 1906 he decided to and did reduce the entire traffic of the road, passenger, freight and work train service, to a basis of a ton carried a mile, and then prorated the cost of the different operating accounts on this basis between these three services. In arriving at the ton mileage handled over the road, the rolling stock was figured as empty cars at their actual weight. The passenger load was figured from the average distance of passenger carried on a basis of 135 pounds per passenger, as being the average weight per passenger. The freight and express was figured at the actual weight from point to point.

The revenue express was 12,139 ton-miles, the local freight 1,070,461 ton-miles, and carload freight 108,092 ton-miles. The operating expenses chargeable to combined freight and express per revenue ton-mile were as follows:

Account No. 1.....	.00082
Account No. 2.....	.00003
Power .....	.00262
Account No. 6.....	.00053
Account No. 7.....	.00029
General expense, less Account 39.....	.00152
Account 39 .....	.01242

Total01824

The revenue freight and express ton mileage amounted to, freight, 99 per cent of the total; express, 1 per cent.

The express was handled on the same basis as the other express companies operating over the steam roads, and paying a collection and delivery charge for cartage of 40 per cent of the express receipts, consequently in making a prorated charge between freight and express, this 40 per cent must be deducted from Account 39 and charged direct to the express account and then the other accounts, together with 39, would come under the pro rate on the basis of 99 and 1 per cent. These prorate accounts between freight and express would come out as follows:

	Freight.	Express.
Account No. 1.....	.0082	.0008
Account No. 2.....	.00003	.0000
Power .....	.00261	.0026
Account No. 6.....	.0063	.0005
Account No. 7.....	.000029	.0002
General account, less Account 39.....	.00163	.0015
Account No. 39.....	.01048	.2103
Totals .....	.01646	.2159
Income per ton-mile—		
Express .....		.50
Local freight .....	.01148	
Carload freight .....	.02626	
Average of freight.....	.01284	
Average of freight and express.....	.0178	
Recapitulation of operating expenses and income per ton-mile:		
Operating—		
Express .....	.2159	
Freight .....	.01646	
Freight and express.....	.01824	
Gain or loss—		
Express, gain .....	.2841	
Freight, loss .....	.00362	
Freight and express, loss.....	.00044	

This same year under the system of expense charging against freight and express which, as before stated, contained only such charges to Account 39 as are actually seen, shows a gain of .00505 per ton-mile in receipts over expense, whereas according to the above analysis it should have been a loss of .00044 per ton-mile.

From an inspection of the different costs and receipts of the freight and express handled, it will be seen that the entire loss comes through the handling of package freight. The reason for this is that scarcely any of the trolley roads are so situated as to be in any kind of shape for properly handling this class of freight, consequently the continuance of handling this package freight merely resolves itself into a question of whether the railroad company is a gainer in the long run by handling package freight as an accommodation to the public and a loss to the company, or whether it is wiser to reorganize the freight business and place it on a paying basis.

Mr. Allen inquired if the companies represented in the association would furnish in detail to a committee a statement of their receipts and disbursements in connection with the freight and express service, so that the committee could tell whether there is any money in the express business or not. He said he is willing to do it.

B. E. Wilson (Rochester Railway) stated that he could not tell at the present time whether the freight and express business was profitable or not. He thought it was not possible for any one, no matter how much of an expert he may be in that line of business, to go out and say he could make money in the freight and express service on one's road. The question depended on many factors, whether one had a freight house in each town where he could deliver goods, with a warehouseman to deliver the goods as called for, or whether he must deliver the goods at the stores of the different merchants; upon these questions depend the question whether one can handle his express in combination cars on the passenger runs. He thought that the mistake was this: that the companies had all been giving express service at freight rates, and it was going to be difficult for them to raise rates without disturbing their relations in the different towns with the people of the towns. One plan he had in mind—though he did not know whether it would meet with the approval of his superior officers—which was to hold to the express rates and try to develop a real express business, running possibly two cars a day in each direction on passenger runs. When shipments were taken at the rates of the official classification

of steam roads, express service would not be given, but a freight service would be provided twice a week.

J. H. Pardee (J. G. White & Co.) called the attention of the members to the fact that the electric railways were attempting to carry freight with an electric car, at an investment of about \$10,000, equipped with two men, in competition with steam roads hauling freight on cars costing about \$1,000 each, and operating about forty cars in a train with four men. He thought that was the principal reason why the freight and express business had not been profitable, particularly as the rates on most of the classifications were very low.

H. J. Clark said that they were operating on the Auburn & Syracuse road between Auburn and Syracuse with the same rate as charged by the steam roads, and that they were making money. Mr. Armatage said that he could show the figures proving that the freight and express business on the Albany lines was profitable.

F. C. Nugent (Oneonta & Mohawk Valley Railroad) remarked that the locality in which a road is situated has a great deal to do with the business. For instance, the Oneonta & Mohawk Valley is of course a country road connecting the Susquehanna and Mohawk valleys, not paralleled by any steam road throughout the district. They are running a local carload freight service on the line, and also an express service, which is carried on with passenger cars. The express rates are based on a mileage equal to the old line companies, a graduating scale, and a classification similar to the express companies. He wished to assure the gentlemen that there was money in the freight and express business if properly handled.

E. F. Peck, general manager Schenectady Railway, said that the great trouble was that the railway companies did not nurse the freight and express business as they could do, but charged everything possible against that department of their business. Mr. Ryon was of the opinion that as far as the express business was concerned with the old line express companies, it did not necessarily follow that the rate they received per hundred pounds paid the cost of handling the goods; some goods are handled at a loss; the street railways had to do what is practically a purely local business. Some years ago the cost of transportation of express matter from Oswego to New York City was more per hundred pounds than the tariff, but of course the express companies made up this loss in other ways. He thought that if there was business in the immediate vicinity of the road sufficient to fill up the cars it might be profitable, but if the territory is not that in which you would move a considerable amount of freight or express, he doubted if it could be made profitable.

Mr. Pardee thought there was money in the express business for an electric railroad, but in the past the companies rushed in and did not know exactly what they were doing. In one case he knew where an electric railroad company carried a carload of furniture at the third-class classification a distance of 25 miles for \$6.00.

Mr. Walsh suggested that the steam railroad classifications are not suitable in his judgment for electric railways, and he thought the electric railroads would have to adopt a new classification.

Vice-President Fassett, in the chair, remarked that the discussion brought out the fact that a committee on express and freight rates was a necessity, if anything was to be learned about the business at all, and he hoped a motion would be made to appoint such a committee.

Mr. Allen thought the subject was one that could be carefully considered by the committee, not only as to the question of the revenue, whether it was commensurate with the expenses, but also as to whether the rates were arbitrary, and he moved that a committee of three, consisting of one representative of the freight and express department of the railway, one from the accounting department, and a manager of the road, be appointed to give this subject consideration and make a report at one of the quarterly meetings, and that

all the roads be requested to supply data to assist the committee in its work.

Mr. Pardee remarked that he did not think it was possible that a committee of that kind could formulate a tariff that would suit every road, but certainly by a comparison of the actual results of the different express companies, or express departments, a great deal of knowledge could be formulated, and many excellent suggestions could be given to the companies who could take advantage of them and could change to suit their own conditions if necessary any tariff that might be prepared. He offered an amendment that the committee consist of five, three men representing the express and freight department, one from the accounting department, and one general manager, as he felt that the large amount of the work which the committee would do would be a comparison of the tariffs and the preparation of the proposed new tariff, and it would be a great hardship to expect one freight and express man to do it alone. The motion was adopted.

A motion was passed extending thanks to C. Gordon Reel and his associates of the Kingston Consolidated Railroad Company for the very successful and elaborate preparations made to entertain the delegates to the convention.

The meeting then adjourned.

Entertainment.

After the meeting those in attendance were the guests of Mr. Reel and the Kingston Consolidated Railroad at a supper which was served on board one of the Hudson river boats. After supper a trip was made down the river and those who were not obliged to leave the boat at Poughkeepsie in order to take the train for their homes were given the pleasure of a more extended trip and spent the night aboard the boat.

Members in Attendance.

Albany—Edgar S. Fassett, general manager, C. H. Armatage, traffic manager United Traction Company and Hudson Valley Railway Company.

Auburn—R. A. Dyer, Jr., assistant general manager Auburn & Syracuse Electric Railroad.

Buffalo—T. W. Wilson, general manager, C. A. Coons, superintendent of transportation, M. Sheehan, division superintendent, International Railway Company.

Elmira—F. G. Mahoney, superintendent Elmira Water Light & Railroad Company.

Glens Falls—J. G. Phillips, assistant general manager, John H. Cain, division superintendent, John Mahoney, division superintendent, Hudson Valley Railway Company.

Gloversville—W. H. Collins, general superintendent, Julian Du Bois, division superintendent, Fonda Johnstown & Gloversville Railroad.

Kingston—Charles M. Preston, president, C. Gordon Reel, vice-president and general manager, Augustus J. Phillips, secretary, Abraham Hasbrouck, treasurer, G. B. te Bow, superintendent, M. J. Sullivan, chief engineer, Kingston Consolidated Railroad Company.

Middletown—D. C. McMonagle, general manager, W. M. Gould, superintendent, Walkill Transit Company.

Ogdensburg—E. E. Hawkins, president Ogdensburg Street Railway Company.

Oneida—Isaac H. McEwen, superintendent Oneida Railway.

Oneonta—Henry W. Bean, president, Joseph K. Choate, assistant to president, J. W. Nugent, general freight and passenger agent, C. V. Weidman, chief dispatcher, Oneonta & Mohawk Valley Railroad Company.

Peekskill—J. M. Beatty, assistant general manager, W. F. Simmons, superintendent, Peekskill Lighting & Railroad Company.

Rochester—E. J. Cook, general manager, J. C. Collins, secretary and auditor, E. J. Wilcoxen, general superintendent, William O. Ingle, assistant auditor, W. C. Callaghan, superintendent of transportation, Theodore H. Sperry, assistant general freight agent, B. E. Wilson, general passenger and freight agent, John Collins, ticket and freight auditor, T. H. Christie, Rochester Railway Company; W. R. W. Griffin, superintendent Rochester & Eastern Rapid Railway; B. C. Amesbury, superintendent Rochester & Sodus Bay Railway.

Schenectady—E. F. Peck, general manager, Frank Walsh, express manager, B. Penoyer, engineer maintenance of way, Schenectady Railway Company.

Syracuse—C. Loomis Allen, vice-president and general

manager, J. E. Duffy, superintendent, A. Eastman, general express agent, Syracuse Rapid Transit Railway Company; H. J. Clark, assistant to president Syracuse Lake Shore & Northern Railroad.

Utica—F. J. Gerdon, superintendent, B. A. Frankel, chief treasury department, F. W. Watts, division express agent, Utica & Mohawk Valley Railway Company.

Guests.

R. P. Stevens, president, C. M. Walter, auditor, D. W. McFetridge, purchasing agent, Lehigh Valley Transit Company, Allentown, Pa.

L. C. Bradley, general manager Eastern Pennsylvania Railway, Pottsville, Pa.

E. W. Holst, superintendent of equipment Boston & Northern Street Railway Company, Boston, Mass.

J. E. Sague, public service commission, Albany, N. Y.

C. R. Barnes, electrical expert, public service commission, Albany, N. Y.

G. M. Haskell, The J. G. Brill Company, Philadelphia, Pa.

H. N. Ransom, General Electric Company, Schenectady, N. Y.

Albert V. Thompson, General Electric Company, Schenectady, N. Y.

W. D. Brewster, National Brake Company, New York.

W. L. Boyer, New York Car & Truck Company, New York.

J. B. Smiley, Pennsylvania Steel Company, New York.

J. N. Du Barry, Jr., Westinghouse Electric & Manufacturing Company, Pittsburg, Pa.

F. V. Green, Westinghouse Traction Brake Company, Pittsburg, Pa.

J. H. Pardee, J. G. White & Co., New York.

W. Ray Thompson, J. G. White & Co., New York.

J. M. Wakeman, Street Railway Journal, New York.

Walter Jackson, Street Railway Journal, New York.

J. N. Nind, Jr., Electric Railway Review, New York.

THE COLLECTION AND REGISTRATION OF INTERURBAN FARES.*

BY B. A. FRANKEL, AUDITOR UTICA & MOHAWK VALLEY RAILWAY,
UTICA, N. Y.

The collection and registration of interurban fares is one feature of the railway business in which local surroundings and conditions must take a prominent part. A system of collection which would be a success on a well patronized road might be overburdened for a light carrying line, and the same can be said where the conditions are reversed.

In our section of the state we are blessed with more than the average density of population. This, coupled with the riding habit they have formed, compels us to use a system under which the conductor can pick up his fares, take care of his car and make up a report that will show where we are at.

Like all interurban roads, we have gone through the experimental stages, having used several different systems of each collection, discarding them as we found that they did not answer our purpose, until at the present time there is being used the "tear-off cash fare receipt" on one division and the "Duplex" on another, both of which are working out with a fair degree of success. This we consider is due to the difference in the sales of tickets at our ticket offices. At the opening of the Utica & Mohawk Valley line the conductor used the "zone" collection of fares, making 13 different collections and registrations in a distance of 38 miles. This was more than the passenger could stand and we soon abandoned this method. Since then there has been used the tear-off, the Duplex, the McDonald and the present tear-off, which has been found the most practical for our use. The distances between stations and the heavy travel on this line are such that this system was found the more successful, although the other systems used have a number of good features. Inasmuch as there is no inducement for the passenger to buy single-trip tickets and only a reduction of five cents on round-trip tickets, they have gotten into the habit of getting on a car and paying the conductor. The sale of tickets and opening of ticket offices did not commence until several months after the opening of the line, which gave the public the opportunity of paying cash on the car. The average sales are from 56 to 60 per cent, which is very light in comparison to the sales on the West Shore or the Oneida Railway.

I consider the cost of installing ticket offices as money well spent and think it well to charge a slight excess fare over the ticket fare when the passenger pays on the car. We have followed out this policy in making up the schedule of rates on the Utica-Syracuse division and up to the present time, after a three months' trial, can say that the number of complaints because of this charge is very few. The sale of

tickets averages from 95 to 90 per cent, as compared with the 56 to 60 per cent on the Utica & Mohawk Valley line. I attribute this to the excess between the cash and ticket rate, and the fact that the sale of tickets was started at the same time the line was put in operation. In this connection I think it advisable to commence the use of tickets on the day a new line or division is opened for business. Should the public once get into the habit of paying their fares on the car, it would take a long time for them to give it up unless the inducement of buying tickets is enough to pay them for the trouble. On the West Shore the "Duplex" system of collection has been very successful because of the large sales of tickets. The excess is from 5 to 10 cents on single-trip, depending on the distance, and from 5 to 30 cents on round-trip tickets. The simpler the ticket is printed the better the passengers like it. We make no conditions, merely stating that it is good when properly stamped and placing no time limit on the use. In this way a great many passengers buy in lots of half a dozen or more. It also does away with the complaint a passenger might make if the ticket office were not open.

For the use of the transportation department, some managers would like to know where the travel begins and where it ends, so that the section showing the heavy travel can be given the consideration it deserves, as compared with the light carrying section. We have found that with the use of the "Duplex" and the report of ticket sales this information can be compiled and tabulated to give the information desired. This statement is made up and embodied in our monthly report. It has been our aim to lessen the work of the conductor as much as possible, as we found through this he is in a position to take care of his passengers and car to better advantage. For their convenience on the heavy carrying sections of the Utica & Mohawk Valley the conductors register all 5-cent fares, giving no receipt whatever. For all cash fares above this amount a receipt is given.

On the opening of the electrified West Shore we tried the experiment of making but one collection for a through rider, instead of the usual practice of collecting in sections. I have heard a number of favorable comments on the part of passengers, as they can now enjoy their ride without being disturbed by the conductors, who also seem to have taken up with this method, as after hat-checking the passenger to the point of destination, he has nothing further to trouble about, except to get the hat check before the passenger leaves the car.

In conclusion, I would strongly recommend the use of tickets and installing of ticket offices, the use of a cash fare receipt which will give the conductor a chance to pick up his fares, look after the car, make up his report, and such other duties as he may have. Where the percentage of ticket sales is high enough, the Duplex will cover this, especially as it shows the "from and to" travel, and the collection of the fare at one time.

FREIGHT AND EXPRESS RATES.*

BY FRANK WALSH, GENERAL MANAGER ELECTRIC EXPRESS COMPANY,
SCHENECTADY, N. Y.

During the past few years many of the electric street railway companies have given considerable thought to the handling of freight and express matter on their lines. The business of transporting freight and express on electric lines is one that deserves considerable attention, as it is not only a great convenience to the public, but a source of revenue to the railway company, and, of course, we all agree that that is the primary object of the managers of the various companies.

The writer was for a number of years in the employ of the old line companies, which operate over the steam roads and cover thousands of miles of territory. When I entered the service of the electric lines, which do only a local business, I felt that it would be so easy, after my previous experience, that, as the saying is, "There is nothing to it." I soon found I was mistaken, and that there was a whole lot to it. It opened up an entirely new field, and it was necessary to apply methods that suited the locality.

From what I have learned I find that each company that is handling freight and express has its own methods of doing business, and while I believe that local conditions bear largely on the methods used, I think that some uniform system should be adopted. We all agree that for the present our business will be purely local, but with the progress that has been made in the last few years in electric service there is no telling what the future has in store.

It is not my purpose to submit a large amount of data, but simply to discuss the plan of operation and to try to set forth some ideas that could eventually be worked into a sys-

*Paper presented before the Street Railway Association of the State of New York, Kingston, N. Y., September 21, 1907.

*Paper presented before the Street Railway Association of the State of New York, Kingston, N. Y., September 21, 1907.

tem that would be applicable to the majority of localities.

I have already stated that local conditions govern to a large extent. One of the first things to do is to size up the territory and ascertain if it produces or consumes, and I should strongly advise anyone who contemplates engaging in the freight and express business to look the ground over very thoroughly.

Another very important point is the rate question. Some managers advocate class rates as adopted by steam roads. Others favor the flat rate as used by the old line express companies. I may be prejudiced, on account of my previous experience, but personally I favor the flat rate, but think that it is only a question of time before we will have to adopt class rates, but rather than use the present steam road classification, favor making a classification to suit ourselves.

The steam roads have eight different classifications. Four, or even three, would be enough for electric roads. In my judgment, the low-class freights do not pay for the trouble of handling, and with the prompt service that electric lines are able to give on local freight, they should look for the high-class commodities. If any merchant is in a great hurry for heavy, rough material, and to save time is compelled to ship by electric roads, he will gladly pay what the difference would be in the classification. I find that in most cases we can get all the steam road asks, and often a trifle more, for it stands to reason that the service is much better and the primary object in electric freight and express service is promptness and delivery at destination. I think that the question of rates and classification of freight is one that deserves considerable attention.

The matter of delivering freight and express is an important one. We at one time hired wagons to do our collecting and delivering on a percentage basis, but after trying it for several months, found it did not work to our satisfaction, and finally put on our own wagon equipment. From the time we put on our own wagons and horses our business increased. We were able to pick our own men for drivers, which we could not do on hired rigs, and we also found it was a good advertisement for us, for neat looking wagons attract attention.

I have been asked several times what is the difference between freight and express, and while it is a rather hard question to answer, there is as much difference between them (looking at them from the standpoint of steam road freight and old line express company business) as there is between chalk and cheese. While the Electric Express Company may not have a perfect system, I think we have a good one and the easiest way to answer the question of the difference between freight and express is to give you our method of operation and point out the distinction as we see it.

We classify our business into three classes, viz.: Class "A"—Express service, includes collection and delivery. Class "B"—Freight, no wagon service. Class "C"—Fast freight, wagon service on one end.

Under our Class "A" rate we handle at a flat rate all goods which we are expected to pick up by wagon and deliver, and give this class of business preference in loading and delivering.

Class "B" rate is applied on all shipments that are delivered at our terminals and called for at destination by consignees.

Class "C" freight, which includes wagon service on one end (as a general thing the delivery end), we apply mostly on shipments from wholesale houses to stores in various places, and we find that this class is used by most people and is a popular one with the big shippers. Under this Class "C" we handle a lot of groceries and other like commodities that formerly went by steam road consigned to various truckmen in towns for them to deliver to the different consignees.

I think I may safely say that 50 per cent of our business is handled under the last class, as we simply charge, in addition to the freight rate, a fair delivery charge.

We do not apply this class on goods of a perishable nature that would in any event be sent forward by express.

We maintain that any company which does not use wagons in connection with its freight cars is doing only a freight business, and where wagons are maintained it is doing both. Anything that is handled by wagons, either at one end or both, we classify as express, and where no wagon service is required we call it freight.

I strongly advocate a meeting of the freight men whose companies are members of this association to thoroughly discuss the matter of rates and classifications of freight, feeling that the classification used by the steam roads is not just what is needed for our electric roads. We have an entirely different proposition from the steam roads or old line express companies, but at the same time a proposition that is worthy of much consideration at the hands of the electric railroads, as there certainly is money in the freight and express business.

REHABILITATION PROGRESS IN CHICAGO.

On September 19 Mayor Busse of Chicago made public a report from President T. E. Mitten of the Chicago City Railway outlining the progress that has been made by his company in the rehabilitation of its system under the terms of the recent ordinance. Those parts of the report which related to the adoption of the pay-as-you-enter type of car and to the construction of a telephone system for dispatching and regulating the headway of cars, were presented with illustrations in the Electric Railway Review for September 21, page 332. The latter part of the report, outlining the progress made in bettering other parts of the system, such as track, shops and car houses, is presented in abstract herewith:

Car Houses.

Upon the date of the settlement ordinance becoming effective, February 1, 1907, the Chicago City Railway Company owned and operated six car houses, two of which were equipped for the housing and care of cable cars, and three of which were originally built for the housing and care of horse cars and had later been electrically equipped. The track arrangement in these three houses was designed for the accommodation of the narrow horse cars, the result being that when used for the electric cars, which are very much larger, there was not sufficient space between the tracks to permit of cleaning the outside of the cars. The buildings as a whole were old and in a badly run-down condition. Their general design, including the location of the principal columns supporting the roofs, would not permit of a rearrangement without practically rebuilding the structures, so that it became imperative that the buildings themselves be replaced by larger structures designed upon modern lines and supplied with equipment necessary to the thorough and economical inspection and cleaning of electric cars.

The one car house remaining adjoining the shops at Seventy-seventh street was built in 1902, being the initial half of the complete structure as originally designed. This building in its entirety is now nearing completion and provides for the housing and care of 534 standard cars. It is equipped with the necessary tools and conveniences, so that cars may be brought in at the rear end of the building, inspected, washed and disinfected daily, and delivered to the traffic department at the front door of the building in perfect condition for service upon the street. It is possible under this arrangement of car house facilities to do the inspection, cleaning and disinfecting of the cars by the separate gangs as the car moves from the rear to the front of the house, making possible the establishment of a much more systematic and economical method of procedure than has been possible heretofore.

A second car house, which will be completed for occupancy during the current year, is now under construction at Thirty-eighth street and Cottage Grove avenue, covering the site of the old horse car barn and additional adjoining property which had been secured by purchase. This car house will accommodate the cars on the Cottage Grove and Indiana avenue lines only, and will have a capacity of 250 cars.

Three additional car houses, with a capacity of approximately 700 cars, will be erected within the 3-year rehabilitation period to take the place of the present car houses at Archer avenue and Thirty-first street, Sixty-ninth street and Emerald avenue and Thirty-ninth street and Wabash avenue.

All of the stations now under construction, as well as those proposed, are to be of the same general design and include ample provision for sanitary wash room and toilet conveniences, including a barber shop and bootblackening stand, as well as a general assembly or club room, in which the conductors and motormen may be at ease and in comfort during off-duty hours.

Electrical Distribution.

The general plan of electrical distribution was determined upon early in 1905 and the work of constructing substations at Twentieth and Dearborn streets and Sixty-third street and Wentworth avenue commenced during that year. During 1906 ground was broken for a third substation at Forty-second street and Wabash avenue. The two first of these buildings have been used for distribution of electrical energy for more than a year past and the installation of the machinery in the substation at Forty-second street and Wabash avenue is now being made and will be sufficiently well advanced to permit of its use in carrying the heavy load of the coming winter.

Temporary quarters belonging to the Commonwealth Electric Company, from which we now purchase power, have been secured at Plymouth court, pending the determination of a permanent location in the Loop district.

The general plan also provides for another substation in

the southwest portion of the city. This is in addition to the substation or main power house, as may be determined, to be located on the property purchased for power house purposes some years ago at Thirty-eighth and Halsted streets.

Power Distribution.

The general plan of distribution, while primarily used for the utilization of the current purchased from the Commonwealth company, has been designed so as to permit of the use of all parts of the installation for the distribution of power (if produced by ourselves) at a much higher potential than that supplied from the Commonwealth company, the higher potential reducing the amount of copper required, and thus making possible a slightly reduced cost of distribution. The engineering department is now actively engaged in working out the details of cost and in my opinion the estimate is sufficiently advanced to insure a conclusion being arrived at during the current year, so that should it be decided to build a power house the plans could be so prepared as to allow the work to proceed with the opening of the coming spring.

Shops.

In 1902 a block of property was secured at Seventy-eighth street and Vincennes road, since which time the construction of modern shop buildings of ample capacity has been undertaken.

During the past two years additional land has been secured so as to square the company's property and provide room for expansion, a steam railway connection and the extension of the high-pressure water system arranged for, and connection established with the main sewer, so that by the close of the current year the company's shops will be complete in detail and equipped to turn out first-class work promptly and economically.

Track Construction.

The ordinance requires that the company shall proceed immediately to remove its cable tracks, of which there are approximately 35 miles of single track, and rebuild at least 60 miles of its electric track, making a total of 95 miles of single track, with track of a character and type therein described, to be completed within three years from the date of the actual acceptance of the ordinance. The ordinance was accepted by the company on April 15, 1907.

The members of the board of supervising engineers, under whose inspection and approval the work of reconstruction is to be performed, were appointed and assumed their duties on May 7, 1907. The work of preparing specifications and the establishment of standards to govern the track construction was at once undertaken and orders placed for large quantities of material. The standard specifications for track construction were finally passed by the board of supervising engineers on July 27, 1907, prior to which time the company had organized its construction force and was proceeding with the actual work of track reconstruction on Root street as rapidly as the material then at hand would permit.

During the month of August track building material was received in large quantities and the working force increased, so that there are now from 1,500 to 1,800 men engaged in the actual work of track reconstruction, this force being divided into five separate tracklaying gangs, each containing its proportionate number of graders, tracklayers and street pavers.

The work first commenced upon Root street, between Wallace and State streets, has been completed, the five gangs referred to now being in active operation upon the following streets, in which the mileage completed and that under way is as follows:

Street—	Mileage completed.	Mileage under way.
Wentworth avenue	3.0	0.3
Indiana avenue	0.8	2.2
South Chicago avenue	0.7	0.7
Cottage Grove avenue .....	...	4.0
Forty-third street .....	...	3.0
Root street	1.4	...
	5.9	10.2

The result of the work of all of the tracklaying force now engaged approximates one-third of a mile of single track per day or nine miles of single track per month; so that if the weather continues fair up to and during the first week in December it is quite probable that one-third of the total mileage required during the 3-year period will be completed during the current year.

Electric Welding.

The introduction of labor-saving machinery, consisting of derricks for the handling of material and portable concrete mixers for use in making track foundations, is being encouraged and undoubtedly will result in reducing the cost of the work, as well as facilitating its progress.

The Lorain Steel Company is here maintaining a full electric track-welding train, consisting of three cars, by which the ends of the rails are respectively prepared by cleaning, electrically welded and ground to a true surface for the operation of cars. The train moves from street to street and is of sufficient capacity to follow up the tracklaying work of all the tracklaying gangs employed. It is confidently expected that after the track has been joined by this process very much, if not all, of the trouble experienced from electrolysis will have been overcome.

Car Clearance.

The standard specifications unanimously adopted by the board of supervising engineers July 27, 1907, specified that the distance of 9 feet 8½ inches be maintained from center to center of tracks; this as against the 9-foot 6½-inch track center upon which nearly all of the existing track was laid.

At the time of the introduction of the wide cross-seat center-aisle Indiana avenue car, which is of the type prescribed by the ordinance, a very careful and exhaustive investigation of the practice in other cities was made, the result showing that in all cities of over 250,000 inhabitants where this type of car had been adopted, track centers were in no instance maintained of sufficient width to permit of persons standing between passing cars without injury to themselves. In New York City the narrow longitudinal seat car of the type here being relegated to the scrap heap, is still in use, so that the original track centers there permit persons standing between the cars; but in the cities of Philadelphia, Cleveland, Buffalo, Minneapolis, Cincinnati and St. Louis the width between passing cars varies from 3 to 18 inches, the latter distance being only in use at St. Louis, and is of such recent introduction as not as yet to afford any evidence of result. The consensus of opinion among the various railway managers was that very few of the accidents occurring to persons from being crushed between cars occur where the cars operate with a very few inches of clearance; but that such accidents did occur in greater numbers proportionately as the distance between cars became greater, which presumably would continue up to the point where cars were operated at such a distance apart as to insure absolute safety to persons standing between them. In my experience, covering a period of several years' operation of the system at Milwaukee and Buffalo, where in neither case the distance between the standard cars exceeds six inches, no single accident of this class occurred.

The decision of the company then reached was that with the track center of 9 feet 6 inches then established the greatest degree of safety could be secured by the use of a car with an over-all width of 9 feet, which would give a clearance of 6½ inches between passing cars. As the cross-seat center-aisle type of car had then been determined upon by the city authorities as their future standard, it seemed imperative that the car should be of at least sufficient width to insure a comfortable seating arrangement and the possible passing of passengers in the aisle without undue crowding. This view of the company later has been substantiated by the only real criticism as yet directed against the Indiana avenue car, viz., that the width of the seat was too narrow and the aisle too great, which fault, however, is being corrected by the increased width of seats now being installed, a further widening still being possible should the pay-as-you-enter car later be found practicable.

The facts brought out in our original investigation seemed to have been well substantiated by the later investigation of the board of supervising engineers, resulting in their unanimous decision as to the track centers made on July 27, 1907. There are three present conditions which cannot be changed, the first being that over 60 per cent of the track mileage will remain at 9-foot 6-inch centers during and for varying periods after the 3-year rehabilitation period; second, that there are now 400 of the Union Traction standard cars with an approximate width of 8 feet 5 inches or 6 inches; third, that there are 805 of the Chicago City Railway cars in service or now being delivered with a width of 9 feet.

The result of the operation of these cars with a 9-foot 6½-inch track center gives a width of 6½ inches between the Chicago City Railway cars, of 12½ inches between the Union Traction cars and of 9½ inches when a Union Traction and a Chicago City Railway car pass, as will be the case when the through routes are established. With the new standard track specifications the track centers established at 9 feet 8½ inches, the clearance between Chicago City Railway cars would be 8½ inches, between the Union Traction cars 14½ inches, and between a Union Traction and Chicago City Railway car 11½ inches.

These facts were all given due consideration, the decision of the board being that the increase of the track centers from 9 feet 6½ inches to 9 feet 8½ inches would not so far separate the cars as to make it appear safe, and so serve as an invitation to persons to stand between them. The later sug-

gestion that a greater degree of safety could be secured by the building of all new track at a standard width of 10 feet 2 inches, and all new cars at a maximum width of 8 feet 6 inches or 8 feet 8 inches was not considered by a majority of the board of supervising engineers to be borne out by the varying conditions which would result if this change was made for the reason that when operating upon all new track so constructed the distance between the Chicago City Railway cars would be 14 inches, between the Union Traction and the Chicago City Railway cars 17 inches, and between the Union Traction, or the recommended standard cars, 20 inches; so that upon any of the streets which had been reconstructed these three varying conditions of width would have to be considered. While the latter width is by some considered sufficiently wide to insure the safety of the thinner portion of the population, the width of 17 inches and 14 inches would most assuredly crush or kill any person attempting to stand within either of these spaces, the result being a condition which would invite reckless and foolhardy persons to attempt to stand between cars—a feat which, when attempted between the wider cars or upon any portion of the 60 per cent of that track with the 9-foot 6-inch track center which is not now to be reconstructed, undoubtedly would result in serious, if not fatal, accidents.

A danger which is self-evident or well understood to be such, is from this very fact itself an insurance against accident, so that there has been a distinct advantage in the wide publicity given by the newspapers to the danger of attempting to stand between the new type of cars; and while the majority of the members of the board of supervising engineers has been subjected to what may be considered unmerited criticism, the price is indeed cheap if it should result, as I believe it will, in a more general appreciation by the public of the danger of attempting to stand between the passing cars.

ANNUAL MEETING COLORADO ELECTRIC LIGHT, POWER AND RAILWAY ASSOCIATION.

The fifth annual convention of the Colorado Electric Light, Power and Railway Association was held at the Savoy hotel, Denver, Colo., on September 18, 19 and 20. The association now comprises 40 member companies and 38 associate members and the convention was a remarkably successful and interesting one in every respect. The following papers were read:

"Business Building by Commercial Departments," by George E. Putnam, Denver.

"Incandescent Lamp Outlook," by Francis W. Wilcox, Harrison, N. J.

"High-Tension Porcelain Insulators," by Frank E. Johnson, Denver.

"Central Station Power Problems," by Charles Robbins, Pittsburg.

"Lightning Protection in Colorado," by Leonard Wilson, Denver.

"Notes on Modern Boilers," by B. E. Buttles, Denver.

A question box which was distributed to members beforehand in pamphlet form, together with the programme of the meeting, contained questions on boilers and engines, transformers and lines, meters, lamps and wiring, new business and management. The discussion of the question box was one of the most interesting features of the convention.

A number of interesting entertainments were provided by the entertainment committee for the delegates and visitors, as follows: Wednesday evening, a theater party for members and ladies at the Broadway theater; Thursday afternoon, a visit to the new power house of the Northern Colorado Power Company at Lafayette, Colo., also an automobile ride, "Seeing Denver," for the ladies; Friday afternoon, a visit to the power plants of the Denver City Tramway Company and the Denver Gas & Electric Company on special cars provided by the Tramway company; Friday evening, the "Rejuvenation of the Sons of Jove."

The following officers were elected:

President—W. G. Matthews, vice-president Denver City Tramway, Denver.

Vice-President—C. K. Durbin, United States Light & Traction Company, Denver.

Secretary and Treasurer—J. F. Dostal, Denver Gas & Electric Company, Denver (re-elected).

Executive Committee—George B. Tripp, Colorado Springs; W. T. Wallace, Canyon City.

RECEIVERS APPOINTED FOR THE NEW YORK CITY RAILWAY.

Adrian H. Joline and Douglas Robinson were appointed receivers for the New York City Railway Company by E. H. Lacombe, judge of the United States circuit court, New York, on September 24. The appointment was made on application of the Pennsylvania Steel Company, which has a claim for \$36,831.38, and the Degnon Contracting Company, which is a creditor to the extent of \$11,173.38.

Mr. Joline is a member of the law firm of Joline, Larkin & Rathbone, and is chairman of the board and president of the Missouri Kansas & Texas Railway. Mr. Robinson, who is in the real estate business, is a brother-in-law of President Roosevelt. The New York City Railway, through its counsel, admitted the allegations in the bill of complaint and joined in the prayer that a receiver be appointed. The bonds of the receivers were fixed at \$250,000 each.

Complaint and Order of Court.

After reciting various debts of the New York City Railway the complaint says:

Your orators are informed, and believe, that the defendant has no means at hand with which to meet its immediate pressing needs in operating its system; that many of the creditors to whom the defendant is liable are pressing the defendant for immediate payment and that some of said creditors may bring suits in respect of their said claims, and may levy execution on the lines of railroad owned by the defendant and on the material and supplies and other property of the defendant on hand; and your orators allege that there is grave danger that the line of the defendant may no longer be operated in a single system, but the various lines which are now owned or controlled or leased by the defendant may be broken up and be separately operated.

Your orators allege that an attempt by your orators to enforce at law their claims as general creditors would precipitate similar action on the part of other creditors, and this in turn would lead to wasteful strife and controversy, which your orators believe can be avoided and the property preserved for equitable distribution among those entitled thereto only by the intervention of a court of equity and the granting of equitable relief, including the appointment of a receiver.

In his order Judge Lacombe gave the New York City Railway until October 7 to show cause why the receivership should not be made permanent. The order of the court directs every officer of the company to turn over to the receivers any books or papers which he may have in his possession belonging to the company, and also enjoins all officers and employees from interfering in any way with the management of the properties by the receivers.

Holding and Subway Companies Not Affected.

August Belmont, chairman of the board of directors of the Interborough-Metropolitan Company, made the following statement:

The receivership of the New York City Railway Company in no way affects the solvency of the Interborough-Metropolitan Company or of the Interborough Rapid Transit Company, and it cannot be too positively stated that a receivership of either of those two companies has at no time ever been considered. The Interborough-Metropolitan Company has no debt except its issue of 4½ per cent collateral trust bonds, secured by Interborough Rapid Transit stock, and about \$8,000,000 of collateral notes representing advances made to the surface system under the agreement entered into last May, which then contemplated an advance aggregating \$15,000,000. The Interborough-Metropolitan Company has over \$6,000,000 cash in bank.

The actual results of the operation of the surface lines during the last year and a half have disappointed all expectations, with the result that there has been such a large decline in the earnings of the New York City Railway Company that there is no immediate prospect of its being able to earn its fixed charges or to procure the very considerable sums of

money which will be required for the improvement of its lines. Accordingly, the board of directors of the Interborough-Metropolitan Company has determined that it is not wise for the Interborough-Metropolitan Company to make further advances to the street surface system.

In the interest of the public, as well as of every one interested in the securities of the various companies, it is clear that a comprehensive readjustment should be effected promptly in order that the essential improvements may be made as quickly as possible. The receivership is a long step in this direction.

History of the Company.

The Interurban Street Railway Company was incorporated in New York on November 25, 1901, with a capital of \$500,000. On February 10, 1904, the name was changed to the New York City Railway Company. The Interurban company leased the Metropolitan Street Railway for 999 years from February 14, 1902, for 7 per cent per annum on its stock. At the same time arrangements were made for financing the requirements of the Metropolitan Street Railway and the authorized stock of the Interurban company was increased to \$20,000,000, of which there is now outstanding \$9,361,500. The Metropolitan Securities Company owns all of the outstanding stock and agreed to acquire any future issues of stock or securities of the New York City Railway. The latter company has outstanding, in addition to the stock, \$1,761,000 of 10-year notes.

On June 30, 1906, the New York City Railway had 424 miles of electric railway track and 93 miles of track on which horse cars were run, a total of 517 miles. This includes the mileage not operated and tracks in car barns. On the same date the equipment of the company was reported as follows:

Box cars, motor cars, 1,920; others, 215; open cars, motor cars, 928; others, 151; combination cars, motor cars, 155; express cars, motor cars, 30; freight motor cars, 5; service motor cars, 34; others, 10; snowplows, with motors, 12; others, 7; sweepers, with motors, 75; others, 11. Grand total, motor cars, 3,159; other cars, 394.

DECISION OF MASSACHUSETTS COMMISSION ON PROPOSED LINES OUT OF BOSTON.

The Massachusetts railroad commission on September 18 granted the first certificate of public necessity and convenience for the building of an interurban line in accordance with the provisions of the electric railroad act of 1906. After a number of public hearings on the four projects for lines out of Boston, whose applications have been before the board for a number of months, the commission granted a certificate to the Boston & Providence Interurban Electric Railroad, promoted by the Stone & Webster interests of Boston, which proposes to build from Boston to Seekonk, R. I., on the Massachusetts-Rhode Island state line. The commission at the same time disposed of the other petitions, those of the Boston & New York Electric Railroad, the Boston Lowell & Lawrence Electric Railroad and the Boston & Eastern Railroad, whose plans were described in the Electric Railway Review of July 20, 1907, in an order which reads in part as follows:

The vigorous rivalry among four groups of promoters, each asking a special charter to authorize the building of an interurban electric railway between Boston and Providence, and the feeling that the time had come for general legislation with reference to such railways, led to the passage in 1906 of the electric railroad act under which these petitions are brought.

Owing to the close resemblance between the new electric and the old steam railroad the act provides that a company which desires to build an electric railroad must first secure a certificate that public necessity and convenience require its construction. This had long been the law governing the building of new steam railroads.

In effect the statute declares that indiscriminate competition is undesirable, and that the resources of a monopoly, provided the management be efficient and progressive, may provide the largest and best public service; that established companies conducting their business in a proper manner are to be given a reasonable measure of protection; and that the extraordinary right of eminent domain is not to be exer-

cised at the will of those who, professing public purposes, have in view merely private gain.

The question to be decided under each of these petitions is whether, upon the whole, the net results of a proposed undertaking promise public gain or public loss. It surely cannot be said that public necessity and convenience require the building of an additional railroad if the effect upon existing railroads is so disastrous that the service as a whole is impaired rather than improved.

Men keenly interested in the development of interurban railways have long had in mind an electric road between Boston and Providence. Though it must openly compete with an excellent steam railroad service it would offer equal speed with more frequent trains and with freedom from smoke and cinders. Physical conditions are favorable for an electric road of modern type, and as matters now stand it cannot be said that the adventure would be unprofitable. Without exception cities and towns in this section welcome the new service and no similar accommodation is offered in connection with any existing lines. The question is simply which of the two companies that desire to build shall receive the necessary certificate, for it has been taken for granted from the first that there is room for only one.

The route of the Boston & Providence Interurban is the choice of experts who in the beginning had different lines in view. Their investigation has been exceptionally thorough and their plans have on the whole popular preference in the communities that would be served. This railway would connect existing street railways with a high-speed main line, manifestly a great convenience to patrons. Home capital is largely interested in the road and the acquaintance of the men behind it with the conditions to be met would warrant the expectation of a high standard of service.

The route of the Boston & New York Electric Railroad is of recent suggestion. While this project, as the name indicates, is more ambitious than that of the Boston & Providence, its future would be far more uncertain and speculative, success being dependent upon the ability of the company to prosecute the enterprise in other states where as yet nothing of a definite or tangible nature appears to have been accomplished.

In our opinion a certificate ought to be issued to the Boston & Providence Interurban Electric Railroad Company, as the company by comparison is in better position to make use of it for the public advantage.

In denying the petition of the Boston Lowell & Lawrence the order says that such a road would interfere with important extensions of the Boston Elevated system and that the prospective benefits of the new enterprise are scarcely such as to justify the sacrifice of such a public interest; that the liberal promises made by this company with regard to fares and service seem to show an indifference to the possibility that promises might call for performance, and that there is little in the enterprise to recommend it to the business judgment of investors.

With regard to the Boston & Eastern Electric Railroad, which proposes to build from Boston to Lynn, while recognizing the need for additional transportation facilities in this territory, such as would be provided by the establishment of a frequent electric service in this territory, the commission does not believe that the present route selected by the company meets the emergency, in that it proposes to get its passengers into Boston by a connection with the Boston Elevated at Sullivan square. This feature is declared to be absolutely prohibitive, because the Sullivan square terminal is already taxed to the limit of its capacity. The opinion is expressed that no electric railroad can successfully reach Boston from the north that does not secure an entrance to the city independent of the existing elevated structure in Charlestown, and it is suggested that the present East Boston tunnel or a second tunnel under the harbor might well be the connecting link. The petition, however, is not dismissed, but is held to await further study and development of the plans.

There were 2,227,041 passengers carried for every passenger killed on railways in the United States in the fiscal year 1906, compared with 1,375,856 to 1 in the preceding year. For each passenger killed last year 70,126,686 passenger-miles of travel were accomplished, while in the preceding year the ratio was 44,320,576 to 1.

CONVENTION BULLETIN NO. 4.

Under date of September 27, 1907, Bernard V. Swenson, secretary and treasurer of the American Street and Interurban Railway Association, has issued Convention Bulletin No. 4, relating to the progress of plans for the Atlantic City convention on October 14 to 18, inclusive. This bulletin is devoted specially to railroad rates, trains and changes which have been decided upon in the programmes. An abstract of the bulletin follows:

The Trunk Line Association, New England Passenger Association, Eastern Canadian Passenger Association and the Southeastern Passenger Association have granted a rate of a fare and a third on the certificate plan for all points within their territories. The Central Passenger Association has granted a uniform rate of two cents a mile within its territory. The Western Passenger Association grants special 1-way rates to its eastern terminals. The Southwestern Passenger Bureau grants reduced 1-way rates to St. Louis.

Rules of Trunk Line, New England, Eastern Canadian and Southeastern Associations.

Delegates from points in the territory governed by these associations are granted reduced rates on the certificate plan. Each person desiring the excursion fare must purchase a first-class ticket, for which he will pay the regular fare, and, upon request, the ticket agent will issue a printed certificate of purchase of the standard form. Tickets may be secured within three days (exclusive of Sunday) prior to and during the first three days of the convention. If through tickets cannot be procured at the starting point tickets should be purchased to the nearest point where such through tickets can be obtained. A certificate from the agent where each purchase is made should be requested. Tickets for the return journey will be sold at Atlantic City, at one-third the first-class limited fare, only to those holding certificates signed by the ticket agent at point where through ticket to place of meeting was purchased, countersigned by the secretary of our association, and certified by the special agent of the railway association. Certificates will not be honored for return trip if presented later than October 22.

Instructions to Delegates from Central Passenger Association Territory.

Delegates attending the convention from points in this territory will be granted a rate of two cents per mile in each direction from starting point to Buffalo, Pittsburg, Parkersburg and other Central Passenger Association eastern gateways, added to tender therefrom of one and one-third first-class fare for the round trip, such through fares to be applicable via all routes over which short-line one-way fares from starting point to Atlantic City apply. Tickets will be sold on October 11, 12 and 13, to persons presenting Central Passenger Association standard form of card orders. Representatives of street and interurban railway companies may secure card orders upon application to Bernard V. Swenson. Representatives of the Manufacturers' association may secure card orders upon application to George Keegan, secretary.

Instructions to Delegates from Western and Southwestern Passenger Association Territory and Pacific Coast Points.

Delegates from the territories of the Western Passenger Association and the Southwestern Passenger Association should take advantage of the reduced 1-way rates in effect to Chicago, Peoria and St. Louis. Delegates from Pacific coast points should avail themselves of the daily nine months' excursion rates between these points and St. Louis and Chicago.

Trains from New York to Atlantic City.

The Central Railroad of New Jersey and the Pennsylvania Railroad will run special trains from New York to Atlantic City if sufficient delegates desire to go at one time.

Convention Programmes.

Since the programmes were announced William J. Clark of New York City, manager foreign department General Electric Company, has promised to present a paper on the subject "Municipal Ownership in Great Britain and in the United States" before the convention of the American association on Friday morning. Changes in the titles of three papers should also be noted. They are:

American Association.—Paper by P. P. Crafts changed from "Package Express Business" to "Light Freight Handling by Electric Lines." Paper by H. H. Polk changed from "Freight Interchange with Steam Railroads" to "Freight Service on Electric Railroads."

Engineering Association.—Paper by J. R. Bibbins changed from "Double Flow Turbines" to "Recent Developments in Steam Turbine Power Station Work."

Delegates to the American association convention should attend the Tuesday afternoon session of the Engineering association convention, when the report of the Engineering association committee on "Standardization" will be presented and discussed. The report of the American association committee on "Standardization" will be short and will be based upon the work of the Engineering association committee. Your attendance and participation in the discussion will be greatly appreciated by the officers of both the Engineering and American associations.

List of Delegates and Roll Call.

We are sending copies of data sheet entitled "Official List of Delegates Attending the 1907 Convention." Kindly see that this list is filled out promptly and one copy returned to Bernard V. Swenson.

There will be a roll call at each session of the conventions. Notices will be sent to the various companies, informing them at what sessions their representatives were present.

Convention Papers.

The advance copies of convention papers are being printed and will be mailed to member companies as soon as they are ready for distribution.

Entertainments.

President Beggs and the executive committee of the American association have decided that there will be no annual banquet this year. The entertainment committee of the Manufacturers' association has practically completed its plans for the convention week. This committee will probably arrange for a theater party on Thursday evening to take the place of the annual banquet. Entertainment features will also be provided for the other evenings of the week.

STEAM LOCOMOTIVE VERSUS ELECTRIC LOCOMOTIVE.

At the meeting of the New York Railroad Club on September 20 a paper was read by Max Toltz on "Steam Locomotive Versus Electric Locomotive." The paper was intended as a reply to the one read before the American Institute of Electrical Engineers on January 25, 1907, by L. B. Stillwell and H. S. Putnam on "The Substitution of the Electric Motor for the Steam Locomotive," which was published in the Electric Railway Review for February 2, 1907, page 150. Mr. Toltz's paper, however, deals very slightly with the electric locomotive and has special reference to the various improvements which can be made in the steam locomotive in order to increase its economy of operation. The author claimed that even better construction of track and roadway would be required for electric lines and that they would be more expensive to maintain, and he also furnished data to show that the improved steam locomotive would be more economical than the electric locomotive. The figure which had been assumed by Messrs. Stillwell and Putnam as the cost of a horsepower in electric traction was 0.6 cent at the busbars and 0.8 cent at the drawbars, the former comprising 0.35 cent for fuel when coal of 14,000 British thermal units and costing \$3.00 per ton of 2,240 pounds was used, and 0.25 cent for power house maintenance and labor. From the statistics of the interstate commerce commission of 1905, Mr. Toltz obtains the cost of locomotive power by assuming that each locomotive will develop during six hours' work out of the twenty-four 250 drawbar horsepower, and dividing the total horsepower-hours into the total cost of fuel it would give six cents for fuel per drawbar horsepower as compared with the estimated cost of fuel of 0.35 cent for electric operation as assumed by Messrs. Stillwell and Putnam.

Mr. Toltz's investigation of the water powers of the Cascade mountains leads him to say that none of them can deliver electric power for drawbar horsepower for less than 0.5 cent. He claims also that if the Great Northern, the Northern Pacific and the Canadian Pacific were electrically operated the load factor would not exceed 48 per cent.

PIPING AND POWER STATION SYSTEMS—LV.

BY W. L. MORRIS, M. E.

Figure 318 (O 1-3) shows a hydraulic lift with the sleeve in place and a turntable on top of the platform. Ordinarily the pit for the platform would not be over 18 inches deep. A catch basin should be placed at the bottom of the pit to dis-

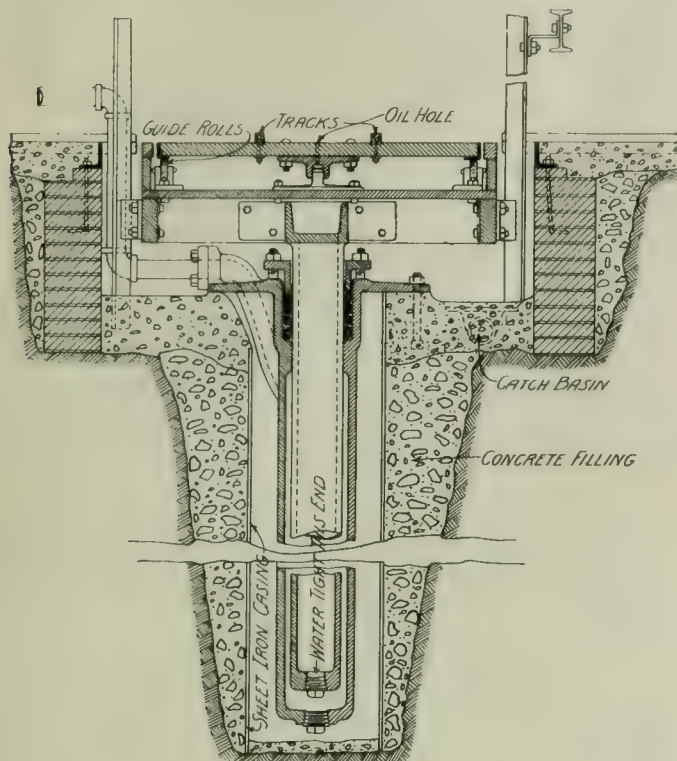
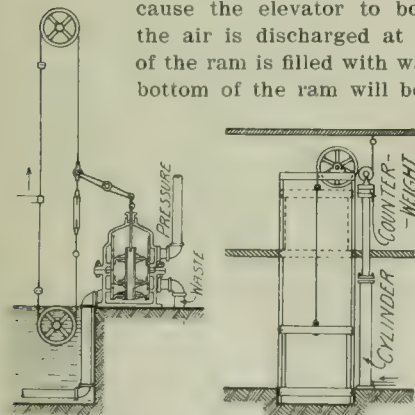


Figure 318 (O 1-3).

charge any water getting into it. The bottom end of the ram should be closed air tight, for if it is left open the inside of the ram will fill with air, become "air bound" and cause the elevator to bounce up and down. If the air is discharged at the top, and the center of the ram is filled with water, the pressure on the bottom of the ram will be reduced by an amount

equal to the area of the head times the weight of a column of water as high as the length of the ram. Two guides for the platform are generally fitted at diagonally opposite corners of the elevator shaft. These also are necessary



if a turntable is used on the elevator platform. For small power houses this type of the elevator is in many ways better than a high-speed electric elevator, being less easily damaged by careless handling and less liable to accident. If the lift were 16 feet or over it would be quite an undertaking to sink the casing plumb for such a distance and in such cases an outside cylinder with overhead sheaves and cable would be simpler to install and would be somewhat less expensive.

Such a lift is shown in Figure 319 (O 1-4), the hydraulic ram in this case having one-half the travel of the elevator platform. A sufficient counterweight must be loaded on the ram to permit it to discharge the water and raise the platform when loaded. This construction is quite similar to the

standard high-lift elevator construction. For high lifts an electrically operated elevator may be found more economical to operate.

It is only for a low lift that the type of elevator shown in Figure 318 is particularly adapted in power station work. An operating valve and operating cable are shown in Figure 320 (O 1-5). Automatic stops (top and bottom limits) are clamped to the operating cable, which, being struck by an arm extending from the platform, automatically shut off the water and stop the elevator at the upper and lower levels.

The pressure pipe for such an installation should be carried above ground, but the waste pipe may be run underground, especially if it discharges into a sewer. Unfortunately the location of the operating valve is generally such that it precludes the possibility of using pipe bends instead of elbows, but if it were possible to use them, the hoist would operate more quickly without requiring any greater power from the pump.

Class P 1—Air Lines—Main.

The use of compressed air in power stations is quite general, but for some classes of work it is used because it is available rather than because it is especially suitable. Ordinarily a motor-driven compressor of the type used on electric railway cars having an automatic governor is used. Air in many plants is used for blowing out dust and cleaning electrical machinery. These requirements are sufficiently urgent to make the installation of a compressor necessary. An air tank about eighteen inches in diameter and five feet high should be used to provide for sudden demands for air beyond the capacity of the compressor. For ordinary station use a steam-driven air compressor will be found to be more expensive and more troublesome to operate than the regular air compressor.

The air main and its branches may be made of black iron pipe with cast-iron fittings. The heating of the air as it is compressed is not sufficient to require any special consideration other than in the compressor itself. For stationary service, compressors are usually water jacketed, for the reason that water is available and can be circulated without the difficulties to be met with in water jacketing a compressor in car service. If a small compressor with a water jacket is obtainable it should be used. To avoid the neglect of opening the jacket lines when the compressor is started it may be well to use a tank, as shown in Figure 321 (P 1-1). Whenever heat is delivered to the cylinder the water will start to circulate and keep the cylinder cool until all the water in the tank becomes heated. A compressor thus fitted will show less wear on piston, cylinder and valves and will require less oil for internal lubrication. The motor would not have as heavy a load and a greater quantity of air would be delivered than otherwise.

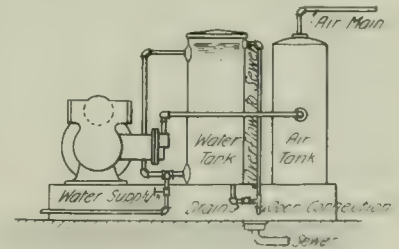


Figure 321 (P 1-1).

In determining the size of an air compressor, it would be well to consider the many uses for which air can be economically applied. In car shops air is used for forges, cranes, pneumatic tools, blowing dust out of cars, sand drying and many small applications. These services are most economically operated with air and are not such as to demand an absolutely uninterrupted service, therefore it is not necessary to install two air compressors.

(To be continued.)

In the construction of street railways in New York the total amount of cement used during 1906 was a fraction over 82,000 barrels.

News of the Week

New York Public Service Investigation.

At the hearing before the New York public service commission on September 18, at which the Interborough Rapid Transit Company was given an opportunity to show cause why it should not be required to increase its service 20 per cent for an hour and a half preceding and succeeding the rush hours, William M. Ivins, special counsel to the commission, inserted in the records reports and charts of observations made by the commission's assistants for the purpose of showing that the elevated and subway lines are not operated to their full capacity during rush hours. The commission had employed 127 men to make observations of the elevated and surface lines during the third week of August. E. P. Bryan, president of the Interborough company, stated that in the morning rush hours the company put into service every train that it was possible to run. When asked why only 17 cars are run on the Second avenue elevated line between 6 and 7 a. m., although the trains are often crowded with strap hangers, while 27 trains are run the following hour, Mr. Bryan said it was probably because the company had not sufficient equipment to maintain that headway for two hours. Frank Hedley, general manager, also testified as to the manner in which the schedules were made up. The Interborough hearing was adjourned until September 27.

At the investigation into the affairs of the Metropolitan Street Railway on September 19 the commission's accountant testified that checks amounting to \$3,500, paid to L. E. Quigg, a lawyer and politician, in 1902 and 1903, had been charged to the "special construction account," but Mr. Ivins was unable to learn for what services the money was paid.

Oren Root, Jr., general manager of the New York City Railway, was recalled and asked to explain why it was that in view of the fact that there had been an increase in 1905 and in nine months of 1906 of cash fares amounting to \$10,681,958 over the receipts of 1904, as shown by the company's reports to the state railroad commission, there had been a decrease in the 21 months referred to of 1,077,076 miles of car mileage.

"As a general proposition," Mr. Root replied, "under the conditions of operation in New York City today the question of car-miles could not be taken as a factor in the service rendered. As an illustration let me say that in December, 1906, we increased the number of cars the first three weeks in December with an attempt to meet the holiday traffic $3\frac{1}{2}$ per cent on the entire system. We actually got no increased carrying capacity out of it compared with December, 1905." Mr. Root also testified that the fender now in use was considered impracticable for New York conditions and that the company was perfecting a design of its own which it would shortly ask permission to adopt. He said that no new horse cars had been bought for five years and that the company now had 500 cars more than its schedules called for.

On the following day Mr. Root's examination was continued and the entire hearing was devoted to a consideration of the surface car service. Mr. Root reiterated his previous statements that it was impossible to run more cars until some means had been found for removing the congestion of the vehicular traffic. He referred to a letter written by Mr. Shonts to the commission some time ago, in which he made a number of suggestions for changes in the traffic regulations in order to give the street cars a freer use of the streets. Mr. Shonts' letter also suggested that on several streets where the width of the sidewalks was entirely out of proportion to the space devoted to teams and cars conditions would be improved by narrowing the walks. The letter was spread upon the records.

On September 23 Mr. Root was questioned with regard to the Madison avenue line, to show cause why the commission should not order an increase in the service. He produced figures to show that the heaviest travel was from September to December, inclusive. He said the closed cars seated 36 and the open cars seated 55 persons; this caused trouble in the winter, when less cars could be operated in rush hours and at the same time the cars accommodated less people. He said the company's new cars would not have cross seats, as they required more time for passengers to enter and leave. He considered the straphanger a necessary evil because "to do away with that class of passengers would certainly limit the carrying capacity of the lines." A member of the commission's staff testified that on September 19, between 5:30 and 6 p. m., 171 cars passed east and west and 104 cars north and south, at the corner of Twenty-third street and Madison avenue.

On September 23 the attorneys of the Interborough-Metropolitan Company advised the commission of their willingness

to permit an examination of the company's books by the commission's accountants, and the books were delivered to Mr. Ivins the following day.

On September 24 the commission heard the testimony of Daniel L. Turner, who has made a four days' study of the number of sitting and standing passengers on the elevated and subway lines during rush hours. He reported that the average number of standing passengers on all the lines was 49,742 a day, to accommodate whom would require an increase of 997 cars. The largest number was on the northbound Third avenue trains, 13,703 a day. Southbound trains on the same line in the morning hours showed a daily average of 10,100. To give every one a seat on the subway expresses in the morning at Ninety-sixth street would require 103 more cars.

Handling of Crowds Commended Editorially.

It is seldom that a daily newspaper commends a street railway for good service. In its issue of September 14 the Milwaukee Sentinel approved editorially the Milwaukee Electric Railway & Light Company for the manner in which it carried the crowds to the Wisconsin state fair on Milwaukee day. The Sentinel said:

"The tremendous multitude, surpassing in size any gathering of people ever held in Milwaukee, was taken to the grounds and brought back to the city without confusion, with practically no delay, and without an accident. Even at the most crowded hours, when thousands of persons were anxious to board the cars, they were required to wait but a short time, and, while it was a physical impossibility to provide a seat for every one who rode, every one was brought to the city or to the grounds expeditiously and much more comfortably than might have been expected."

Committees of Directors in Philadelphia.

At the suggestion of President John B. Parsons six committees of directors of the Philadelphia Rapid Transit Company have been created. Through these committees the directors will assume more active duties. The committees are as follows:

Executive Committee—P. A. B. Widener, Henry W. Phipps and W. H. Carpenter.

Finance Committee—George D. Widener, Clarence Wolf and George H. Earle, Jr.

Committee on Track Work—August B. Loeb, Henry W. Phipps and William H. Sheldermine.

Committee on Claims—Clarence Wolf, J. J. Sullivan and William H. Sheldermine.

Committee on Rolling Stock and Equipment—William H. Sheldermine, W. H. Carpenter and August B. Loeb.

Committee on Conducting Transportation—J. J. Sullivan, George H. Earle, Jr., and P. A. B. Widener.

Special Train to Atlantic City Convention.

In order to accommodate members of the American Street and Interurban Railway and affiliated associations who expect to attend the twenty-sixth annual convention at Atlantic City, N. J., October 14 to 19, the Pennsylvania Lines West of Pittsburgh will run a special train, to be known as "The Street Railway Special," leaving the Chicago Union station, corner of Canal and Adams streets, at 12 o'clock noon on Sunday, October 13, running direct to Atlantic City without change and arriving there the following day about noon. The train will be composed of Pullman modern sleeping, observation and library-smoking cars, with Pennsylvania Lines dining car.

For this occasion a fare of \$32.15 is authorized on what is known as the card order plan, round trip tickets to be sold on October 11, 12 and 13, to persons presenting card orders identifying them as members of the associations and which may be secured from B. V. Swenson, secretary of the American Street and Interurban Railway Association, 29 West Thirty-ninth street, New York. These tickets will be good returning until October 22, 1907. On the return trip sleeping car reservations can be made on application to James S. Murphy, ticket agent Pennsylvania Railroad, corner South Carolina and Atlantic avenues, Atlantic City.

Applications for space in this train should be made promptly, as there promises to be a large delegation.

First Car Operated Through Belmont Tunnel.

The first passenger car was operated through the Belmont tunnel under Forty-second street, New York, from Manhattan island to Long Island City, on September 21. Four round trips were made through the north tube and on the last trip a test for speed was made. The distance of more than two miles was made in $3\frac{1}{2}$ minutes, including the time for starting and stopping. A number of engineers and officials of the Degnon Contracting Company, which built the tunnel, and of the New York & Long Island Railroad Company, which owns the tunnel, made the trip for purposes of inspection. Power for the operation of the steel car was furnished from a

temporary power house at Fourth street and Jackson avenue. Current is received from the overhead third rail. Work on the uncompleted south tube is being rushed and it is nearly ready for traffic.

An official inspection was made through the tunnel on September 24, when August Belmont, with a large number of officials of the Interborough Rapid Transit Company, the New York & Long Island Railroad, the Interborough-Metropolitan Company and the Degnon Contracting Company, a number of city officials and members of the public service commission, made the trip through the tunnel. The operation during the first trip was entirely successful and much favorable comment was expressed with regard to the ventilation of the tunnel. The car almost entirely fills the space in the tube and consequently pushes the air ahead of it and draws in more behind.

Rules of Practice, New York Commission.

The New York public service commission for the second district has issued its rules of practice. General sessions will be held at the hearing room in the capitol at Albany on the dates appointed. Special sessions will be held at other times and places when ordered by the commission. The procedure with regard to complaints is very simple. No particular form is required other than that the statute violated shall be referred to. Upon the presentation of a complaint where the charges are of such a nature as to admit of satisfaction an order will be served upon the company complained of and the company required to answer within 20 days from the service of the order. In case the company disputes the charges made a public hearing will be given. Applicants for permission and approval to exercise franchises and privileges under Section 53 of the public service commission law are required to state thoroughly the public necessity for the service they intend to give. Full details of route and methods of operation must be given, also the method by which the new company, if it is a new one, or the extension, if of an old company, is to be financed.

Memphis Low-Fare Ordinance.—The upper house of the Memphis, Tenn., city council has passed an ordinance requiring the Memphis Street Railway to sell 11 tickets for 50 cents.

Electric Road Gets Mail Contract.—Beginning on October 1 the Toledo Fostoria & Findlay Railway will make two United States mail deliveries daily between Findlay and Fostoria, O.

To Compel Universal Transfers.—The mayor and city attorney of New Orleans have prepared an ordinance to be introduced into the city council which requires the New Orleans Railway & Light Company to adopt a universal transfer system.

Freight Service Started.—The City & Elm Grove Railroad of Wheeling, W. Va., on September 18 began operating a freight and express service between Wheeling and West Alexander, W. Va. The freight car will for the present make one round trip a day.

Paper on Signaling.—John I. Beggs, president and general manager of the Milwaukee Electric Railway & Light Company, will read a paper on "Signaling for Trolley Lines" at the meeting of the Railway Signal Association, to be held at Milwaukee on October 8.

American Institute of Electrical Engineers.—The first fall meeting of the season of 1907-1908 of the American Institute of Electrical Engineers will be held in the auditorium of the Engineering Societies' building, 29 West Thirty-ninth street, New York, on Friday, October 11.

Geary Street Road Operating.—The Geary Street Park & Ocean Railroad of San Francisco, which had run no cars since the beginning of the carmen's strike on May 5, on September 17 resumed operation under a permit from the city, with 10 cars and 43 platform men in service.

Arrested for Failure to Keep Required Space Between Cars.—Seven motormen on the Los Angeles Railway were arrested on September 18 on complaint of E. J. Fleming, city prosecuting attorney, for violation of the city ordinance which requires that cars shall be kept a distance of 20 feet apart.

To Compel Use of Air Brakes.—The street railway committee of the city council of Portland, Ore., has approved an ordinance requiring the use of air brakes on the cars of the Portland Railway Light & Power Company. The ordinance is opposed by the company's officials, who state that hand brakes are more satisfactory on the lighter cars. President B. S. Josselyn said that all new cars are being equipped with air brakes and that in a short time 125 of the company's 375 cars will be so equipped. The ordinance also provides that the cars shall not be run at a speed greater than

four miles per hour over street crossings or when passing a standing car. An attempt to reduce the speed limit from 12 to 8 or 6 miles per hour was defeated in the committee.

New Schedule for the Elgin & Belvidere.—The officials of the Elgin & Belvidere Electric Company are said to be preparing a new schedule which will reduce the running time between Elgin and Belvidere, Ill., to 1 hour 10 minutes and make possible a ride from Rockford to Chicago in 3 hours and 20 minutes, an hour less than the present schedule.

Accountants' Committee to Attend Railway Commissioners' Meeting.—President C. L. S. Tingley of the American Street and Interurban Railway Accountants' Association has announced the appointment of the following committee to attend the meeting of the National Association of Railway Commissioners at Washington, D. C., on October 8: W. F. Ham, C. N. Duffy and W. H. Forse, Jr.; alternate, W. G. McDole.

Ft. Wayne & Wabash Valley Mutual Benefit Association.—The recently organized Mutual Benefit Association of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., will begin operations on October 1. Over 340 employees of the company have joined the association. In addition to paying sick, accident and death benefits the association will establish reading rooms for the employees at various points on the system and will provide a circulating library.

Mob Prevents Franchise Grant.—An angry mob of citizens of Whiting, Ind., on September 21 took possession of the council chamber and prevented the passage of a 50-year franchise to the Hammond Whiting & East Chicago Electric Railway, which it was understood the aldermen were about to grant. The threat was made that any alderman who should vote for the franchise would be tarred and feathered. Most of the aldermen left the hall and one was severely beaten.

Pennsylvania Fare Law Upheld.—Judge John D. Shafer of Pittsburgh, Pa., on September 21 handed down a decision in the case of William H. Ashworth against the Pittsburgh Railways Company, upholding the constitutionality of the Kennedy act, which prohibits street railway companies in cities of the second class charging more than five cents fare for a continuous trip within the city limits, and consequently prevents the Pittsburgh Railways Company from charging 10 cents fare at night. The suit brought by Mr. Ashworth against the company, in which he claimed damages for having been ejected from a car on July 16 for refusal to pay more than five cents fare, is believed to have been a test case brought at the instigation of the company.

Spokane's Electric Railroads.—An excellent example of the progressive advertising methods of the Spokane & Inland Empire Railroad, Spokane, Wash., is furnished by the company's latest pamphlet, entitled "Spokane's Electric Railroads." This contains 24 pages of halftone illustrations of interesting views along the lines; interior and exterior views of the various types of rolling stock, which include electric locomotives, parlor cars and freight and baggage cars, as well as the ordinary types of passenger equipment; a large number of views of freight and passenger stations, most of which are architecturally pleasing, showing the large traffic, both freight and passenger, that is handled; the new power plant under construction at Nine Mile Bridge on the Spokane river, etc. The Inland Empire system now comprises about 200 miles of track, and extensions now under way or contemplated are expected to bring the total up to 225 miles by June 1, 1908. The cover page of the pamphlet contains the motto "Steam Practice Electrically Operated," which is especially applicable to this system.

Complaint Against Des Moines Interurban.—A petition signed by 116 farmers living along the Perry interurban line of the Inter-Urban Railway of Des Moines, Ia., has been forwarded to the Iowa railroad and warehouse commission, complaining of several alleged abuses on the part of the company. The complaint states that a large per cent of the right of way for the line was donated by the farmers, with the understanding that they were to have low fares, 1¼ cents a mile, but that the rate has been increased to 1½ cents or 2 cents with cash fares; that fares are only figured from certain stations, known as pay stations, and that those who board the cars at flag stops, located between the pay stations, are obliged to pay mileage to the next station beyond, which in many cases amounts to a high rate per mile of actual distance traveled; and that the Inter-Urban Railway enters the city of Des Moines over the tracks of the Des Moines City Railway, which has a franchise for a 5-cent fare, under a lease, and that it charges a mileage rate in the city. It is contended that the lessee cannot charge more for fares than the lessor under the franchise. One man, who lives near the Beaver avenue station, rides six miles into the city, but has to pay fare to Johnston, a distance of nine miles.

Construction News

FRANCHISES.

Brooklyn, N. Y.—The Brooklyn Rapid Transit Company has made application for permission to build a 4-track elevated structure along the Flatbush avenue extension to the new Manhattan bridge. The extension will cross the Myrtle avenue line overhead and connect with the present tracks on Flatbush avenue. Besides the 4-track line the plans contemplate the construction of additional elevated tracks affording connection with the Myrtle avenue line. The extensions will cost about \$8,000,000. The application has been referred to the committee of the whole.

Carthage, Ill.—The Mississippi Valley Electric Railway Company, which is building an electric line from this city west to Keokuk, Ia., and from Hamilton, opposite Keokuk, through Nauvoo, Ill., to Ft. Madison, has applied to the state board of railroad and warehouse commissioners for permission to cross the Wabash Railroad in this city at grade. The petition also requests permission to cross at grade the Toledo Peoria & Western Railroad at Elvaston, Ill.

Cheyenne, Wyo.—A franchise has been granted to W. J. Barker, Denver, Colo., to construct and operate an electric railway between this city and Ft. Russell. A deposit of \$6,000 must be made by the petitioner within 60 days as a guarantee that the line will be built.

Chicago, Ill.—The application of the Northwestern Elevated Railway, Chicago, to build a stub end terminal in North Water street from Wells to North Clark street with a station at North Clark was considered by the council committee on September 26, but no decision was reached. The company asked for permission to build the terminal on the ground that it would relieve the traffic on the Union loop.

Chicago, Ill.—At the meeting of the city council on September 23 the Chicago City Railway asked permission to lay tracks on the following streets, in order to form two loops, stating that frontage consents had been obtained: Seventieth street, Marshfield to Ashland avenue; Ashland avenue, Sixty-ninth to Seventieth street; Marshfield avenue, Sixty-ninth to Seventieth street; Langley avenue, Thirty-eighth to Thirty-ninth street; Thirty-eighth street, Cottage Grove to Langley avenue. The matter was referred to the transportation committee.

Eveleth, Minn.—The city council has granted a franchise to the Mesaba Traction Company for the operation of its interurban line through Eveleth. The company now has franchises in all the important towns along its route with the exception of Hibbing.

Houston, Tex.—The Houston Electric Company has applied to the county commissioners for right of way along the Harrisburg road for an extension of its line from the city limits of Houston to those of Harrisburg, to cost about \$50,000.

Indianapolis, Ind.—The Grand Central Traction Company, which proposes to construct an interurban line from Indianapolis to Terre Haute and Evansville, has secured a franchise in Indianapolis for right of way 50 feet wide by 800 feet long, cutting off the southwest corner of Garfield park.

Oakland, Cal.—An ordinance has been introduced in the city council granting to the Southern Pacific Coast Railway permission to convert its broad-gauge line running from Fourteenth and Franklin streets to the Alameda mole for electrical operation. This is the first active step of the Southern Pacific Railroad toward the general electrification of its local steam lines. The ordinance has been referred to the street railway committee.

Oshkosh, Wis.—A franchise has been granted to the Winnebago Traction Company to lay a double track on High street.

Oswego, N. Y.—A perpetual franchise has been granted to the Oswego Traction Company, its earlier franchise with a 25-year limit being rescinded. The new franchise is for a double track from a point in East Fourth avenue, between Utica and Albany streets to Burkle street.

Springfield, Ill.—The Springfield Consolidated Railway has been granted permission to extend its tracks on Tenth street, through Harvard Park and east on South Grand avenue, beyond the city limits.

Toledo, O.—The ordinance granting the Lima & Toledo Traction Company a perpetual franchise for the operation of its interurban line from the southern limits of Toledo to Eleventh and Lafayette streets and Belmont avenue, crossing

several of the streets at grade, has been signed by the mayor. Inside of 10 years the company must lower its tracks under the boulevard, South street and Western avenue, and in the meantime furnish safety gates and build depots at the grade crossings for the accommodation of local traffic. The signing of the ordinance marks the end of a long controversy as to whether the grant should be perpetual or for 25 years.

RECENT INCORPORATIONS.

American Railway & Power Company, Americus, Ga.—Incorporated in Georgia to build four miles of street railway in Americus and to erect an electric lighting plant. The company also will furnish the power for pumping water for the city, covering a period of 20 years. Capital stock, \$250,000. Incorporators: W. A. Dodson, A. W. Smith, Americus; E. B. Lewis, Montezuma; and J. F. Lewis, Valdosta, Ga.

Bal Cave Railway, Henderson, N. C.—Incorporated in North Carolina to build an electric railway from Rutherfordton to Bal Cave and Chimney, N. C., a distance of 20 miles. Capital stock, \$125,000. Incorporators: P. C. McNelly, Marion, S. C.; W. A. Smith and W. A. Garland of Hendersonville, N. C.

Birmingham & Gulf Railway & Navigation Company, Birmingham, Ala.—Incorporated in Alabama as an auxiliary corporation of the Tidewater Development Company of Birmingham, for the purpose of financing the construction of the proposed electric railway from Gadsden to Tuscaloosa, by way of Birmingham. The Birmingham & Gulf Construction Company was also chartered as an auxiliary corporation for the purpose of constructing the line, which, as announced in an earlier issue, is financed by New York and Philadelphia capitalists to the extent of about \$11,000,000. The Tidewater company has secured the Tuscaloosa Belt Railway at Tuscaloosa for terminal facilities and is in possession of all the necessary franchises and right of way, including one through the heart of Birmingham unoccupied by any other road. The two companies are incorporated for \$3,000 and \$100,000, respectively. Incorporators: J. M. Dewberry, Eugene F. Enslin and Forney Johnston, Birmingham, Ala. Joseph A. Vandegrift, Philadelphia, will be general manager. Robert B. Morehead and Charles H. Silliman of New York City are also interested.

Lansing Southern Railroad, Lansing, Mich.—Incorporated in Michigan as a subsidiary company of the Michigan United Railways to build two miles of electric railway through Mason, Mich. A franchise for the operation of the Michigan United Railways' line through Mason had been refused by that village and the incorporation of the Lansing Southern was resorted to for the purpose of condemning property for its right of way. By this means the Michigan United will be afforded a direct route for its proposed extension from Jackson to Lansing. Capital stock, \$50,000. Theron W. Atwood is one of the incorporators.

Larimer & Routt County Railway, Denver, Colo.—Incorporated in Colorado with a capital stock of \$1,000,000 to build an electric railway. Incorporators: Isaac Van Horn, M. P. Dickinson and L. W. Thompson of Walden, Colo.

Marquette Negaunee & Ishpeming Interurban Railway, Marquette, Mich.—Incorporated in Michigan to build an electric railway between Marquette and Negaunee, Mich.; capital stock, \$25,000. Incorporators: L. M. Sigler, John Stanton, J. W. Barber, C. C. Sigler, William H. Wagner, Kit Carson and W. K. Rose, all of Cleveland, O.

Memphis, Tenn.—The Clarksdale Collierville & Covington Interurban Railroad has been granted a franchise for a city entrance for its line from Clarksdale, Miss., to Memphis, Tenn.

Northern Electric Railroad.—Incorporated in California to acquire the property of the Northern Electric Company, Chico, Cal., operating an interurban line from Chico to Sacramento by way of Oroville, Yuba City and Marysville, and the Shasta Southern Railroad, operating between Chico and Hamilton. The new company also will construct electric railways between Chico and Redding, by way of Red Bluff, 76 miles; between Sacramento and Folsom, 20 miles, and from Sacramento to Hamilton through Woodland, 108 miles, with a branch from Colusa to Yuba City, 28 miles. This will practically consolidate under one head all of the electric railways now building or proposed in the Sacramento valley. Capital stock, \$25,000,000, with 100,000 shares of preferred stock and 150,000 shares of common stock. About 10 per cent of the capital, or \$339,000, has been paid in. Incorporators: President, R. Augustus Bray; treasurer, W. Maginnis; directors, Curtis Hillyer, Francis C. Van Diense, Martin S. Washburn, Henry C. Mack and Charles Elsey.

Oklahoma Central Interurban Railway Telephone Telegraph Light & Power Company, Oklahoma City, Okla.—Incorporated in Oklahoma to build an extensive system of interurban electric lines connecting practically all of the principal points in Oklahoma and Indian territories. Its main line will start from South McAlester, passing through Holdenville, Wewoka, Shawnee, Oklahoma City, El Reno, Geary and Weatherford to Cheyenne, the county seat of Roger Mills county. Branches are also to run from McAlester north to Checotah and Muskogee; south from McAlester to Atoka and Durant; north from Holdenville to Okemah and Okmulgee; south from Wewoka to Ada; north from Shawnee to Chandler and Stillwater; south from Shawnee to Pauls Valley, Davis and Ardmore; north from Oklahoma City to Guthrie and Perry; south from Oklahoma City to Norman and Purcell; north from El Reno to Kingfisher and Enid; south from El Reno to Chickasha and west to Anadarko and Lawton; north from Geary to Watonga; north from Weatherford to Taloga; south from Weatherford to Cordell, Hobart and Mangum, and north to Sayre and Elk City; 528 miles in all. The estimated cost of construction is \$17,000 per mile. Capital stock, \$5,000,000. Incorporators: Dr. R. X. Wade, J. R. Brown, J. B. Boucher, F. M. Stone, H. H. Codington, of Weatherford; Leon Brown of St. Louis; G. M. Watson of Nevada, Mo.; Louis Landmann of Jefferson City, Mo.; C. D. Freeman of Denver; and B. F. Sharp of Memphis.

Southwestern Interurban Railroad, Mangum, Okla.—Incorporated in Oklahoma to build an interurban line from Mangum to Hollis, Okla., by way of Francis, Granite and Cordell, with a branch from Granite to Hobart and from Mangum to Altus, a total distance of 119 miles. Capital stock, \$1,000,000. Incorporators: W. F. Sunderburk, D. J. Doyle, E. E. Pinkerton, T. P. Clay, H. M. Ferguson and R. C. Echois, all of Mangum, Okla.

TRACK AND ROADWAY.

Beach Haven Railway, Jacksonville, Fla.—Grading has been completed on two miles of this electric line, which will extend from Palmetto Beach to a point on Big Bayou. Upon the arrival of five cars of rails, which are expected soon, the work of laying the track will be pushed in order to have the line in operation by November 1.

Beaver Valley Traction Company, Beaver Falls, Pa.—This company has opened for traffic its 18-mile line between Beaver, Beaver Falls and Leetsdale, Pa.

Brownsville Carmichaels & Waynesburg Railway, Mason-town, Pa.—W. J. Sheldon, president, writes that grading on this single-phase alternating-current line will be started on October 15. This is the Green county division of the Brownsville Masontown & Smithfield Street Railway and will extend from Waynesburg to Rice Landing by way of Carmichaels and Jefferson, a distance of 15 miles. Surveys have been completed from Carmichaels to Waynesburg, 12 miles. All contracts have been awarded to the Masontown (Pa.) Construction Company, of which Mr. Sheldon is vice-president and general manager. The officers of the railway company are: W. J. Sheldon, president, McKeesport; M. H. Cloud, vice-president; C. S. Crawford, treasurer, Masontown; John Lueckert, secretary, McKeesport, Pa.

Columbus Delaware & Marion Railway, Columbus, O.—The grading on the Marion-Bucyrus extension of this line is nearly completed and tracklaying will be started next week. George W. Whysall, general manager, is quoted as saying that the line will be in operation this fall. Much delay in its completion has been caused by the scarcity of labor.

Denver & Interurban Railroad, Denver, Colo.—Fourteen of the 16 miles of grading necessary between Denver and Louisville Junction have been completed and it is stated the line will be in operation between Denver and Boulder by next February. It is the intention to use the tracks of the Colorado & Southern in Boulder as far as the "Y," from which point it is proposed to reach the heart of the city along Pearl street to Twelfth street by independent tracks, for which right of way is now being negotiated.

Ensley (Ala.) Street Railway.—All the material for this company's electric line in Ensley has been purchased and the contracts let. Tracklaying has been started and the local line will probably be in operation within a few months. The rails to be used will be made in the Ensley steel mills. The line later will be extended to South Highlands.

Evansville Princeton & Vincennes Interurban Railway, Evansville, Ind.—This company on September 21 opened for traffic its recently completed extension from Evansville to Darmstadt. This route shortens the distance between Evansville and Princeton and reduces the running time 20 minutes.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—It is stated that this company's extension from Princeton to Patoka, Ind., will be completed within 60 days. The extension covers 4½ miles and includes five bridges, the largest of which will be over the Patoka river near Patoka. The Lafayette Engineering Company has the contract for the building of the bridges and Jones Brothers of Columbus, O., will do the track work.

Fairview, Nev.—Twenty thousand dollars has been raised in this city by popular subscription for the installation of an electric light plant and the construction of an electric railway, which will connect Fairview with the adjacent mining properties. It is announced that arrangements are now being completed for the financing of these proposed systems by San Francisco capitalists. E. D. Lidstone of Fairview is interested.

Ft. Worth-Mineral Wells Interurban Railway, Mineral Wells, Tex.—J. H. Orndorff, Mineral Wells, general superintendent, writes that contracts for the first 10 miles of road out of Mineral Wells were let on September 20 to the American Engineering Company of Indianapolis, Ind., and that construction work will be started about September 27. The line will connect the two points named in the title and will be 60 miles long. A. C. Harrington, chief engineer, Indianapolis, Ind. W. L. Erickson, assistant chief engineer, Mineral Wells, Tex.

Georgia-Carolina Railway.—The contract for surveying a route for this company's line from Athens, Ga., to Anderson, S. C., has been awarded. W. L. Hodges, president, Hartwell, Ga.

High Point, N. C.—One mile of the electric railway which D. Allen is promoting from High Point to Thomasville, Greensboro and Winston-Salem, has been completed in this city from the center to the city corporate limits and work will now be resumed toward Thomasville, several miles of which already have been graded.

Indiana Union Traction Company, Anderson, Ind.—This company has plans under way for the construction of a new bridge over the White river at Clusterton. Several fills also will be made for the purpose of eliminating a bad curve at that point. About \$40,000 will be expended on this work.

Indianapolis Columbus & Southern Traction Company, Columbus, Ind.—Rapid progress is reported on this company's Seymour extension and it is announced that cars will be running between Columbus and Seymour by October 1. All of the grading has been finished, practically all of the overhead work has been completed and there remains but a small portion of the track to be laid.

Lewiston, Me.—Preliminary surveys are to be started at once by J. A. Jones of Portland, Me., for an electric railway which it is proposed to build between Lewiston and Portland. The line will be 33 miles long.

Lexington & Frankfort Interurban Railway.—Announcement is made that this road will be formally opened for traffic on October 1, the initial trip over the line to be made by the business men's club of Frankfort, Ky.

Meridian (Miss.) Street Railway.—The problem of connecting the north and south divisions of Meridian by an electric railway was settled at a conference on September 20 of representatives of the street railway company and the Mobile & Ohio and Queen & Crescent Railroad companies, resulting in an agreement that a viaduct over the railroad tracks be built at a cost of \$50,000, the interested parties to share the expense.

Missoula, Mont.—Announcement is made of the proposed adoption of electric traction on the Bitter Root division of the projected Chicago Milwaukee & St. Paul lines in Montana and Idaho. The line of this division will pass from Missoula, Mont., through Lost Pass of the Coeur d'Alene mountains, following the St. Joseph river for about 100 miles west of the divide and making a junction with the Northern Pacific at Chatcolet, Idaho, on Lake Coeur d'Alene. A 4,000-foot tunnel in Lost Pass will be the largest of several tunnels that will be built. The heaviest grades will be 1.7 per cent, with 10-degree curves. The Idaho & Montana Power Company, a subsidiary corporation, will develop power at various points along the St. Joseph river for the operation of the line.

Oregon Electric Railway, Portland, Ore.—Plans are being made for beginning operation on the new line from Portland to Salem, Ore., about November 1. Practically all of the grading has been completed and some of the tracklaying. The bridge over the Willamette river at Wilsonville is practically complete and construction trains are running over it. G. W. Talbot, general manager.

Quitman Valdosta & Thomasville Electric Railway, Quit-

man, Ga.—At a meeting of the stockholders of this company directors were elected as follows: A. C. McLeod, O. K. Jelks, Frank Spain, J. W. Spain, L. W. Branch, S. S. Bennett, J. D. Wilson, H. L. Young, R. B. Young, E. C. Bridges and F. Groover. The following officers were elected: A. C. McLeod, president; H. L. Young, vice-president; J. J. Jelks, secretary and treasurer.

Rochester Corning & Elmira Traction Company.—Announcement is made that this company will abandon the construction of its proposed line from Corning to Elmira and use instead the tracks of some traction company operating between these points. This decision was reached at a hearing of the company before the public utilities commission in Albany last week. There are two electric and two steam roads now operating between Corning and Elmira whose existence is believed to have caused the recent decision.

Silver City, N. M.—The survey for the construction of an electric railway from Silver City to the power plant of the New Mexico Light & Power Company, which is to be erected eight miles north of Pinos Altos, has been completed. The line will be about 18 miles long and will afford an outlet to the market for the timber in that district. Both passengers and freight will be carried.

Spokane Cheney & Southern Railway.—Tracklaying has been completed on this line from Spokane to Cheney, Wash. Ballasting has been started and the road is expected to be in operation in a few days.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.—This company has begun laying new rails on South Fourteenth street, Newcastle, Ind., a distance of about half a mile. The new rails, which replace the old light-weight rails, are 7-inch, 90-pound girder rails.

Toledo & Chicago Interurban Railway, Kendallville, Ind.—This company now has a force of men at work grading on an extension to Waterloo, preparatory to the laying of track. It is expected that the line will be in operation from Auburn over the Waterloo extension into Waterloo within two weeks.

Wausau (Wis.) Street Railroad.—Neal Brown, president, writes that this company has constructed and is now operating 5½ miles of its line, which will ultimately extend from Schofield to Merrill, Wis., 25 miles, via Wausau and Brokaw. The grading has been completed the entire distance. The Knox Engineering Company of Chicago, Ill., has charge of the engineering work. The company expects at an early date to build a water power plant at Trappe Rapids on the Wisconsin river, about ten miles south of Wausau, where 4,000 horsepower will be available. As a temporary measure power is being purchased from the Wausau Electric Company.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—It is announced that the contract for the excavation of a new line which this company will build between Little Valley and Salamanca, about four miles, has been let to P. R. Colgan and M. V. Ryan of Dunkirk, N. Y. Work already has been started on the contract.

POWER HOUSES AND SUBSTATIONS.

Indianapolis Newcastle & Toledo Electric Railway, Newcastle, Ind.—The large Allis-Chalmers engines and generators for the power house at Newcastle have arrived and are being installed.

Northwestern Pacific Railroad, San Francisco, Cal.—A building at San Anselmo, Cal., at present used as a storage battery station, will be enlarged and two 500-kilowatt motor generators will be installed. This change is made necessary by the new equipment put in service to take care of the increase in traffic.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has recently erected at a cost of \$12,000 a reinforced concrete substation at the corner of Twenty-seventh and Lake streets. The Kahn system of steel reinforcing was employed. The work was done by the Capital City Brick & Pipe Company and the Trussed Concrete Steel Company.

Southern Pacific Railroad, Oakland, Cal.—As reported in the Electric Railway Review of September 21, this company has completed contracts for the erection of a power house at Oakland. The contract is for \$900,000, and it is expected that the cost of the substations and the main station will be approximately \$2,000,000. The contracts were let by A. H. Babcock, electrical engineer of the Southern Pacific Railroad.

Susquehanna Traction Company, Lock Haven, Pa.—This company has begun work on the enlargement of its power house and car barn and will make a number of needed improvements.

Personal Mention

Mr. I. H. McEwen has been appointed assistant superintendent of the West Shore Railroad, in charge of the Oneida Railway Company, which operates the electrified division between Utica and Syracuse, N. Y.

Mr. J. M. Bradley has resigned as superintendent of the electric department of the Birmingham (Ala.) Railway Light & Power Company, to engage in other business. Mr. Bradley has been connected with the Birmingham company and its predecessors for 22 years.

Mr. Frank B. Batchelder, until recently associated with L. B. Stillwell, consulting engineer, New York City, as assistant to the superintendent of power and construction, has been given entire charge of the operation of the power plant and substations of the United Railways & Electric Company of Baltimore, with the title of acting superintendent of motive power. Mr. Batchelder was formerly chief clerk and later assistant to the superintendent of motive power of the Boston Elevated Railway, resigning this position last January to go with L. B. Stillwell, who has the contract for the reconstruction and operation of the plants of the United Railways & Electric Company.

Mr. C. E. Flynn has been elected president of the Conneaut & Erie Traction Company, Erie, Pa., succeeding Mr. R. L. Forrest of Philadelphia, resigned. Mr. John S. Rilling



C. E. Flynn.

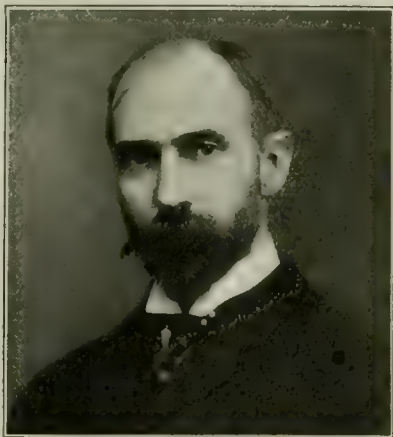
of Erie has also been elected vice-president, succeeding Mr. M. M. Freeman of Philadelphia, resigned. Mr. Flynn, the new president, was until June 30 of this year, vice-president and general manager of the company. He has had a long experience in the electric railway and electrical engineering business, and for about eight years previous to 1893 was with the General Electric and subsidiary companies, the Vandevoele and Thomson-Houston companies, as constructing and mechanical engineer superintending the construction and operation of electric railways. In 1887 he installed the

first street railway system in Wheeling, W. Va. From 1893 to 1897 he was electrical engineer and superintendent of motive power of the Central Railway Company of Peoria, Ill. From January, 1897, to February, 1900, he was general manager of the Carbondale Traction Company and the Lackawanna Valley Rapid Transit Company. During his connection with these companies the operating expenses were reduced nearly 50 per cent. From February, 1900, to November 1901, he was general manager of the Easton Consolidated Company of Easton, Pa., which controlled 12 underlying properties, which were later leased to the Lehigh Valley Traction Company of Allentown, Pa. From November, 1901, to July, 1903, he was general manager of the Wheeling (W. Va.) Traction Company and in 1903, under his management, the only two dividends in the history of that company were paid. On May 1, 1904, he resigned to become vice-president and general manager of the Conneaut & Erie Traction Company, which position he held until June 30, 1907, when he resigned and went on an extended pleasure trip through the west, until his election as president.

Mr. William E. Moore, general manager of the West Penn Railways Company and its subsidiary corporations, with headquarters in Connellsville, Pa., is to leave Connellsville soon and go to Pittsburg, where he will act in the capacity of consulting engineer and adviser to Mr. W. S. Kuhn, president of the West Penn Railways Company. Mr. Moore will continue to hold the title of general manager and Mr. George R. Folds, who recently resigned as general manager of the South Chicago City Railway and the Hammond Whiting & East Chicago Electric Railway, as previously announced in the Electric Railway Review, has been appointed assistant general manager of the West Penn Railways and will assume many

of the duties formerly handled by Mr. Moore. Mr. Moore has been connected with this company for about 4½ years, part of the time as general superintendent.

Mr. Charles N. Black, whose portrait is presented herewith, has recently resigned as vice-president, general manager and chief engineer of the Metropolitan Street Railway of Kansas City, Mo., and has gone to San Francisco, Cal., to accept the position of vice-president and general manager of the United Railroads, succeeding George F. Chapman, deceased, as previously announced in the Electric Railway Review. Mr. Black was associated with Ford, Bacon & Davis of New York for a number of years and in 1902 went to Kansas City in charge of the reconstruction of the street railway and lighting properties, which was being done by that firm. In 1905 he resigned to become general manager and chief engineer of the Metropolitan company.



Charles N. Black.

Mr. Lucius T. Gibbs has been appointed electrical engineer of the Baltimore & Ohio Railroad, succeeding Mr. W. D. Young, resigned. Mr. Gibbs is a graduate of Cornell and since then has served in various engineering capacities with steam and electric railways. He was at one time electrical engineer of the Milwaukee Electric Railway & Light Company and vice-president and chief engineer of the Gibbs Electric Company of Milwaukee. During the Spanish-American war he entered the navy, serving as assistant engineer on the Newark and later on the battleship Brooklyn. More recently he has been engaged as consulting engineer in New York City and was for a time associated with the Westinghouse Company.

Mr. Fred. A. Stowe, whose appointment as assistant to President T. E. Mitten of the Chicago City Railway has been announced, was born in Chicago on August 29, 1872. He was



Fred. A. Stowe.

graduated from the collegiate department of the University of Iowa, class of 1892, and later took a post-graduate course in political economy and political science at the University of Chicago and in law at Northwestern University, Evanston, Ill. After leaving college Mr. Stowe entered newspaper work, his first experience in journalism having been on the staff of the Chicago Tribune. He subsequently became connected with the Chicago Chronicle, where he remained for 10 years as political editor. In Mr. Stowe's office as assistant to President Mitten he will have much of the responsibility and many of the important duties which were connected with the office of vice-president when that position was held by Mr. Mason B. Starring, who resigned last spring to become president of the Northwestern Elevated Railroad of Chicago.

Mr. Joseph O'Hara, superintendent of the Aurora Elgin & Chicago Railroad, with headquarters at Wheaton, Ill., has resigned, effective about November 15, to accept a position with the Washington Baltimore & Annapolis Electric Railway, Baltimore, Md. Mr. O'Hara formerly was connected with the Eastern Ohio Traction Company, Cleveland, O., resigning about four years ago to become superintendent of the Aurora Elgin & Chicago, which at that time had just been completed.

Financial News

Baltimore Terminal Company.—This company has given a trust deed to the Citizens' Savings and Trust Company, Cleveland, O., as trustee, to secure an issue of not exceeding \$2,500,000 of 5 per cent bonds, due on March 1, 1927, but subject to call at 110 and interest on March 1, 1917, or on March 1, 1922. Of these bonds \$1,250,000 are outstanding and are guaranteed principal and interest, by the Washington Baltimore & Annapolis Electric Railway of Washington, D. C.

Chicago City Railway Company.—The following statement of gross earnings, operating expenses, fixed charges and division of net earnings for the six months ended July 31, 1907, has been made to Mayor Busse of Chicago:

Gross Earnings—			
Passenger	\$4,014,557.03		
Chartered cars	1,351.00		
Mail	12,430.20		
Newspaper	750.00		
Advertising	18,750.00		
Rent of land and buildings.....	123.00		
Rent of tracks.....	2,985.00		
Sale of power.....	6,389.85		
			\$4,057,336.08
Operating Expenses—			
Maintenance way and structures...\$	273,509.86		
Maintenance power plant.....	12,947.12		
Maintenance cars	230,878.68		
Maintenance miscellaneous equip...	8,667.62		
Miscellaneous shop expenses.....	34,040.23		
Operation of power plants.....	497,342.16		
Operation of cars.....	1,242,813.70		
General expenses	400,391.46		
Unexpended balance of 70 per cent allowance	139,544.41	2,840,135.24	
Excess of gross earnings over operating expenses			\$1,217,200.84
Fixed Charges—			
Taxes	\$ 137,500.02		
Interest on investment.....	576,036.91		
Interest on employees' deposits.....	97.49	713,634.42	
Net earnings for the six months.			\$ 503,566.42
Divisible as follows:			
Chicago City Railway Company, 45%..\$	226,604.89		
Less interest on bank deposits payable to city.....	1,256.77		
			\$ 225,348.12
City of Chicago, 55%....\$	276,961.53		
Add int. on bank deposits	1,256.77	278,218.30	
			\$ 503,566.42

This report was accompanied by the following statement from Marwick, Mitchell & Co., chartered accountants: "This statement of income is prepared in accordance with the accounts of the company. It is submitted subject to the verification of the detailed audit now being made by us."

Chicago General Railway.—The property of this company will be offered for sale on September 30 in pursuance with a decree in favor of the Merchants' Loan and Trust Company, as trustee. The upset price is \$1,000,000. The property has been deeded to the Southern Street Railway Company, subject to the foreclosure proceedings.

Joliet & Southern Traction Company, Joliet, Ill.—This company has given a trust deed to the American Trust and Savings Bank of Chicago, as trustee, to secure an issue of \$1,500,000 of 5 per cent bonds, due serially. The last bonds mature in 1942. The proceeds of the bonds will be used for the construction and equipment of new lines.

York Railways Company, York, Pa.—Announcement is made of the consolidation at Camden, N. J., on September 24, of all the electric railways in York county, Pennsylvania, under the name of the York Railways Company. The new organization will acquire the properties of the following electric lines: York Street Railway, York & Dover Electric Railway, York & Dallastown Electric Railway, York & Wrightsville Electric Railway, York Haven Street Railway, Red Lion & Windsor Street Railway, Colonial Street Railway and the York & Manchester Electric Railway. The York & Hanover Electric Railway, a partly completed line, is also included in the new merger. Among the improvements and extensions under way and contemplated are the completion of the York

over & York line, the extension of a line into Harrisburg and the double-decking of the Pennsylvania Railroad bridge into Columbia in order to provide electric railway communication with Lancaster county. The capital stock of the new company is placed at \$6,000,000, including \$1,600,000 preferred stock.

ELECTRIC RAILWAY EARNINGS.

Aurora Elgin & Chicago Railroad.			
August—	1907.	1906.	
Gross receipts	\$150,597.47	\$131,434.46	
Operating expenses	73,463.23	62,656.92	
Net earnings	77,134.24	68,777.54	
Fixed charges	26,986.44	24,939.13	
Surplus	50,147.80	43,838.41	
Two months ended August 31—			
Gross receipts	\$302,849.52	\$267,232.09	
Operating expenses	148,371.74	127,628.41	
Net earnings	154,477.78	139,603.68	
Fixed charges	54,494.70	49,878.26	
Surplus	99,983.08	89,725.42	
Montreal Street Railway Company.			
August—	1907.	1906.	
Total earnings	\$329,755.11	\$300,278.36	
Operating expenses	184,844.15	158,415.38	
Net earnings	144,910.96	141,862.98	
Total charges	67,208.02	59,429.61	
Surplus	77,702.94	82,433.37	
Expenses, per cent of earnings.....	56.05	52.76	
October 1 to August 31—			
Total earnings	\$3,164,399.46	\$2,794,947.90	
Operating expenses	1,946,389.33	1,686,769.19	
Net earnings	1,218,010.13	1,108,178.71	
Total charges	524,555.10	434,239.87	
Surplus	693,455.03	673,938.84	
Expenses, per cent of earnings....	61.51	60.35	
Puget Sound Electric Railway, Tacoma, Wash.			
July—	1907.	1906.	
Gross earnings	\$171,146	\$138,152	
Net earnings	69,597	53,745	
Surplus over charges	36,862	28,159	
Whatcom County Railway & Light Company, Bellingham, Wash.			
July—	1907.	1906.	
Gross earnings	\$30,394	\$23,269	
Net earnings	12,156	8,208	
Surplus over charges	5,404	4,449	

Dividends Declared.

American Cities Railway & Light Company, New York, preferred, quarterly, $1\frac{1}{2}$ per cent.
 Aurora Elgin & Chicago Railroad, Chicago, common, quarterly, three-fourths of 1 per cent; preferred, quarterly, $1\frac{1}{4}$ per cent.
 Bangor (Me.) Railway & Electric Company, quarterly, $1\frac{1}{4}$ per cent.
 Cincinnati (O.) Street Railway, quarterly, $1\frac{1}{2}$ per cent.
 Cleveland (O.) Electric Railway, quarterly, three-fourths of 1 per cent.
 Easton (Pa.) Consolidated Electric Company, semi-annual, $2\frac{1}{2}$ per cent.
 Forest City Railway, Cleveland, O., quarterly, $1\frac{1}{2}$ per cent.
 Havana (Cuba) Electric Railway, preferred quarterly, $1\frac{1}{2}$ per cent.
 Johnstown (Pa.) Passenger Railway, quarterly, three-fourths of 1 per cent.
 Manila (P. I.) Electric Railroad & Lighting Company, 1 per cent.
 Metropolitan West Side Elevated Railway, Chicago, preferred, quarterly, three-fourths of 1 per cent.
 Springfield (Ill.) Railway & Light Company, quarterly, 1 per cent.
 Tri-City Railway & Light Company, Davenport, Ia., preferred, quarterly, $1\frac{1}{2}$ per cent.
 United Railways of St. Louis, preferred, quarterly, $1\frac{1}{4}$ per cent.
 West End Street Railway, Boston, common, $3\frac{1}{2}$ per cent.
 Capital Traction Company, Washington, D. C., quarterly, $1\frac{1}{2}$ per cent.
 Chicago City Railway, quarterly, $1\frac{1}{2}$ per cent.
 Louisville (Ky.) Traction Company, common, quarterly, 1 per cent; preferred, semi-annual, $2\frac{1}{2}$ per cent.
 New Orleans Railway & Light Company, preferred, five-eighths of 1 per cent.
 St. Joseph (Mo.) Light Heat & Power Company, preferred, quarterly, $1\frac{1}{4}$ per cent.

Manufactures and Supplies

ROLLING STOCK.

Boise & Interurban Railway, Boise, Idaho, has purchased two cars from the St. Louis Car Company.

East Liverpool Traction & Light Company, East Liverpool, O., is in the market for 24 double-truck cars.

Worcester Consolidated Street Railway, Worcester, Mass., it is reported, has placed an order with the John Stephenson Company for 25 cars.

Indiana Columbus & Eastern Traction Company, Columbus, O., has placed an order for one double-truck car with the Cincinnati Car Company.

Claremont Railway & Lighting Company, Claremont, N. H., has placed an order with the American Locomotive Company for one electric locomotive.

Louisville & Eastern Railroad, Louisville, Ky., which the Electric Railway Review of March 2 reported to be in the market, has placed an order for four double-truck cars.

Sioux City Traction Company, Sioux City, Ia., is building six double-truck closed cars in its own shops. The trucks are furnished by the Taylor Electric Truck Company.

Maj. H. J. Crowley, general manager of the American Railways, 1729 McKean street, Philadelphia, Pa., is reported to be in the market for 100 street railway cars for shipment to South America.

Camden & Suburban Railway, Camden, N. J., which the Electric Railway Review of June 22 reported to be in the market for 41 cars, has contracted with the John Stephenson Company for 41 double-truck cars.

Northern Electric Street Railway, Scranton, Pa., was reported in the Electric Railway Review of August 31 to be in the market for 10 double-truck cars. Richard W. Day, general manager, advises us that the contract for these cars has been awarded to The J. G. Brill Company. The equipment will be furnished by the Westinghouse Electric & Manufacturing Company.

Lewiston Augusta & Waterville Street Railway, Lewiston, Me., was reported in the Electric Railway Review of September 21, to have purchased 12 cars. E. D. Reed, general manager and chief engineer, advises us that the order was placed with The J. G. Brill Company in August, and delivery is to be made in January, 1908. The cars are of the semi-convertible type, 43 feet long over all, and weigh 15,000 pounds, unequipped.

Ft. Dodge Des Moines & Southern Railroad, Des Moines, Ia., as reported in the Electric Railway Review of September 14, has purchased two double-truck closed cars from the St. Louis Car Company. The specifications include the following details:

Seating capacity.....	40 passengers	Length of body.....	28 ft.
Weight	32,000 lb.	Over vestibule	40 ft.
Wheel base	4 ft. 6 in.	Over all	41 ft.
Height, inside	7 ft. 9 in.	Width, inside	7 ft. 7 in.
Sill to trolley base.....	8 ft. 8 in.	Over all	8 ft. 5 in.
Height, track to trolley base	11 ft. 8 in.	Body	Wood
		Underframe ..	Wood and steel

Special Equipment.

Air brakes.....	Westinghouse	Heating system	
Axles	Hammered steel	Consolidated Car-Heating Co.	
Bolsters, body.....	Trussed plate	Headlights	
Truck	Trussed plate	Dayton Manufacturing Co.	
Brakeshoes	Cast iron	Interior finish	Mahogany
Center bearings.....	Malleable	Journal bearings	Spiral
Couplers	St. Louis Car Co.	Journal boxes	Cast iron
Curtain fixtures.....	Forsyth	Motors.....	Four Westinghouse
Curtain material	Pantasote	Safety tread	Metal
Destination signs.....	Illuminated	Seats	St. Louis Car Co.
Dust guards.....	Wood	Trucks	St. Louis Car Co.
Hand brakes.....		Trolley catchers	Knutson
.....	Malleable, vertical geared		

SHOPS AND BUILDINGS.

Joplin & Pittsburg Railway, Joplin, Mo.—This road, which is under construction, expects to build a car house at Joplin and two transfer stations, one at Chitwood and the other at Asbury, Mo.

Pacific Electric Railway, Los Angeles, Cal.—Work on the station at Monrovia, Cal., mentioned in the Electric Railway

Review of June 15, has been started. It will be of the mission type of architecture and the estimated cost is \$10,000.

TRADE NOTES.

F. P. Huntley has been elected vice-president and general manager, and **George G. Milne** secretary, of the **Gould Coupler Company**, New York.

B. F. Sturtevant Company, Boston, Mass., has been awarded the contract for the heating plant in the new repair shops of the **Hocking Valley** at Columbus, O.

Kansas City Car Building & Contracting Company has been incorporated in Missouri with a capital stock of \$2,100. Incorporators: **C. C. Mills**, **E. O. Brown**, **R. F. Ralon**, **John Cox**, **W. A. Payne** and **E. W. Hare**.

Robert Long, South American representative of the **National Brake & Electric Company** of Milwaukee, has sailed for London to look after the interests of his company there. From London he will go to Buenos Aires and Rio de Janeiro.

Niles-Bement-Pond Company, New York, N. Y., has received an order from the **General Electric Company** for one 15-ton crane and one 30-ton crane, both with a 65-foot span. These cranes are to be installed in the **General Electric Company's** storage warehouse at Schenectady.

Price Publishing Company, Lima, O., in addition to its well-known electric railway maps of Ohio, Indiana and Michigan, has just issued a similar map of the states of Illinois, Wisconsin and Iowa, and will shortly have one out of New York, Pennsylvania and other eastern states.

Putnam A. Bates, New York, N. Y., has been made consulting electrical engineer for **Hay & Co.** of London, Eng. Mr. Hay was in this country recently and the appointment is the result of his investigation. **Hay & Co.** act as fiscal agents for the sale in Europe of complete issues of high-grade securities.

W. F. Bossert Manufacturing Company, Utica, N. Y., has been incorporated with a capital stock of \$50,000 to manufacture railway signals. The directors of the company are: **William F. Bossert**, 432 Sunset avenue; **Hiram C. Williams**, 351 Genesee street; **Charles G. Bennett**, 342 Blandina street; all of Utica, N. Y.

Emery Steel Company, Brown-Marx building, Birmingham, Ala., has been incorporated by **J. A. Emery**, **R. C. Foster** and **J. H. Pritchard**, with a capital stock of \$15,000. The company will operate the **Weller rolling mill** at Gadsden, Ala. Track bolts, light rails, concrete bars and other specialties from soft steel will be manufactured.

John MacD. Greene, Drexel building, Philadelphia, as an engineer-broker, acts for buyers or sellers of second-hand railway and contractors' equipment. He has a list of available materials on hand for those desiring an entire or any part of an equipment. The modernizing of manufacturing plants is a special feature of Mr. Greene's work.

Technical Literature, published by the **Technical Literature Company**, 220 Broadway, New York, with the September number has been changed to the standard magazine size, 7 by 10 inches, and presents in more attractive form than ever its monthly digest of engineering and technical journals. The usual index to technical articles in current periodical publications is continued.

Buffalo Forge Company, Buffalo, N. Y., recently received among its orders for foreign shipments one of special interest, covering a horizontal center-crank compound automatic engine, 13 by 20 by 14, for direct connection to a **General Electric Company** generator. This unit is to be used for the electric illumination of the tower of **Noshiro**, which is located on the northwest coast of Japan.

D. C. Newman Collins, consulting engineer and industrial architect, 29 Broadway, New York, has recently issued a bulletin and paper, which will be found of considerable interest and benefit to persons contemplating the erection of a manufacturing building, warehouse, mill or anything in the way of an industrial plant. The publication covers the details of the numerous kinds of material and different methods employed in erection of various classes of structures.

General Fireproofing Company, Youngstown, O., has completed a contract with the **Rogers Shear Company**, Warren, Pa., manufacturer of the universal corner bead, for the control of the sale of this product throughout the United States. This material is made of steel heavily galvanized and is used as a reinforcement for plastered corners and finishing plastered walls around windows, ovals, arches, etc., doing away

with the necessity for combustible wood trimmings. The use of corner bead is said to greatly improve the appearance of structures, besides adding to its fireproof qualities, and eliminating the necessity for frequent repairs of plastered corners.

Northern Engineering Works, Detroit, Mich., has furnished the **North Shore Electric Company** with two alternating-current electric cranes for its new power stations at **Waukegan** and **Blue Island**, near Chicago. These cranes are 30 tons and 25 tons, respectively, with 58-foot and 39-foot spans. The larger crane is equipped with an auxiliary high-speed 5-ton alternating-current hoist. The **Black Hills Traction Company** has also recently installed an 8-ton 32-foot span **Northern** traveling crane at **Spearfish**, S. D.

Standard Varnish Works, New York, N. Y., has purchased 12 acres, with an option on five more, at **Chicago Heights**, Ill. The company writes that plans are now being prepared for the erection of the largest varnish factory in the world and that ground will be broken shortly. The **Standard Varnish Works** already has a warehouse and factory at 2620 **Armour** avenue, Chicago, where a part of the goods for its western trade is manufactured, although the larger percentage comes from its eastern plant, which is said to be, at present, the largest varnish factory in the world. The proposed factory at **Chicago Heights**, when completed, will be as perfect as modern equipment and methods can make it, and will double the capacity of the **Standard Varnish Works**.

Eugene Munsell & Co., the well-known dealers in mica, and the **Mica Insulator Company**, manufacturer of **Micanite** and other high-grade electrical insulators, for years located at 218 **Water** street, New York, have removed to 68 **Church** street, corner of **Vesey** street. Owing to the increase in their business they were compelled to seek more commodious quarters, and their new location is one of the most central in the downtown business district, being only one block west of **Broadway**, and within five minutes' walk of the principal railways and ferries. They occupy four floors at their new location, the second floor being devoted entirely to their office, while the other three are used for stock and shipping departments, for the preparation and assorting of mica and for the manufacture of mica specialties.

General Electric Company has applied for a preliminary injunction in the United States circuit court for the middle district of Tennessee against the city of **Nashville**, Tenn., to restrain the city from the further use of some alternating-current generators manufactured by the **Bullock Electric Manufacturing Company** of **Cincinnati**, O. These generators have laminated pole pieces attached to the revolving field spider by means of bolts from the spider engaging a transverse bar embedded in the pole piece, a construction covered by the **Parcelle** patent, No. 463704, granted November 24, 1891, which has been heretofore sustained by the courts. Judge **Clark** holds that the defendant has not produced any new matter tending to invalidate the patent, and that, therefore, there is no reason why injunction should not issue, this patent having previously been held valid by the court of appeals for the sixth circuit of **Cincinnati** in the case against the **Bullock** company on the same construction. The court allows the city of **Nashville** 60 days in which to change the pole pieces or to withdraw the machines from use entirely.

ADVERTISING LITERATURE.

Formacone Company, New York.—A 16-page booklet has been issued describing **Formacone**, the formaldehyde disinfectant, germicide and deodorizer. Various uses that **Formacone** has been put to are shown in reproductions of letters received from users.

Watson-Stillman Company, 25 **Dey** street, New York, N. Y.—Catalogue No. 72 consists of 48 pages, 6 by 9 inches in size and treats of twin-volute turbine pumps. This company is the sole authorized manufacturer of these pumps. Their principle is fully explained and illustrated by numerous diagrams and half-tone engravings.

E. R. Caldwell & Co., 34 **Hilton** street, **Bradford**, Pa.—Hydraulic wheel presses are the subject of a folder from the above concern. Particular emphasis is laid on three special features: strength, simplicity in construction and convenience in operation. Half-tone engravings of the company's small motor drives are also shown.

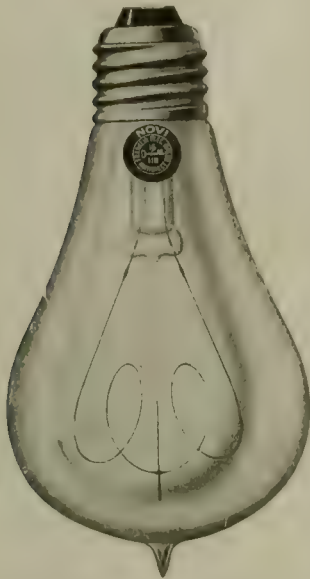
Brown Hoisting Machinery Company, **Cleveland**, O.—A splendid booklet, devoted to "Brownhoist" locomotive cranes, has just been issued by this company. The illustrations, which are exceptionally clear, show the cranes handling ore from stock piles, gondola cars, etc., and the possibilities of the equipment are at once apparent. A partial list of iron

and steel companies using "Brownhoist" locomotive cranes is given.

H. W. Johns-Manville Company, 100 William Street, New York, N. Y.—Catalogue No. 110 sets forth, in an attractive and convincing way, the advantages of Morris metallic packing, for which this company is sole selling agent. The booklet is amply illustrated and for convenience two pages are perforated, so they may be used as order blanks.

THE NOVI RAILWAY LAMP.

The Novi incandescent lamp is designed to meet the demand for an incandescent lamp that will withstand more than the ordinary amount of hard usage. Owing to the shape of filament utilized the end-on or tip candle-power is in excess of that developed by a lamp containing the ordinary oval filament.



Novi Incandescent Lamp.

As will be seen from illustration, a most efficient filament support is obtained with but one anchor. This support is formed by a small glass column extending from the platinum seal to a point a little below and between the outer portions of the filament coils. From this point a metal wire extends a like distance below the lower portion of the center coil. Through this method of construction, a maximum distance between the leading-in wires and the point of support is secured and the greatest rigidity obtained.

It is impossible for the filament to droop and touch the glass or for the coils to become entangled and short-circuit. The vibration in street cars that is injurious to the life of an ordinary incandescent lamp is said to have no effect on the Novi street railway type of lamp.

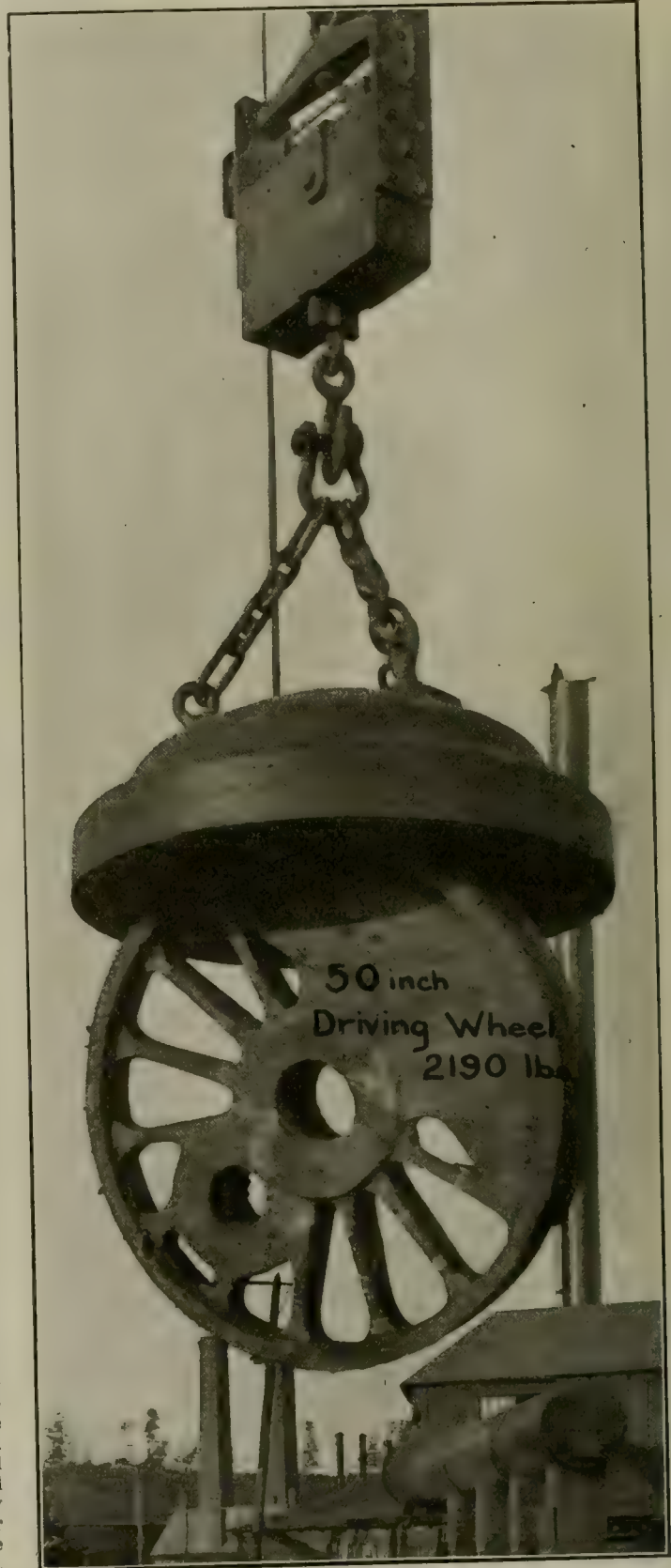
At the Atlantic City convention, in Section A, spaces 139 and 141, the Franklin Electric Manufacturing Company, Hartford, Conn., will demonstrate the Novi street railway lamp by means of vibrating machine.

INTERPOLE MAGNETS FOR LIFTING.

In the shops and yards of both railway and manufacturing companies there are many applications which can be made of the electromagnet for lifting purposes, and the Cleveland Armature Works has made a specialty of the manufacture of interpole magnets for this purpose. Derrick cars equipped with magnets have shown themselves to be of value as labor-saving devices on electric railways where current is so readily available. The term interpole refers to the design; the magnet has three poles energized by means of two coils, the purpose of introducing the third, or "inter" pole, being to increase the lifting capacity. The magnets are made in two styles. One, known as the bell magnet, is concave on the under side, as indicated by the name and is designed especially for handling pig, scrap and small pieces of iron and steel; also 1-piece ingots and all kinds of large and irregularly shaped pieces. The flat magnet is designed for handling pieces of metal which present a flat surface.

The capacity of these lifting magnets is from 1 to 12 tons. In many applications it is desirable to have both the flat type and the bell type for attaching to cranes; the change from one type to the other may be made very quickly, as the conductor cable connections are made uniform, so that the same cable may be used for both magnets. Current is supplied to the magnet through a twin conductor cable, which is wound upon a reel mounted on the crane carriage. This is arranged so that the lifting or lowering of the magnet automatically operates the reel and keeps the free cable at the proper length. Both the bell type and the flat type of magnets are made in two sizes, 32 and 52 inches in diameter, respectively. The 52-inch bell magnet weighs about 4,900 pounds and requires a current of 20 amperes at 220 volts, or $4\frac{1}{2}$ kilowatts, for operation. The 52-inch flat magnet weighs 2,500 pounds and requires 27 amperes at 220 volts. Either type of this size will lift 12 tons in one piece. The 32-inch magnets weigh about 1,000 pounds and require about $2\frac{1}{2}$ kilowatts for operation.

Tests of a 52-inch bell magnet with the voltage somewhat irregular and using 20 amperes, the maximum voltage being 220, gave the following results as the lifting capacity with different kinds of material: Sand cast pig, 700 to 1,350



Interpole Magnets for Lifting—Bell Type Magnet.

pounds; turnings and borings, 500 to 675 pounds; plate scrap, 425 to 1,150 pounds; miscellaneous scrap, 475 to 550 pounds; angle scrap, 475 to 510 pounds. The accompanying illustration shows a bell magnet lifting a 50-inch driving wheel.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 14

CHICAGO, OCTOBER 5, 1907

WHOLE No. 232

TABLE OF CONTENTS.

Editorial:	Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL.B.	411
—Three-Cent Fare Means Zone System.....	News of the Week:	
—Steam and Electric Railway Statistics.....	—Railroad Rates to Atlantic City.....	413
—Six-Car Trains and 1,200 Volts at Oakland.....	—New York Public Service Investigation.....	413
—Operating Expense Accounts	Construction News:	
—Centralized Repair Forces	—Franchises	415
—Freight and Express Traffic.....	—Recent Incorporations	415
Track Reconstruction by the Chicago Electric Traction Lines (Illustrated)	—Track and Roadway	416
Receivership of New York City Railway is Extended to Metropolitan Street Railway	—Power Houses and Substations.....	418
Classifications of Operating Expenses.....	Personal Mention	418
Electrification of the Evanston Suburban Line of the Chicago Milwaukee & St. Paul	Financial News	419
Line and Track Service Plant, Brooklyn Rapid Transit Company (Illustrated)	—Electric Railway Earnings	419
German Commission Inspecting Single-Phase Railways (Illustrated)	Manufactures and Supplies:	
Meeting of the New York Street Railway Association at the Electrical Show	—Rolling Stock	420
Entertainment Programme for Convention Week.....	—Shops and Buildings	420
Public Control from the Corporate Standpoint. By Everett W. Burdett	—Trade Notes	420
The Electric Railway Situation of Today. By Henry J. Pierce.....	—Advertising Literature	420
Piping and Power Station Systems -LVI. By W. L. Morris, M. E. (Illustrated)	The Benjamin Steel Patent Tie (Illustrated).....	421
	The Use of Sand Blast by Electric Railways (Illustrated).....	422
	Increasing Use of Graphite Paint.....	422
	Solderless Connections	423
	Westinghouse Companies at the New York Electrical Show.....	423
	Good Results of Feed Regulation (Illustrated).....	423
	New Cars for the Ft. Dodge Des Moines & Southern Railroad (Illustrated)	424

The public announcement made this week by Mayor Johnson of Cleveland that he has no intention of applying 3-cent fares outside of the city limits calls attention to one of the greatest differences in the plans of the two companies that are now striving for franchises in Cleveland. The Cleveland Electric Railway asks an extension of its franchises for 20 years on the basis of seven tickets for 25 cents, only a fraction of a cent above that upon which its rival, the Forest City Railway, bases its claim for consideration by the public and the city council of Cleveland in its effort to assume the old company's franchises as fast as they expire. The Cleveland Electric is now and proposes to continue giving rides from any point in the city of Cleveland to a large number of suburbs located outside the city limits for one fare. The Forest City company only proposes to carry its passengers to the limits, where the suburban passengers will be obliged to pay another fare and take another car before reaching their destinations. The inevitable result of such a practice is the zone system, which is common in Great Britain, but which has met with universal opposition in American cities. The zone system not only adds greatly to the work of collecting and auditing fare receipts, but is undemocratic and unprogressive. Its adoption could only result in still further congestion in the central portions of our already overcrowded cities.

According to the abstract recently made public by the interstate commerce commission of its nineteenth annual statistical report, there were 224,363 miles of single track of steam railways in the United States on June 30, 1906. This is an increase of 6,262 miles over the preceding year. The number of companies the mileage of which was reported was 2,313. These carriers had 51,672 locomotives, 42,262 passenger cars, 1,837,914 freight cars and 78,736 cars used solely in the service of the companies. The stock outstanding amounted to \$6,803,760,093 and the funded debt to \$7,766,661,385. The relative gain in single-

track mileage has been much greater with electric railways than with steam roads. Statistics of the mileage, equipment and capitalization of street and interurban railways—the figures representing largely conditions existing at the end of 1906—have been compiled from the 1907 edition of American Street Railway Investments. The figures cover the operations of 1,164 companies. Of these companies the electric railways had 36,212 miles of track, as compared with 32,517 miles at the end of 1905; 66,206 motor cars, as compared with 63,391; and 15,442 trail and service cars, as compared with 13,059 the preceding year. Cable, steam and horse railways reporting showed a total of 719 miles of track, as compared with 633 miles the previous year; 707 grip cars and locomotives, as compared with 1,084; and 2,377 trail cars or horse cars as against 2,217. The total capital stock outstanding amounted to \$2,039,948,875, an increase of \$195,383,739, and there were also outstanding \$1,725,369,000 bonds, an increase of \$200,997,074. The increase in miles of track of electric roads in one year amounts to 11.4 per cent; in motor, trail and service cars of electric roads the increase was 6.8 per cent.

An interesting announcement regarding the Southern Pacific 1,200-volt electrification project at Oakland, Cal., was made last week in the reported proceedings of the fall meeting of the Central Electric Railway Association. At this meeting Mr. E. H. Anderson, of the General Electric Company, presented a very thorough description of the commutating-pole railway motor and its application in 1,200-volt use. It is stated that already some four roads in this country are operating cars with 1,200 volts on the trolley, and in Europe our friends have gone so far as to use in railway motors 2,000-volt direct current. The project as announced for the Southern Pacific electrification includes the converting of a number of steam railway lines which converge at the ferry terminals on the Oakland shore opposite San Francisco. From here they carry suburban traffic to Oakland and its several nearby residence centers. Because this traffic is delivered to the trains intermittently by ferry boats

it will be necessary to operate the electric cars in multiple-units. The arrangement of the train with regard to electrical equipment is undoubtedly new, inasmuch as some of the cars will be trailers, some equipped only with motors and others provided with complete motor and control apparatus. Considering six cars to a train, each of which will be 71 feet 5 inches long, seating 80 passengers, there will be two cars, one at each end of the train, equipped with motors, master controllers, air compressors and dynamotors for supplying as desired 600 or 1,200 volt current to be used in the lighting and control circuits. The two cars, which will be placed one each next to the end motor cars, will be equipped only with motors and such control apparatus as may be required for multiple-unit operation, but no air compressors. The two cars at the middle of the train will be trailers and the necessary buses for power and lighting will extend throughout the length of the train. It is noted that with this arrangement there will be four motor cars in a 6-car train and the two end cars only will be complicated with the auxiliary apparatus other than the motor and control, necessary in the usual method of operating single units.

OPERATING EXPENSE ACCOUNTS.

Three classifications of operating expense accounts are presented in parallel columns in another part of this issue. The classification of the Ohio Electric Railway, Cincinnati, O., was prepared by M. W. Glover, auditor of the company. It was adopted as of September 1, 1907, when the company acquired the properties of the Indiana Columbus & Eastern Traction Company and the Lima & Toledo Traction Company. The tabulated comparison with the standard classification of the American Street and Interurban Railway Accountants' Association, and that prescribed as of July 1, 1907, by the interstate commerce commission for steam railways shows the great differences in the primary accounts. The Accountants' association classification was revised in 1902.

Striking variation will be noted in the number of primary accounts in the various classifications. The Accountants' association classification contains 38 accounts, the interstate commerce commission prescribes 123, and the Ohio Electric Railway uses 69. Some of the primary accounts of the commission, touching particularly the maintenance of equipment and the transportation expenses, relate solely to the needs of steam roads; and this classification is therefore amplified considerably beyond the requirements of exclusively electric railways. Although the Ohio Electric Railway classification follows the Accountants' form in some respects, it conforms more closely, in its division of primary accounts and its amplification, to the interstate commerce commission classification. The work of preparing a new classification was undertaken by Mr. Glover some months ago, while he was auditor of the Indiana Columbus & Eastern and the Lima & Toledo traction companies, the properties of which now comprise the Ohio Electric Railway. The latter company operates about 550 miles of track.

It will be observed that the Ohio classification provides for "Traffic Expenses"; but its division of "Transportation Expenses" as between (1) "Power Plant Operation" and (2) "Station and Car Operation" is similar to the separation in the association form. Under maintenance of way and structures certain differences will be noticed. The Ohio company considers "Cleaning, Sanding and Watering Track" and "Removal of Snow and Ice" proper charges to "Maintenance of Way and Structures." The commission classifies in a similar way "Removal of Snow, Sand and Ice." The Accountants' association, however, regards "Cleaning and Sanding Track" and "Removal of Snow and Ice" as proper charges to "Transportation: Operation of Cars."

Though "Traffic Expenses" have been shown previously in the reports of some steam railways, a subdivision in operat-

ing expenses for expenditures coming under this head has not previously been prescribed by the interstate commerce commission.

Another difference which will be observed is that "Damages" and "Legal Expenses in Connection with Damages" are placed with "General Expenses" in the Accountants' classification and that the corresponding accounts in the interstate commerce commission list (Nos. 106-110) and in the Ohio Electric Railway classification (Nos. 57 and 58) are held to be charges against "Transportation Expenses." The numbers of the commission's accounts are shown in parentheses and were supplied by us.

CENTRALIZED REPAIR FORCES.

The improvement which makes possible a concentration of the line and track departments of the Brooklyn Rapid Transit Company at one large plant is the subject of an article to be found on another page of this issue. As large traction systems have developed in the very populous sections of the country, the various branches of each system have become more centralized. The power generating machinery has been centered in one or two large power houses and current distributed at high tension and the repair shop facilities have usually been grouped at central points on each system. It has not been the usual practice to concentrate the line and track work at one point and in the few instances where this has been done the usual building utilized has been an abandoned horse car barn or some other building not designed with any special regard to the needs of the line and track departments.

The general arrangement and the care with which the details of the new line and track department buildings for the Brooklyn Rapid Transit have been worked out, show that the necessity of having buildings designed especially for this class of service was fully appreciated.

The proper safeguarding of valuable supplies has been well provided for in the arrangement of the storehouses. The scheme of placing the tower wagons, with their loads of copper, under lock and key, and requiring all men leaving the plant to pass a watchman, will prevent the waste and theft of supplies, so hard to guard against on a large system when the departments are widely separated. The superintendence of a unified plant of this kind is sure to be more efficient than when the departments are scattered and can only be visited at intervals of several days. This saving in time to the superintendent should result in his being able to give closer attention to the operating details and thus materially increase the efficiency of the department.

In a centralized plant it is possible to specialize the men in various parts of the work, in a manner that would be absolutely impossible if a small gang of men did all of the work on a section of line or track. By classifying the work and occasionally changing some of the men, highly specialized and efficient crews can be developed. By carefully separating the new work from the repair work much higher efficiency will be attained than by continually changing gangs from one class of work to another.

The practice of keeping all the horses of the two departments at one central stable makes it possible, by judicious changing from time to time, to prevent any of the horses becoming worn out on the harder kinds of work. There is always light work to be done which can be taken care of with teams that have been in the harder and heavier service, with the result that the annual outlay for horse flesh can be considerably reduced.

Bringing the scattered crews all together in one plant should result in a considerable reduction in wages, as it will be possible to work all of the men a greater portion of the time as well as at higher efficiency. It might be argued that the time lost in transporting the men from a central plant

to the remote parts of a system would be considerable; but it should be remembered that in a city as compact as Brooklyn this would not be a large matter. Again, on systems where the distances are great, line cars instead of tower wagons and horses can be used, and this will again bring the time spent in transit to a minimum.

With the old-time wooden buildings, the danger of a fire seriously crippling a department carrying on all its work from one plant made concentration a rather unwise policy, but with the more modern buildings built of brick, stone, steel and concrete, the liability of a fire crippling a department is so remote as hardly to need consideration. It is to be noted that the disastrous car house fires that have occurred within the past two years have all occurred in the older wooden buildings not provided with adequate fire protection. Also it should be remembered that a line and track service plant would hardly contain the inflammable material to be found in a car storage barn filled with wooden cars.

There can be no doubt as to the wisdom of concentrating all of a similar class of work for an electric railway system if the buildings are designed for the use to which they are to be put and are provided with the recognized necessary fire protection.

FREIGHT AND EXPRESS TRAFFIC.

The subject of freight and express traffic occupied a large part of the time of the Central Electric Railway Association and the Street Railway Association of the State of New York at their recent meetings at Kingston, N. Y., and Columbus, O. The discussion, papers and reports on this topic were presented in last week's issue of the Electric Railway Review; and they contain facts and statistics which should be heeded by every electric railway manager who has undertaken, or who contemplates, freight or express service as an additional use of facilities which were intended primarily for passenger service.

Statements were made which illustrate the danger of assuming a profit from freight or express business merely because the revenue exceeds the proportionate and frequently inadequate expenses charged against this service. Before one manager analyzed the situation he shared the opinion of others that the revenue from freight traffic was practically clear profit; but after receiving the expense accounts of the freight departments of several roads he noticed that the only items which were entered were those that involved visible expense, plus an arbitrary pro rata charge for several operating men, this latter charge being made without regard for the real proportion of business handled. Subsequently, this member of the New York association analyzed operations on his own road on the ton mileage basis and came to the conclusion that the actual result was a loss of 0.00044 cent per ton-mile on the freight and express business. It was pointed out that some electric railways carry freight in an electric car which cost \$10,000 and requires two men for operation; and then attempt to compete with steam railways which operate about forty cars costing \$1,000 each in a train requiring four men.

Of allied importance were the discussions concerning rates. Attention was called to the danger of starting a freight or express business at ridiculously low rates. Eagerness to secure business at unprofitable prices should be restrained. If an error of this character is made, a subsequent increase in rates produces determined opposition, and harmony which had existed between the company and its patrons is in peril. A case was cited of one road which hauled a carload of furniture 25 miles for \$6.00.

Conditions vary in different localities, but in general the primary advantage of electric railway service over that offered by steam railways is so great that it furnishes an insurmountable argument. The facilities which only electric railways

can readily provide were stated by C. H. Armatage, traffic manager of the United Traction Company of Albany, N. Y., as follows: "The value of an electric express service lies in the great saving of delay, the process of natural evolution, the frequency of its trips over short mileage routes, the speedy transportation of farm products and garden truck from the rural district to the cities, the filling of rush orders by telephone, the ability to make fast time and deliver at highway crossings or at store doors, all of which are elements of inducement and recognition to shippers and receivers."

Managers were warned against the undue cost of maintaining wagons for collecting and delivering freight. It was stated that the Connecticut Railway & Lighting Company has abandoned the use of wagons in several cities. Hired wagons were not favored by one company, which found that its business increased after wagons were purchased for its exclusive use. The maintenance of wagon service requires a large part of the net earnings remaining from operation of the cars.

An excellent suggestion was presented in the statement that judgment and care should be exercised in determining the character of freight and express to be handled, and in stating with precision all rates and the policy of the company respecting certain classes of goods. Precaution should be observed in the selection of classes of goods. The handling of commodities that are bulky and do not yield profit in proportion to the space required and breakable articles should not be permitted to hamper the development of the business along lines that will furnish assured profit. It should be remembered, however, that if merchants are in a hurry to receive bulky materials, they will frequently pay enough more than the regular steam rates to make the business of carrying the goods a source of profit.

Certain fundamental principles were laid down to guide those who anticipate installing freight or express service. Frank Walsh of Schenectady, N. Y., spoke before the New York association on the necessity of investigating the territory thoroughly and of ascertaining whether, in the main, it produces or consumes. Then there should be weighed questions of policy, of relations with the public and steam railways and of laws.

Varied opinions were expressed to the Central Electric Railway Association regarding contracts with existing express companies, and the formation of an interurban express company was favored. Contracts with existing express companies have been based on a tonnage or a mileage basis. Some instances were cited where the railway companies receive 50 per cent of the gross earnings from the express business.

The question of handling freight or express is no longer an experiment with many electric railways; but it is pressing for solution on other roads. Such roads should weigh carefully the chances of profit in their territories.

Waterloo Cedar Falls & Northern Car House Burned.

The car house of the Waterloo Cedar Falls & Northern Railway at Waterloo, Ia., was totally destroyed by fire on the night of September 24, together with eight cars, six local and two interurban. The loss is placed at \$20,000, fully covered by insurance. The building is a wooden structure and burned rapidly. Several buildings in the neighborhood were also destroyed. The cause of the fire is not known, but it cannot be attributed to the usual causes of car house fires, as the power was shut off for the night. The company's transportation facilities were badly crippled, as there were only six cars not included in the fire—two local cars at Cedar Falls, two interurban cars and two cars in the shops. Seven new cars had been ordered and are expected to be delivered this month. In the meantime the company expects to be able to operate with equipment borrowed from some company in a neighboring city.

TRACK RECONSTRUCTION BY THE CHICAGO ELECTRIC TRACTION LINES.

In the rehabilitation of the Chicago electric railways, which is now in progress under the direction of the board of supervising engineers, it is proposed to rebuild in a permanent manner the tracks throughout the city. During the past summer much was accomplished and there are at present 10 track gangs, aggregating 2,000 men, at work. Work will be pushed by both the Chicago Union Traction Company and the Chicago City Railway until the cold weather sets in and makes it impracticable to continue. It will be taken up again in the

not removed and their presence is a feature of additional strength to the concrete roadbed. Six to nine single-duct tile conduits are placed in this old cable slot. Two of the accompanying engravings show the open trench with the excavating gang at work and the iron gang removing the centers of the yokes. The cable slot as shown is ready for the placing of conduits.

The conduits in place and the track structure in its various stages of completion are also shown by halftones reproduced from photographs. Manholes, providing entrance to the electric conduits, are spaced at intervals of 350 feet on straight track. There have been completed to date about two and one-quarter miles of this type of construction.

Type No. 2.

The surface wood tie concrete track construction designated as Type 2, consists essentially of a concrete bed in which are laid dressed yellow pine ties, 6 by 8 inches by 7 feet in dimension, spaced 4 feet apart. Shoulder tie plates, $\frac{3}{8}$ -inch thick, are fastened to the ties by means of Fetter-drive lag screws and the rails are fastened with $\frac{3}{4}$ -inch screw spikes. The excavation for the construction of the bed is done so as to form rail and crosstie beams similar to those described under Type No. 1.

For the negative-return feeders a small trench is left in the top of the concrete between the tracks and the return cables, placed in loosely. The sand and gravel bed for the paving forms a cushion over these cables and makes them easy of access. About four and one-half miles of Type 2 have been built.

Type No. 3.

This type is a surface track construction with wood ties placed on rolled stone for a foundation. Eight inches of crushed



Chicago Track Reconstruction—Excavating and Iron Gangs on Cottage Grove Avenue, Type No. 1.

spring and it is thought that about two hundred and fifty miles of track will be completed by the winter of 1909.

The work which has been done so far consists essentially of three types of construction of distinctly different characteristic features.

Type No. 1.

Type No. 1 is a surface track construction in which a concrete bed and steel ties are used. The ties are fitted with $\frac{1}{4}$ -inch flat tie plates, fastened to them by means of a clip and wedge device especially designed for this work, the rail fastening being of the same type.

After the excavation has been completed the track is brought to line and surface by means of blocks and wedges and concreted in place. The excavation is made so as to form a concrete stringer 10 inches deep under each rail, the width of which on the base is 18 inches, the sides sloping at an angle of 45 degrees to meet with the concrete which forms the foundation of the paving. In addition to this rail-supporting stringer of concrete the excavation is so made as to form a beam under the crossties 7 inches deep, with a bearing width of 18 inches and 45-degree sloped sides. The ties are spaced four feet center to center, except when a variation is required because of the presence of the old cable yokes.

On Cottage Grove avenue, on the south side, which formerly had a car line operated by cables, it is interesting to note the manner in which the presence of the old cable slot was utilized. The center of the old yoke was removed so as to make the cable slot available for the introduction of cable conduits for feeders. The sides of the old yoke were



Chicago Track Reconstruction—Completed Excavation with Conduits in Place, Type No. 1.

stone is placed in the bottom of the excavated trench after the latter has been rolled with a steam roller, and on this stone bed the track is brought to line and surface. Dressed yellow pine ties spaced two feet center to center are used and the type of tieplate and rail fastenings is the same as described for Type No. 2 construction. The concrete extends from the bottom of the ties to such height as to give the proper foundation for the paving. The greater portion of the work done to date has been of this latter type of construc-

tion because of the difficulty of obtaining the materials required for Types 1 and 2. About fourteen and one-half miles of this type have been built to date.

General Characteristics.

Tie rods $\frac{5}{8}$ by 2 inches are used between the rails and are spaced six feet apart. Temporary rail joints, consisting

Review for April 6, 1907, page 457. Fifty-eight and fifty-six foot lengths are used throughout. Cross bonds are placed approximately every 300 feet and are connected to auxiliary return feeders placed in the small trench between tracks, which is shown by photograph in Type No. 2 construction.

For the concrete beds Portland cement only is used; the concrete being in proportions of 1-3-6, with an aggregate of



Chicago Track Reconstruction—Track Completed and Ready for Paving, Type No. 1.



Chicago Track Reconstruction—Track Ready for Concreting, Type No. 1.



Chicago Track Reconstruction—Drake Concrete Mixer in Operation on Cottage Grove Avenue.

of plates fastened with a single bolt on each side of the joint, are used in the construction, and dry paving is placed in order to allow easy access to the joints for subsequent electric welding.

Electric welding is done by the Lorain Steel Company. A completed joint is shown in an accompanying photograph taken on Type No. 2 construction. The rails are the standard Chicago grooved girder type, weighing 129 pounds per yard and nine inches high, as described in the Electric Railway

crushed limestone. The paving is granite block, conforming to the standard specifications of the city of Chicago, and placed on $1\frac{1}{2}$ inches of bedding sand, the joints being poured with tar and a gravel top dressing applied.

Wherever the width of the street will permit a temporary track is laid on the street surface alongside the main tracks and traffic handled on one of the main tracks and this temporary track. This enables long sections of track to be completed at a time. Where the width of street will not per-

mit the placing of this temporary track it is necessary to confine the work to short sections while the traffic is handled on a single track.

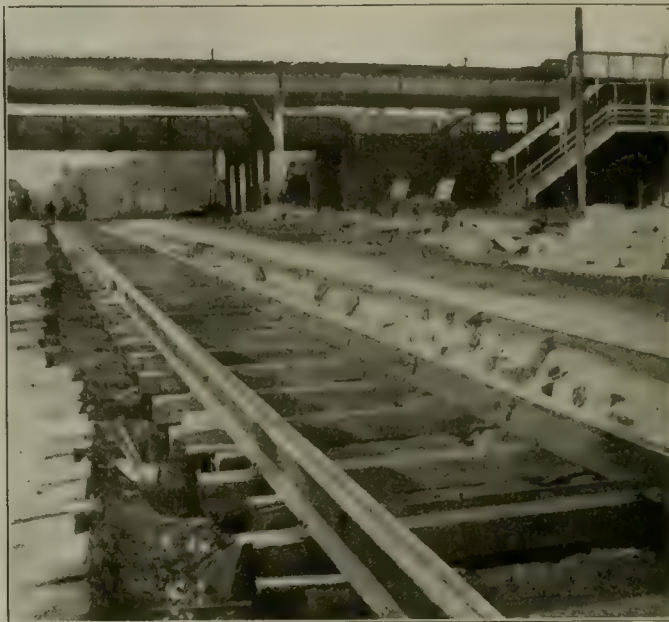
The installation of the feeder conduits does not affect the track construction. If the top of the conduits is below the

by a separate gang, and the paving is laid and street cleaned by the rear gang. Each gang is handled by a separate foreman, while a general foreman has supervision of the various gangs engaged on each section.

On Cottage Grove avenue, where type No. 1 construction is being used, a Drake concrete mixer is employed. A photo-



Chicago Track Reconstruction—Track on Stone Bed Ready for Concrete, Type No. 3.



Chicago Track Reconstruction—Details of Track Structure, with Track Surfaced and Ready for Concrete, Type No. 2.

concrete the space between is filled with earth and rammed, and where the top conduit projects into the space which would ordinarily be filled with concrete, the concrete is filled over the top and sides to the customary depth.

The labor, as is usual, is so distributed that each gang

graph of this mixer is reproduced herewith. The materials for the concrete are distributed along the surface of the street, the cement being added only a short distance ahead of the mixer. These materials are then loaded with shovels on to the car bed and carried back by an endless conveyor to the mixer which is located on the rear of the car. This endless



Chicago Track Reconstruction—Completed Track Ready for Paving, Type No. 2.



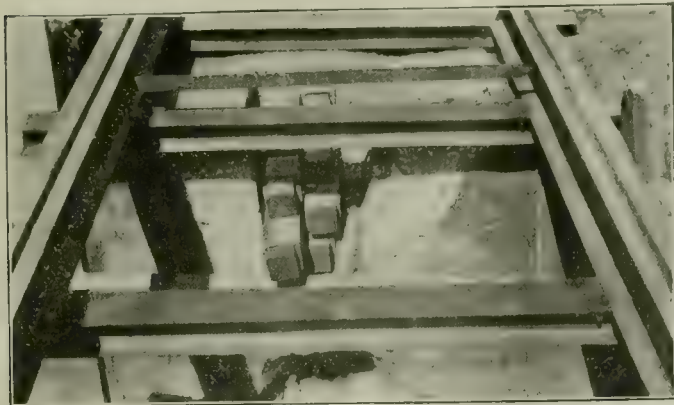
Chicago Track Reconstruction—Chicago Concrete Mixer on Forty-third Street.

performs a stipulated portion of the work. The head gang removes the paving and excavates to the required depth, being immediately followed by the iron gang, which is engaged in removing the iron yokes and completing the subgrade for the track. The track gang follows and its work consists of laying, aligning and surfacing the track. The concrete is placed

conveyor slides in an 18-inch steel channel. The body of the car is also steel. The car is mounted on one trailer truck and one motor truck. It is motor driven and is controlled from the rear of the car, as is also the motor-driven mixer. The car is moved along as the concrete bed advances, the propelling power being taken from the trolley wire of the opposite

track. An inverted hanger or shoe which permits the trolleys of cars moving in either direction to pass over it without losing the wire is used as a trolley wire contact. The mixer car bed is provided with wing boards which direct the material to the carrier and canvas curtains to prevent flying dust from reaching cars passing on the opposite track.

The delivery of the concrete is very close to the track so that the concrete reaches the bed in practically a thoroughly mixed condition. The number of men required to operate the



Chicago Track Reconstruction—Conduits in Place in Old Cable Slot, Type No. 1.

machine is 12 loading or shoveling the materials on to the carrier, 6 spreading, 2 ramming and 1 controlling, making a total of 21 men.

The Chicago mixer which is now employed on Type No. 3 construction on Forty-third street is also motor driven, but is propelled by a friction drum and a cable which is attached to a tie of the new track. The illustration shown gives a good idea of the type of machine. The bucket holds a little less than $\frac{1}{2}$ cubic yard.

It will probably require a number of years to complete



Chicago Track Reconstruction—Lorain Electric Welded Joint.

the entire work of reconstruction, but no expense will be spared to make the completed system one of the best in the United States.

The Illinois Traction System has recently placed an order for 150,000 pounds of copper wire for use on the Lincoln-Mackinaw line, now under construction. The cost of the wire, \$24,000, is considerably less than if it had been purchased a few months earlier.

The New Jersey railroad commission has appointed an inspector to examine the third-rail system as used on the West Jersey & Seashore Railroad with a view to determining its safety and to recommending certain protective devices if found necessary. The third rail on this road is protected only at stations and in yards.

REVEIVERSHIP OF NEW YORK CITY RAILWAY IS EXTENDED TO METROPOLITAN STREET RAILWAY.

The Metropolitan Street Railway Company of New York filed a petition before Judge Lacombe of the United States circuit court on October 1 asking that the receivership of the New York City Railway be extended to take in the Metropolitan property. In its petition the Metropolitan company represented that it depended altogether for its income on the rentals paid to it by the New York Street Railway Company. That company having confessed its insolvency, the Metropolitan would have no funds with which to meet its fixed charges on mortgage indebtedness, its accruing rentals or other obligations. A stipulation in the lease with the New York City company prevents the Metropolitan company from moving for the return of its property within a year of the date on which the default on the rentals takes place. If the company were to wait for a year its system, in the meantime, would be "hopelessly disrupted and your petitioner would suffer irremediable loss."

Judge Lacombe, in granting the application, said that it was vital to the petitioner that the property be kept intact and that under the conditions there was no doubt that a proper case for intervention was shown. Judge Lacombe said:

Whatever may be the actual value of the property of the petitioner, it appears to be in a condition of temporary insolvency and should come in as a party defendant, turning all its property over to the receivers to be marshaled and its obligations paid. Such a disposition seems to be greatly to the public interest. It is hardly to be supposed that any substantial sum could be borrowed on receivers' certificates bottomed only on a lessee's interest in a leasehold which might be terminated in a year for failure to pay all that was stipulated.

On the other hand, when the receivers are in control of all the interests of both lessor and lessee it may reasonably be expected, unless indeed the very growth of the system has reduced its value to a greater extent than is generally supposed, that they will be able, should occasion arise, to obtain the money necessary to pay for such replacements and improvements as may be required to secure efficient service.

Judge Lacombe said that the present receivers will have nothing to do with a reorganization of the companies. Their sole functions, he said, are to hold the property intact, operating it as efficiently as their resources will permit, to ascertain the liabilities, to marshal the assets and eventually, unless in the meantime some entirely solvent concern, able to liquidate all the obligations, shall appear to take them off their hands, to sell the property to the best advantage and apply the proceeds ratably to the payment of liabilities.

Shortly after action had been taken on this petition by Judge Lacombe Attorney-General Jackson of New York state filed a petition before the state supreme court demanding the appointment of receivers for the New York City Railway and the Metropolitan Street Railway. The petition of the attorney-general makes charges of mismanagement, and states that the New York City Railway and its directors have taken no steps to force the Interborough-Metropolitan Company to carry out its obligations concerning the New York City company.

Douglas Robinson and Adrian H. Joline, the receivers, took formal possession of the New York City Railway property on September 25. H. H. Vreeland, president of the company, was appointed manager of the properties.

Coalite, a new fuel recently brought out in England, is the product of the partial distillation of coal, being a black and friable residue, composed in large part of volatile matter. This residue is compacted into a hard substance like coke, the process, however, being a secret one. Tests have shown that, although coalite contains a smaller number of heat units per pound than soft coal, nevertheless a much larger percentage of its heating value can be utilized, one ton of coalite being equal in heating value to $1\frac{1}{2}$ tons of bituminous coal. Its adoption as a fuel will depend largely on the price at which it can be sold, this, in turn, depending on the prices which can be realized for the by-products of distillation—gas and tar.—The Valve World.

CLASSIFICATIONS OF OPERATING EXPENSES.

American Street and Interurban Railway Accountants' Association.	Interstate Commerce Commission.	Ohio Electric Railway, Cincinnati, O.
I. MAINTENANCE: WAY AND STRUCTURES.	I. MAINTENANCE OF WAY AND STRUCTURES.	I. MAINTENANCE OF WAY AND STRUCTURES.
1. Maintenance of track and roadway.	(1) Superintendence. (2) Ballast.	1. Roadway and track: A. Superintendence. B. Ballast (including rental of gravel pits). C. Cleaning, sanding and watering track. D. Removal of snow and ice. E. Other expenses.
	(3) Ties. (4) Rails. (5) Other track material. (6) Roadway and track. (7) Removal of snow, sand and ice. (8) Tunnels. (9) Bridges, trestles and culverts. (10) Over and under grade crossings. (11) Grade crossings, fences, cattleguards and signs. (12) Snow and sand fences and snow sheds. (13) Signals and interlocking plants. (14) Telegraph and telephone lines. (15) Electric power transmission.	2. Ties. 3. Rails. 4. Paving.
2. Maintenance of electric line.		5. Bridges, trestles and culverts.
3. Maintenance of buildings and fixtures.	(16) Buildings, fixtures and grounds. (17) Docks and wharves. (18) Roadway, tools and supplies. (19) Work equipment—repairs. (20) Work equipment—renewals. (21) Work equipment—depreciation. (22) Injuries to persons. (23) Stationery and printing. (24) Insurance. (25) Other expenses. (26) Maintaining joint tracks, yards and other facilities—Dr. (27) Maintaining joint tracks, yards and other facilities—Cr.	6. Fences, road crossings, cattle guards and signs. 7. Track bonding.
		8. Electric line. 9. High-tension transmission lines. 10. Telephone and telegraph lines. 11. Signal and interlocking plants. 12. Buildings, fixtures and grounds. 13. Docks and wharves.
I. MAINTENANCE: EQUIPMENT.	II. MAINTENANCE OF EQUIPMENT.	II. MAINTENANCE OF EQUIPMENT.
4. Maintenance of steam plant.	(28) Superintendence. (29) Steam locomotives—repairs. (30) Steam locomotives—renewals. (31) Steam locomotives—depreciation. (32) Electric locomotives—repairs. (33) Electric locomotives—renewals. (34) Electric locomotives—depreciation. (35) Passenger-train cars—repairs. (36) Passenger-train cars—renewals. (37) Passenger-train cars—depreciation. (38) Freight-train cars—repairs. (39) Freight-train cars—renewals. (40) Freight-train cars—depreciation. (41) Electric equipment of cars—repairs. (42) Electric equipment of cars—renewals. (43) Electric equipment of cars—depreciation.	16. Steam plant. 17. Electric power plant. 18. Electric substations.
5. Maintenance of electric plant.	(44) Floating equipment—repairs. (45) Floating equipment—renewals. (46) Floating equipment—depreciation. (47) Shop machinery and tools. (48) Power plant equipment. (49) Injuries to persons. (50) Stationery and printing. (51) Insurance. (52) Other expenses. (53) Maintaining joint equipment at terminals—Dr. (54) Equipment borrowed—Dr. (55) Maintaining joint equipment at terminals—Cr. (56) Equipment loaned—Cr.	19. Passenger, mail and baggage cars. 20. Freight and express cars.
6. Maintenance of cars.		21. Electric equipment passenger, mail and baggage cars. 22. Electric equipment freight and express cars. 23. Locomotives: A. Electric. B. Steam. 24. Miscellaneous equipment.
7. Maintenance of electric equipment of cars.		25. Shop machinery and tools.
8. Maintenance of miscellaneous equipment.		26. Stationery and printing.
9. Miscellaneous shop expenses.		27. Miscellaneous shop expenses.
	III. TRAFFIC EXPENSES.	III. TRAFFIC EXPENSES.
	(57) Superintendence. (58) Outside agencies. (59) Advertising. (60) Traffic associations. (61) Fast freight lines. (62) Industrial and immigration bureaus. (63) Stationery and printing. (64) Insurance. (65) Other expenses.	28. Superintendence. 29. Outside agencies. 30. Advertising.
II. TRANSPORTATION: OPERATION OF POWER PLANT.	IV. TRANSPORTATION EXPENSES.	IV. TRANSPORTATION EXPENSES.
10. Power plant wages.		POWER PLANT OPERATION.
11. Fuel for power.		31. Stationery and printing.
12. Water for power.		32. Miscellaneous expenses.
13. Lubricants and waste for power plant.		33. Power plant wages. 34. Substation wages. 35. Fuel for power. 36. Water for power. 37. Lubricants and waste. 38. Miscellaneous supplies and expenses.
14. Miscellaneous supplies and expenses of power plant.		39. Purchased power.
15. Hired power.		STATION AND CAR OPERATION
OPERATION OF CARS.		40. Superintendence.
16. Superintendence of transportation.	(66) Superintendence. (67) Dispatching trains. (68) Station employees. (69) Weighing and car service associations. (70) Stock yards and grain elevators. (71) Coal and ore docks. (72) Station supplies and expenses. (73) Yardmasters and their clerks. (74) Yard conductors and brakemen. (75) Yard switch and signal tenders. (76) Yard supplies and expenses. (77) Yard enginemen. (78) Engine house expenses—yard.	41. Station service.
		42. Station supplies and expenses.
17. Wages of conductors.		43. Rent of land and buildings. 44. Rent of tracks and terminals. 45. Wages of passenger conductors. 46. Wages of freight and express conductors.

CLASSIFICATIONS OF OPERATING EXPENSES—Continued.

American Street and Interurban Railway
Accountants' Association.

Interstate Commerce Commission.

Ohio Electric Railway, Cincinnati, O.

	(79) Fuel for yard locomotives.	
	(80) Water for yard locomotives.	
	(81) Lubricants for yard locomotives.	
	(82) Other supplies for yard locomotives.	
	(83) Operating joint yards and terminals— Dr.	
	(84) Operating joint yards and terminals— Cr.	
18. Wages of motormen.	(85) Motormen.	17. Wages of passenger motormen.
	(86) Road enginemen.	18. Wages of freight and express motormen.
19. Wages of miscellaneous car service em- ployes.		19. Wages of miscellaneous car service em- ployes.
20. Wages of car house employes.	(87) Engine house expenses—road	20. Wages of car house employes.
21. Car service supplies.		51. Train supplies: A. Car service supplies.
	(88) Fuel for road locomotives.	B. Locomotive supplies (includes fuel, water, oil, tallow, waste and other supplies for locomotives).
	(89) Water for road locomotives.	52. Lubricants and waste.
	(90) Lubricants for road locomotives.	
	(91) Other supplies for road locomotives.	
	(92) Operating power plants.	
	(93) Purchased power.	
	(94) Road trainmen.	
	(95) Train supplies and expenses.	53. Dining and buffet service.
	(96) Interlockers, block and other signals— operation.	54. Interlockers, block and other signals— operation.
	(97) Crossing flagmen and gatemen.	
	(98) Drawbridge operation.	
	(99) Clearing wrecks.	
	(100) Telegraph and telephone—operation.	55. Telegraph and telephone operation.
	(101) Operating floating equipment.	
	(102) Express service.	
	(103) Stationery and printing.	
	(104) Insurance.	
	(105) Other expenses.	
	(106) Loss and damage—freight.	56. Loss and damage.
	(107) Loss and damage—baggage.	
	(108) Damage to property.	57. Injuries and damages.
	(109) Damage to stock on right of way.	
	(110) Injuries to persons.	58. Law expenses account damages.
	(111) Operating joint tracks—Dr.	59. Miscellaneous car service expenses.
	(112) Operating joint tracks—Cr.	60. Stationery and printing.
		61. Hired equipment.
22. Miscellaneous car service expenses.		
22a. Hired equipment.		
23. Cleaning and sanding track.		
24. Removal of snow and ice.		
III. GENERAL EXPENSES.	V. GENERAL EXPENSES.	V. GENERAL EXPENSES.
25. Salaries of general officers.	(113) Salaries and expenses of general offi- cers.	62. Salaries of general officers.
26. Salaries of clerks.	(114) Salaries and expenses of clerks and attendants.	63. Salaries of clerks and attendants.
27. Printing and stationery.	(115) General office supplies and expenses.	64. General office supplies and expenses.
28. Miscellaneous office expenses.	(116) Law expenses.	65. Law expenses.
29. Stores expenses.	(117) Insurance.	66. Store expenses.
30. Stable expenses.	(118) Relief department expenses.	67. Insurance.
31. Advertising and attractions.	(119) Pensions.	
	(120) Stationery and printing.	68. Stationery and printing.
32. Miscellaneous general expenses.	(121) Other expenses.	69. Miscellaneous general expenses
33. Damages	(122) General administration joint tracks, yards and terminals—Dr.	
34. Legal expenses in connection with dam- ages.	(123) General administration joint tracks, yard and terminals—Cr.	
35. Miscellaneous legal expenses.		
36. Rent of land and buildings.		
37. Rent of tracks and terminals.		
38. Insurance.		

ELECTRIFICATION OF THE EVANSTON SUBURBAN LINE
OF THE CHICAGO MILWAUKEE & ST. PAUL.

Work will begin soon upon the electrification of the Evanston suburban double-track line of the Chicago Milwaukee & St. Paul from Wilson avenue, in Chicago, to Central street, in Evanston. The Northwestern Elevated Railroad will operate the line, making a connection with its elevated structure at its Wilson avenue terminus by means of an incline structure which will reach the surface tracks at Ainslie street. This incline will be of steel on a grade of 1 to 1.25 per cent.

Current will be distributed by a single overhead trolley wire supported by the usual span-wire construction. A sub-station equipped with a 2,000-kilowatt rotary converter will be built at South Calvary street, in south Evanston, the current being supplied from the Fisk street plant of the Commonwealth Edison Company.

The station buildings of the Chicago Milwaukee & St. Paul now in use on this line will be replaced and new stations will be established at Hayes and Howard avenues. The present stations will be torn down and the tracks spread to permit the building of island stations. These stations, which are intended to serve only temporarily until the elevation of the line through Evanston, which is now proposed, are to be built of rough lumber with an exterior finish of concrete plaster. It is the intention to make these neat and attractive but not so expensive or elaborate as would be needed were

they to be permanent. The stations will be known as Argyle, Edgewater, North Edgewater, Hayes, Rogers Park, Birchwood, Howard, Calvary, Main, Dempster, Davis, Noyes and Central.

An express service will be provided similar to that now given on the Ravenswood branch of the Northwestern Elevated and the schedule time from the Union loop in Chicago to the Central street terminus in Evanston, a distance of 13.82 miles, will be 40 minutes, or about 20.7 miles an hour. A fare of 10 cents will be charged to all stations north of Wilson avenue.

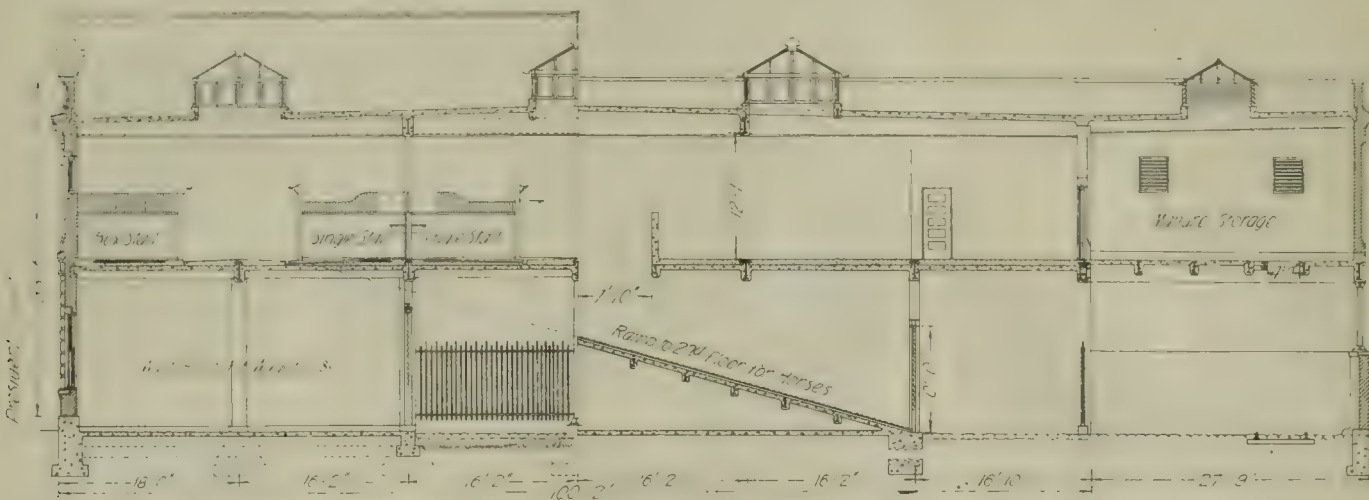
The 37-year franchise granted by the Chicago city council on July 1, 1907, which provides for the electrification, permits the steam road to lay and operate an additional main track, but no decision with regard to it has been announced by the officials of the road. It is not yet known what disposition will be made of the St. Paul tracks from Wilson avenue to the Union depot, but it is likely that they will be maintained for the use of freight traffic, and that the passenger service will be discontinued.

The construction of the steel structure for the incline will require several months and for temporary use a crossover will be laid from the surface tracks of the terminal loop of the Northwestern Elevated at Wilson avenue to the tracks of the steam line at that point. It is thought that by using this temporary crossover the line can be placed in operation by December 1. The estimated entire cost of the improvement is \$960,000.

Line Department Buildings.

The plant consists of several adjacent buildings, two of three stories and the others of two stories in height, divided into three main sections by two passageways, one being a 45-foot passageway between the line and track departments, accommodating two tracks, a roadway and a foot path, and bridged by two bridge runways at the second floor; the other, a 30-foot passage between the stock and track department buildings, affording room for two tracks serving the loading plat-

The second floor is designed for the use of the lighting department and for the storage of materials, and will serve as a place where arc lights used in winter and brought in for summer repairs can receive attention, and where the preparation of lighting clusters and other similar work can be done.



Brooklyn Line and Track Buildings—Section Through Stable.

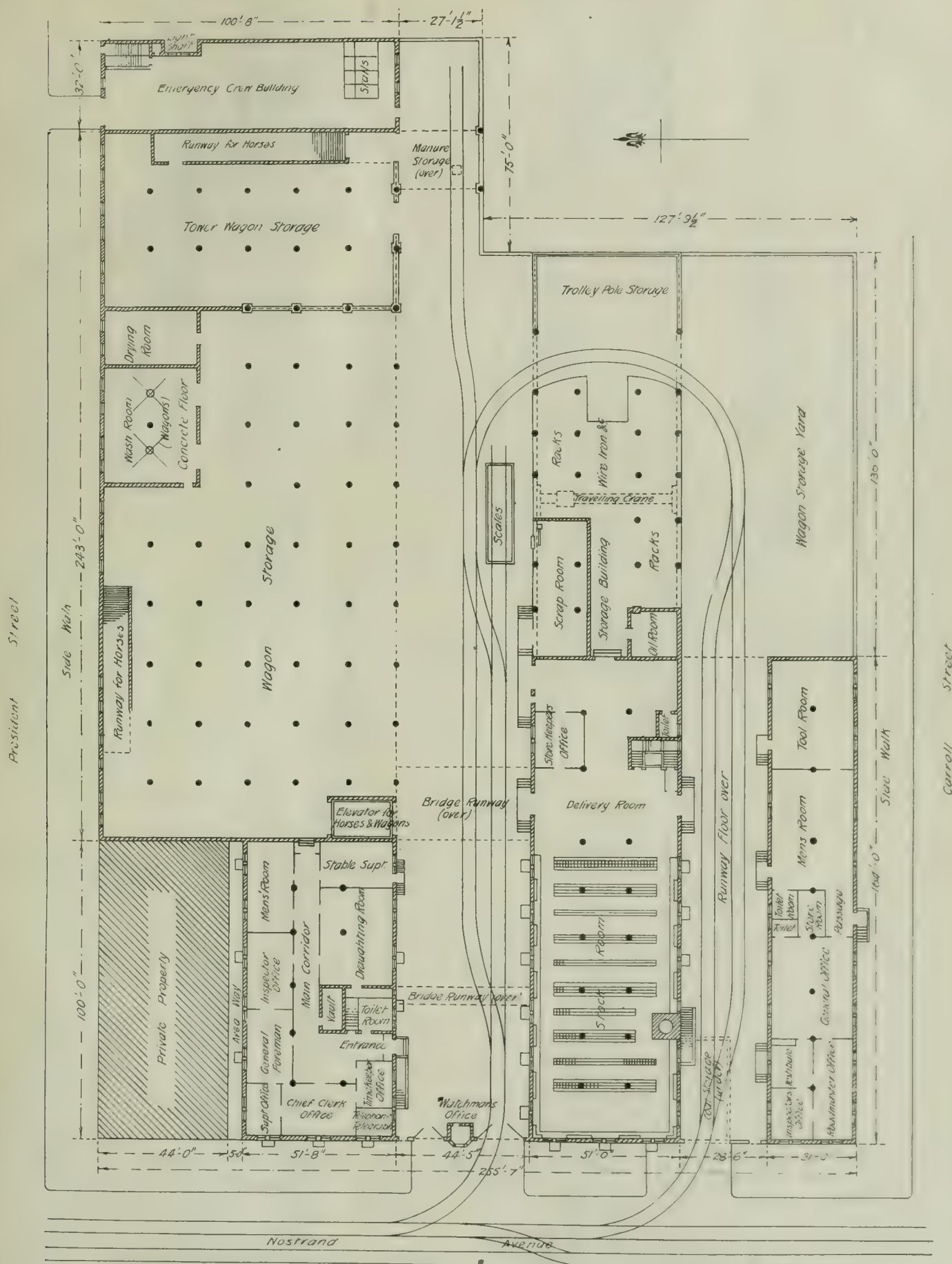
The buildings are brick, steel and concrete construction, all columns, except in the steel storage building, being of iron pipe, filled with concrete, in accordance with the design of the American Column Company.

The pile foundation under each pier consists of four piles, each 20 inches in diameter at the top and 6 inches at the bottom, ranging from 12 to 35 feet in length. The deep piers under walls are placed 20 feet on centers under each pilaster, steel rails reaching from pier to pier, serving as the reinforcements for the beams supporting the main brick wall on President street.

Space will also be reserved for the wiring foreman having charge of the wiring of the entire system.

Wagon Storage Room.

To provide sanitary stables of the best type the engineers visited all of the stables of new design in New York City and combined the best features of each with an original plan to meet the needs of the situation. The stables will have 184



Brooklyn Line and Track Buildings—General Plan Showing Relative Location of Various Structures.

open and six box stalls, with a large harness room and a medicine room on the same floor.

A special building, reached from an exit in one corner of the stable room, is provided for manure storage. This is constructed with a hopper bottom so that manure can be dumped into cars standing on a track below.

The floors of the stables are reinforced concrete throughout, properly sloped and provided with a scientific system of drainage. The stall drainage floor is covered with plank $\frac{1}{2}$ inch apart and so held by iron straps that two planks can be removed at a time to flush the floors.

The first floor of the emergency crew building will be devoted to stables and storage room for the horses and wagons of this department. The second floor will be used by the men and the third floor arranged as an apartment for the captain of the emergency crew and his family. With the exception of those in the emergency crew building, there will be no entrances for employes in the line department, except the front entrance through the office building, and it is intended that all employes who are under the charge of the superintendent of the line department, whether working in the line department buildings or in the shops on the second floor of the stock department building, shall be able to reach or leave their work only by passing the timekeeper in the line department offices. The stock and track departments have their own timekeepers.

The Stock Department.

In accordance with the general policy adopted by the company, the stock department will be distinct from the others and will be under the direct charge of the general storekeeper. The area devoted to the stock department is 51 feet wide, extending back 300 feet. Under the stock department in front is a basement 164 feet long, divided into two rooms, the larger of which will be used as a stock room. All doorways in the stockroom are protected by Kinnear automatic rolling steel doors or by standard automatic tin-clad fire doors. The elevator door in the stock department is so arranged that persons leaving the building must pass by an inspector's window. The storekeeper will have supervision over all general tools used and these will be issued from the tool room as needed.

Steel Storage Building.

Back of the stock room building, and separated from it by a fire wall, is a corrugated steel and iron three-deck storage building, in which are located an oil room and a scrap room, which are separately walled areas. Except for the trolley pole storage yard in the extreme rear, the steel building occupies the rear of the area devoted to the stock department. The steel storage building is served with a traveling crane running its entire length.

The second floor of the stock department building is arranged for the wheelwright and blacksmith shops and the horseshoeing room, the latter being accessible by means of the bridge runway from the stables and from the horse and wagon elevator in the line department building. In the room back of the blacksmith shop are a carpenter and paint shops and in this section a freight elevator is located. The elevator shaft is surrounded by brick walls and the openings protected by Peelle automatic fire doors.

The second floor of the stock department building extends over the 30-foot passageway which separates this building from the track department building. The space over this passageway furnishes space for part of the wheelwright shop.

Track Department Building.

The track department building is 164 feet long and 30 feet wide. The space in front is devoted to the general office and the offices of the roadmaster and inspectors. Back of the offices are the men's room and the tool room.

The track arrangement in the passageway between the stock and track department buildings allows stock to be loaded directly from the stock department building platforms to the cars and the second track serves the tool room of the track department building in the same way. The second floor of the track department building will adjoin the wheelwright room and be used as a paint shop.

Interior Plans.

Every floor throughout the plant will be equipped with toilet facilities, and lockers for the men will be placed where needed. The interior walls in the offices will be pressed brick of a dark red color to wainscot height and of a light buff from there to the ceiling. The inside partitions will be of appropriate finish for office purposes.

Heating.

The entire plant is to be heated by the system of direct radiation. The problem of heating these buildings is somewhat difficult, because of their being widely scattered, and many of the returns have to be brought under ground back to the boiler room where they will be received by a double installation of Blake automatic pumps and receivers. The expansion of the pipes is taken care of in almost all cases by large copper expansion bands, a method not often employed.

In the boiler room there will be a water-heating system for the toilets throughout the building. In winter, while the steam-heating plant is in operation, water will be heated by steam from the boilers; in summer by a fuel-heated water heater, installed by The J. L. Mott Iron Works, the temperature being regulated by a specially constructed thermostat.

The boiler room comprises 1,488 square feet of the basement under the stock department. There will be two boilers of the return tubular locomotive type of 100 horsepower each, built by the Erie Engine Works of Erie, Pa. Combustion gases will be carried off through a 100-foot brick chimney. Ashes will be raised from the boiler room and delivered to the company's ash cars by means of an electrically driven link belt conveyor of the Jeffrey type.

Lighting.

Current for lighting will be supplied by the company, and all work will be for 600-volt series railway lighting and run in conduits throughout.

Fire Protection.

In the entire design proper attention has been given to fire protection. The plant is so constructed that it embraces six special insurance risks. In other words, it is divided into that number of sections, separated in such a way by fire walls that each is accepted as an independent risk. By attention to this matter the company will be able to reduce the fire hazard and secure a lower insurance rate.

Water for fire purposes will be supplied by means of two headers connected with the city main. Fire alarm boxes will be placed at points where they will be readily accessible, and each fire alarm box, as well as each hydrant, will have a red light over it to indicate its position at night. The plant will also be equipped with watchman's time-recording apparatus and a system of fire gongs.

All oil will be stored underground instead of in barrels and handled by means of the Bowser oil system. All openings throughout the buildings will be protected by steel doors and shutters.

A high brick wall will surround the property and a watchman's house will be located at each of the front entrances.

The plans for these buildings were made under the direction of W. S. Menden, chief engineer, and H. J. Kolb, assistant engineer, who has active charge of the design and construction. J. G. Walker planned the heating facilities and has charge of mechanical appliances.

GERMAN COMMISSION INSPECTING SINGLE-PHASE RAILWAYS.

A commission of engineers and railway experts representing the German government has been in this country for several weeks investigating the electric railways of the United States, with especial attention to the development of the alternating-current single-phase system. The commission was appointed by Kaiser Wilhelm for the purpose of determining whether the single-phase system shall be adopted for equipping the Berliner Stadtbahn lines in the vicinity of Berlin, which comprise between 300 and 400 miles of road and are owned by the government.

The party includes Councilor Wittfeld, the head of the commission, and confidential adviser to the minister of public

representative of the Westinghouse company. The party was taken in the president's special car 40 miles south to Spring Valley Junction, the round trip being made in a little over two hours. Upon the return the commission inspected the Inland's electric freight locomotives. A train of 15 standard freight cars was attached to one of the electric locomotives and taken as far south as Moran Prairie on a 2 per cent grade. Several stops were made and the members of the commission were amazed at the ability of the locomotive to stand the heavy overload without the least damage to the apparatus.

Pleased with Spokane's Railroads.

Speaking for the members of the commission Councilor Wittfeld said: "We have read much about the success of the new Spokane & Inland Empire Railroad, which has been commented upon in the German press, and what we have seen here has more than repaid us for coming across the continent. The substantial and permanent construction of the road, especially the overhead work, and the completeness of detail in the frequency changing stations and substations is also a surprise to us. Taken altogether the Spokane & Inland is undoubtedly the best equipped electric railroad of equal mileage in the world."

MEETING OF THE NEW YORK STREET RAILWAY ASSOCIATION AT THE ELECTRICAL SHOW.

During the present week the annual New York electrical show has been in progress in Madison Square Garden, New York City. In connection with the display of electrical appliances which has been made by the manufacturing and electric power and lighting interests, a joint meeting of the Empire State Gas and Electric Association and the Street Railway Association of the State of New York was held in the concert hall of Madison Square Garden on Wednesday evening, October 2.

At this meeting addresses were delivered by Frank W. Stevens, chairman of the public service commission of New York, second district; Henry J. Pierce, president of the International Railway Company, Buffalo, N. Y.; Dr. Alexander C. Humphreys, president of Stevens Institute of Technology; and Everett W. Burdett, chairman of the committee on public policy of the National Electric Light Association.

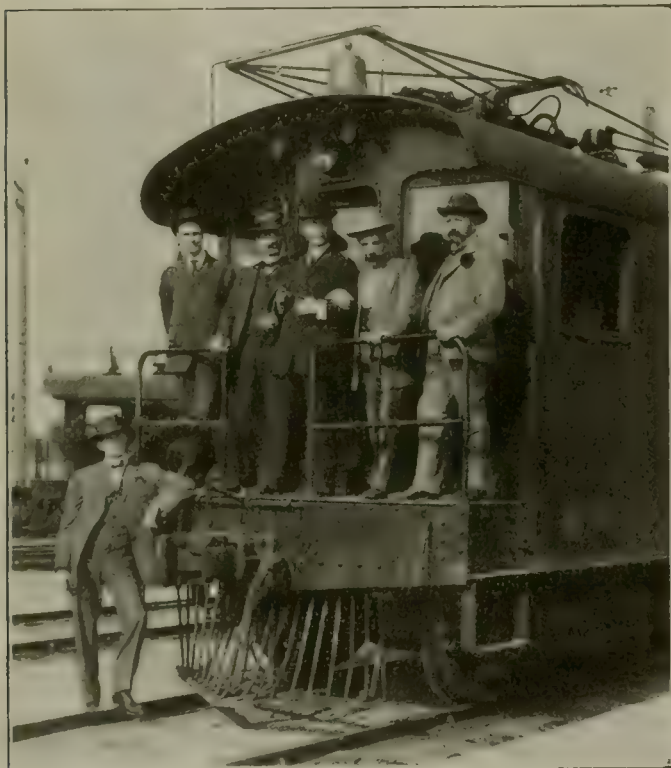
Mr. Stevens had as his subject "The Work of the Public Service Commission of the Second District," and while the interests represented at the meeting were largely those of the gas and electric lighting companies and the traction interests, he spoke principally of the relations of the commission to the steam railways. In speaking on the subject of electric railways, Mr. Stevens said that there had been five deaths from accidents and 10 serious injuries, which, in his estimation, were due entirely to negligence on the part of the operating officials, either in maintaining discipline among their employes or in methods of operation.

Mr. Stevens stated that there was every evidence that some steps would have to be taken by the commission to effect an improvement in a number of directions, but he assured those present at the meeting that any action which would be taken would be made only after a careful consideration of all the evidence and that the commission was earnest in its desire to be just in every decision. He wished to assure railways and other public service corporations that it was to their interests to give testimony freely in all cases where asked by the commission.

Mr. Pierce of the International Railway Company spoke on the subject of "The Electric Railway Situation of Today." Mr. Pierce's paper is presented on another page of this issue.

The programme of the evening was concluded by Mr. Burdett's address on "Public Control from a Corporate Standpoint," which appears elsewhere in this issue.

The exhibits in connection with the electrical show, while



German Commission Inspecting Spokane & Inland Empire Railroad.

works, Prussia; Dr. Walter Reichel, professor of the Berlin Polytechnic Institute; Friedrich Jordan, director of the Felton Guillaume Lahmeier Company; and Phillip Pforr, managing director of the railway department of the Allgemeine Elektricitäts Gesellschaft of Berlin. The commission spent considerable time in East Pittsburg, Pa., as the guests of the Westinghouse company and has since inspected the single-phase lines of the New York New Haven & Hartford Railroad, the Pittsburg & Butler Street Railway and the Indianapolis & Cincinnati Traction Company. The accompanying engraving shows several members of the party on one of the single-phase locomotives of the Spokane & Inland Empire Railroad, Spokane, Wash. On the right is Mr. Pforr, next to him is Councilor Wittfeld, in the center is William F. Zimmermann, hydraulic engineer of the Spokane & Inland Empire Railroad, and on the left are Mr. Jordan and Mr. Randall, Spokane representative of the Westinghouse Electrical & Manufacturing Company. J. B. Ingersoll, general manager and chief electrical engineer of the Spokane & Inland Empire, stands on the ground at the left of the locomotive.

While in Spokane the commission was entertained in the absence of President Graves by other officers of the Spokane & Inland Empire Railroad, Vice-President A. L. White, William F. Zimmermann, J. B. Ingersoll and F. H. Shepard, special

possibly not so numerous as in previous years, were large and fully as interesting.

The Safety Car Heating & Lighting Company, 2 Rector street, New York, exhibited a working model of its axle lighting equipment for steam railway cars. The company's combination electric light and inverted mantle lamps were displayed.

The Chicago Pneumatic Tool Company, Chicago and New York, displayed its well-known electric drills and the Duntley electric hoist.

The General Electric Company's exhibit occupied a prominent position in the center of the hall. The company displayed motors, heaters, fans and a large line of electric cooking utensils.

The Standard Roller Bearing Company, Philadelphia, Pa., displayed models of its many types of roller bearings for various classes of service.

The Westinghouse companies' joint exhibit was one of the largest at the show.

G. M. Gest, 277 Broadway, New York, conduit engineer and contractor, exhibited photographs showing construction work using Gest's methods of conduit construction and showed samples of fiber pipe for conduit work.

ENTERTAINMENT PROGRAMME FOR CONVENTION WEEK.

A pamphlet containing the programme of entertainment for convention week at Atlantic City and a fund of general information has just been issued under the direction of A. L. Whipple, chairman entertainment committee of the Manufacturers' association. The entertainment features include the following:

Monday, October 14.

9 p. m.—An hour with Miss Kitty Cheatham. Solarium—Marlborough-Blenheim hotel. Informal dancing.

Tuesday, October 15.

2:30 p. m.—The committee will endeavor to arrange a roller chair parade for the ladies. See Tuesday morning issue of the Daily Electric Review for later information.

9:30 p. m.—Annual reception in honor of the association presidents and other officers with their ladies. Solarium—Marlborough-Blenheim hotel. Orchestra. Soloists. Refreshments. Informal dancing.

Wednesday, October 16.

2:30 to 5 p. m.—A ladies' afternoon at the Country Club of Atlantic City. Golf. Tennis. Music. Afternoon tea. Ladies' clock golf contest (prizes).

Sight-seeing automobiles will leave the Marlborough-Blenheim hotel at 2 o'clock sharp, stopping at the Chalfonte en route, and, if necessary, special trolley cars will leave from Boardwalk and Virginia avenue at 2:30 p. m. sharp.

Through the courtesy of the Country Club of Atlantic City the official badge will secure guests all the privileges of this beautiful club and grounds, excepting the use of the links, for which the customary fee will be charged.

8:30 p. m.—Theater parties, Young's Pier theater and Savoy theater.

The committee by arrangement has secured the entire house at both of the above theaters, and there should be ample room for all who wish to attend. There will be no reserved seats (excepting for the officers of the railway associations, who will occupy the boxes). Admission by theater ticket. Your choice of seat secured by yourself upon surrendering ticket at door. The committee will distribute the theater tickets for both the above attractions from the box office on Steel Pier on Thursday from 11 a. m. to 1 p. m. on presentation of badges.

11 to 12:30 p. m.—Informal dancing, ballroom Marlborough-Blenheim hotel (orchestra).

Thursday, October 17.

2:30 p. m.—A trolley trip for the ladies of the convention to Ocean City via Shore Fast Line. Special cars will leave Boardwalk and Virginia avenue at 2:30 p. m. sharp, returning about 5:30 p. m.

8:30 p. m.—Third annual Supply Men's amateur vaudeville and theatrical performance, Young's Pier theater.

11 to 12:30 p. m.—Informal dancing, ballroom Marlborough-Blenheim hotel (orchestra).

Friday, October 18.

Afternoon—Men's golf tournament at the Country Club of Atlantic City. (See Daily Electric Review for particulars.)

9 p. m.—Entertainment. Solarium—Marlborough-Blenheim hotel. Informal dancing.

Chairman Whipple desires that especial attention be called to the ladies' afternoon at the Country Club of Atlantic City. The club is located at Northfield and may be reached by the Shore Fast Line electric cars leaving from the Boardwalk and Virginia avenue on the hour and half hour and also by the Atlantic City & Suburban Traction Company's cars leaving from Florida avenue and the Boardwalk at 15 and 45 minutes past the hour. The running time to the club is about twenty minutes. At the club on Wednesday afternoon there is to be a clock golf contest for the ladies, and it is suggested that those desiring to participate bring their golf sticks.

On Friday afternoon the men's golf tournament will be started, to be continued Saturday.

The official badge of the various associations and ladies' badges will be required for identification at all the entertainment features.

Accountants' Luncheon.

Elmer M. White, secretary Accountants' association, has announced a luncheon to be held in the Chevey Chase room of the Hotel Marlborough-Blenheim on adjournment of the morning session Tuesday, October 15. It will be a sea food luncheon and will cost \$3.25 a plate. New members are especially urged to be present and meet and be met in a social way.

TOLEDO EXTENSION OF THE TOLEDO FOSTORIA & FINDLAY RAILWAY.

The Toledo Fostoria & Findlay Railway Company, which operates a line from Findlay to Fostoria and Pemberville, O., a distance of 34 miles, is now building a high-speed extension from Pemberville to Toledo, a distance of 15 miles, by way of Luckey, Lemoyne and Walbridge. F. W. Adams, vice-president and general manager, Fostoria, O., advises us that grading has been completed for the entire distance and that rails are now being laid. The overhead bracket construction is now being erected, also a substation in Pemberville, which will be equipped with a 400-kilowatt Westinghouse rotary converter. Contracts are to be let for 20,000 yards of crushed stone. The new extension is being built entirely on a private right of way 50 feet wide. Steel bridges are being used entirely. There will be no river bridges longer than 54 feet. A 125-foot steel bridge with concrete abutments is being built over the 100-foot right of way of the Hocking Valley Railroad at a 3 per cent grade. An earth fill of 40,000 cubic yards will be required, but no pile or trestle work. A subway with a 4 per cent grade is also being built under the four-track road of the Lake Shore & Michigan Southern Railway near Toledo. There are very few curves in the 15 miles, although one of them is of 8 degrees. The line includes one 6-mile and one 3-mile tangent.

The object was to avoid all but high-speed curves and this was attained by following an ideal survey regardless of the cost of the right of way. Through the last 12 farms near Toledo the right of way cost about \$1,500 per acre, but the original survey was not diverted from in any case. Unless unforeseen delays occur cars will run over the new extension to Toledo some time in November. J. E. Reeves of Canal Dover, O., is president of the Toledo Fostoria & Findlay and E. L. Spafford of Fostoria, O., is chief engineer.

The Ft. Wayne & Wabash Valley Traction Company on September 30 established through limited service between Ft. Wayne and Lafayette, Ind.

PUBLIC CONTROL FROM THE CORPORATE STAND-POINT.*

BY EVERETT W. BURDETT, CHAIRMAN OF COMMITTEE ON PUBLIC POLICY
NATIONAL ELECTRIC LIGHT ASSOCIATION.

A statement of the attitude of the public service corporations of the United States toward public regulation and control naturally and perhaps necessarily divides itself into three parts: (1) What that attitude has been; (2) what it is now; and (3) what in the future it ought to be.

The past, present and future attitudes of public service companies toward public control are not, in my opinion, very much alike. There has been, I think, in recent years, a decided change in the attitude of the corporations toward this subject, and I look for a still more radical change hereafter.

Of course, all corporations are not now in the same class respecting this matter. Some, not confined to those in the "wild and woolly" portions of the country, but including some conspicuous examples right here in the Empire state, are still in what I deem the dark ages of the matter; others have emerged into what I consider a healthier atmosphere, for themselves as well as for the public; while I believe that the great body of them are destined to take still more advanced positions than they have yet occupied.

Development of Public Control.

The subject of public control of private investments in quasi-public enterprises has had a somewhat natural and logical development in this country. Beginning at practically the zero point, it progressed slowly at first, but is now moving forward with giant strides. At the time of their inception these new enterprises were so welcome to the public that it did not seek to throw about them any obstructive or harassing conditions. Rather, it welcomed them with open arms and was only anxious for their establishment and development. This is strikingly shown by the provisions of the charters granted by the state of Massachusetts to three of the first railroads in this country, organized respectively in 1829 and 1830—that the rates of fare and freight, the construction of the roads, the form of cars "and all other matters and things in relation to the use" of the roads, should be wholly within the discretion of the directors. At the close of 1830 the total railroad mileage of the United States was only 23, and the public was, and for many years continued to be, interested in the establishment and development and not in the regulation and control of railroads.

When the street railway was introduced in 1852, and its successor, the electric railway, about 1886, and when the telephone and electric light both made their first appearance in commercial use in 1876, the communities which they were established to serve were clamorous for their introductions and were not much, if at all, concerned about their regulation.

But in all these cases what was at first a wonder or a novelty soon became a commonplace adjunct to daily life. The public awakened to the fact that these utilities had not been established for purely eleemosynary purposes—that, in the expressive language of the day, their owners were "not in business for their health." The more modern doctrine, promulgated, I believe, from New York City, of "the public be damned," was a more or less natural outcome of later conditions. The result was that in each case, and in a somewhat natural order, the public took a hand in what turned out to be the dangerous game of public regulation and control.

At first these efforts took the form of rate regulation in the case of railroads. These were frequently the product of resentment and prejudice, and except for the interposition of the federal judiciary, would have been disastrous. By throwing over transportation companies the protection of the constitution, guaranteeing all our citizens, including corporations, against spoliation under the forms of the law, ruinous consequences of ill-advised legislation have frequently been avoided. The supreme court, while affirming the right and exclusive authority of state legislature to regulate rates and fix maximum charges, has also subjected the reasonableness of legislative action in this respect to the test of judicial inquiry. It has insisted upon rates which are sufficient alike to give a reasonable return upon a reasonable investment and at the same time be inherently fair and reasonable to the public. While insisting that ordinarily a corporation is entitled to some profit upon its enterprise, the court has not as yet undertaken to say what that profit shall be, except in one case (192 U. S., 201—1903) that the rates of a water company may be lawfully reduced by legislative action to a

point where the business will yield only 6 per cent upon the fair value of the investment.

A Reasonable Return Upon Capital.

It seems natural and appropriate to suggest at this point that one of the most important functions of the newly created public service commissions of the state of New York may be to determine, in the first instance, what a reasonable return is upon capital invested in the public service corporations which are under their supervision and control; and it is at least reasonable to indulge in the hope that they will not undertake to limit that return within the narrow margin which has been accepted by the court as sufficient in the case of such a comparatively simple and well established enterprise as that of the supply of water. There is very little analogy between the cases. If the return on capital invested in what can be properly described as essentially experimental industries, such as street railway and electric enterprises, is to be confined to any figure as 6 per cent, it will, in my judgment, be a sorry day, not only for those who have their money at hazard in these enterprises, but for the public at large, whose interest lies in their proper development and extension.

As conservative a man as President Eliot of Harvard University has recently said: "In such enterprises there are often heavy risks. * * * Hence men will not undertake them for the ordinary return on safe investments. They must be induced to venture their capital and their capacity by a prospect of unusual returns." ("The Ethics of Corporate Management," Chicago, March 10, 1906.)

So far as I know, public service corporations other than steam railroads have in but rare instances been made the subject of state regulation or control, by special tribunals created for the purpose. They have ordinarily been left at the mercy of state legislatures, or, worse yet, of the various municipal authorities where they operate. They have thus been forced more or less into state and local politics, a course justified, if at all, by the dictates of "the first law of nature"—that of self-defense. But in 1894 the state of Massachusetts entered upon a more enlightened experiment in public regulation and control of quasi-public enterprises; and since that time the capitalization, debt, rates, service and general conduct of the public service corporations of Massachusetts have been within the control and regulation of public bodies created for the purpose. What has been the result of this experiment can, I think, be fairly gathered from the fact, which I think is a fact, that those concerned with corporate as well as those concerned with public interests in Massachusetts will be found to be in practical agreement that the laws referred to and their administration have been fairly satisfactory, and that no considerable force could now be mustered from any quarter to repeal them.

Defect in Massachusetts Law.

The one primal defect in the laws of Massachusetts regulating and limiting the stock and bond issues of its public service corporations—an error which ought to be avoided in the administration of the law in New York—lies in the failure to discriminate between new enterprises or hazardous extensions of old enterprises, on the one hand, and well-established industries on the other. Admitting that the securities of the latter can properly be limited to amounts sufficient only to cover the reasonable expense of ordinary additions to plant, and the returns upon them to the going rates of interest or profit legitimate in established business of like character, the reasonableness of the rule disappears when applied to extensions of unusual character or into fields of doubtful profit, and particularly to cases of incursions by new enterprises not hitherto unexploited fields. The pioneer who first dares to explore hitherto unexploited territory, or the investor who is willing to increase the usefulness of his enterprise by extending it into channels of doubtful profit, should not be treated in the matter of initial securities or the returns upon them with the same strictness as the conservative investor in an established business. To quote President Eliot again: "There is much to be said on behalf of the proposition that there shall be no water in the stock of public service corporations; yet, if this principle had been applied to all street railway and lighting companies during the past 35 years, the public would have waited long for facilities which they have greatly enjoyed and profited by."

The great authority of the supreme court of the United States, as expressed in the case of *Handley v. Stutz*, 139 U. S., 417, stands for substantially the same proposition.

This branch of my subject naturally closes with the passage by the legislature of the state of New York of the act of the present year constituting two public service commissions, and the appointment by the governor of the members thereof. Not only are these commissions given supervision and control of the most important public service cor-

*Read before the joint meeting of the Street Railway Association of the State of New York and the Empire State Gas and Electric Association, New York City, October 1.

porations in the country, with a combined capitalization estimated by the mayor of New York at three and a third billions of dollars, but they are given practically unlimited powers, within the limits of the constitution, with respect to the regulation of the rates, the limitation of the capital, the requirements of service, and the general supervision and control of the business and affairs of the companies referred to. The powers of the commissioners are alike administrative, judicial and inquisitorial. Their authority over the interest committed to their supervision seems to be practically unlimited, except by the provisions of the state and federal constitutions. In the words of the report of the committee on "Public Policy" of the National Electric Light Association, of which I had the honor to be chairman, "This act can hardly be said to establish a system of laws and not of men. Everything depends upon the men who shall be clothed with the great authority of applying and administering the law." I am glad to believe that in the exercise of his high function of appointment, the governor has succeeded in an eminent degree in securing the services of gentlemen of the highest character and capacity, a fact which I shall assume as the foundation of some of the remarks which I shall make before I close.

Present and Former Attitudes of Corporations.

I have said that I thought the present and former attitudes of public service corporations toward the subject of public regulation and control were not very much alike. Formerly, and in some cases not so very long ago, the idea of public regulation and control of private capital was intolerable alike to the investor and to the man whom he put in charge of his investment. Somewhat extended observation leads me to believe that there has been a decided modification of this attitude in recent years. It is certainly cogent evidence that this belief is well founded to find a great body of public service corporations like the National Electric Light Association adopting at its last convention, held in Washington in June of the present year, the report of its "Public Policy" committee, which, after discussing the subject of public supervision and control, committed itself to the following proposition: "In the judgment of your committee some form of such supervision and control is inevitable in many, if not all, of the important states of the union; and we believe that it should be welcomed by the parties in interest, provided it is put, as we believe it can be, in such form as to preserve the rights and properties of the companies, as well as to promote the interests of the public. The practical question is not so much whether there is to be much regulation and control as it is what the nature and form of them are to be."

Referring to the New York law the committee, while recognizing "the advantages to the public interests attainable by the application and operation of this law under favorable conditions," expressed its belief that "it has great opportunities for evil under other conditions"; and suggested as preferable what the committee called an automatic or semi-automatic system of public regulation and control. By this they meant a system under which "the obligations of the corporations and the authority of the officials are so defined by statute as to make the operation of the provisions of the law upon the state of facts in hand as nearly as possible automatic, calling for the interference of public officials only to the extent of applying the law of the facts as found."

Inasmuch, however, as this is precisely the kind of law which does not exist in New York state, and in which, therefore, you have no reason to be particularly interested at this moment, I am led now to discuss for the few moments left at my command what I conceive to be the proper future attitude of the companies in this state toward the existing law and its application.

The present attitude of New York corporations is one induced by necessity. It is a condition and not a theory which confronts them. Whatever may have been their former attitude is immaterial: at present they have no choice except to submit themselves, to a control more drastic and complete than any heretofore known in this country. They are necessarily on their good behavior. They may not like the commissions, but they cannot afford to make faces at them.

Friendly Attitude is Urged.

What, then, shall the future attitude of the corporations be toward public supervision and control? In my opinion it should be a friendly and not a hostile attitude. If I were in charge of a large corporation in the state of New York I would not if I could repeal the existing law, though I confess I should favor some radical amendments of it. The greatest objection to it is, as I have said, that everything depends upon the men who administer it. It does not announce the principles upon which they shall act, nor undertake to outline

the policies which they shall adopt. Assuming, however—as I am glad to think I have a right to assume—the high character and capacity of these gentlemen, and their disinterested and patriotic purpose to administer the law in the interest of invested capital as well as of the public, I believe that a great opportunity lies before the corporations of this state to so influence the opinions of the commissioners that the highest good to all concerned will result from their construction and administration of the law. But this cannot be successfully done if gone at in a narrow, partisan or altogether selfish manner. The settling of the questions which will arise before the commission will involve great principles of law and of public policy, alike of interest to the community and of vital importance to the companies. All fears of adverse results are dissipated if one entertains the conviction, as I have no doubt the body of the commissioners do, that the true interests of both the corporations and the public are substantially the same; that the necessity for injustice to either in order that justice may be done to the others does not exist. It is not for the interest of the public that the corporations shall be crippled in their activities or unreasonably limited in their profits; and, on the other hand, it is not in the interests of the corporations that the public shall be subjected to exorbitant rates, poor service or contemptuous treatment. Time does not permit, and perhaps this would not be the proper occasion, to undertake to develop and demonstrate the truth of these general propositions, but reliance may well be put upon the fact, which I think cannot be successfully disputed, that both in this country and abroad the public is best served where the corporations are most prosperous, and the corporations are most prosperous where the public is best served.

Harmony and Co-operation.

This state of things will in my judgment be greatly promoted in the future by the application of a principle, or perhaps it should hardly be called more than a device, which, while successfully applied abroad, has not as yet had much attention in this country, to wit, the so-called "sliding scale," under which, when a proper relation has once been established between a company and its customers, the profits of one are made directly dependent upon the economies to the other. Time does not permit more than a reference to this matter; but I think I could put my present opportunity to no better advantage than to urge upon all in interest, both those charged with the administration of the law, as well as those who are subject to it, a careful and sympathetic study of this most interesting question. In the language of the committee heretofore quoted, "Its advantages to the companies, to their customers and to the public are altogether too great to be lost, if it is practicable to secure them."

I hope I have planted a fruitful seed of harmony and co-operation between the companies in interest and the public officials who are charged with their supervision and control. Differences of a serious nature will certainly arise; displays of short-sighted selfishness on the one side and of obnoxious officialism on the other may occasionally obscure issues and perhaps strain personal relations; conflicts of opinion on question of law, policy and practice will inevitably occur; at times the strain will be severe on all concerned. But all these things are but necessary incidents to the development of the principles which must be established for the good of all. If conducted in the right spirit and with an honest purpose, these conflicted ideas will result to the common advantage. The main thing is, that they be conducted without acrimony and in a spirit of harmonious co-operation—not like gladiators seeking to kill each other, but rather like friendly rivals in a common cause. Such a spirit I believe to be not only essential to the interest of the companies and to the success of the commissions in the administration of the law, but greater than other, to the general welfare of the public at large, without which neither corporations nor officials, nor private individuals can enjoy that full measure of happiness and prosperity which they seek.

A. A. Anderson, general manager of the Indianapolis Columbus & Southern Traction Company and the Indianapolis & Louisville Traction Company, whose lines completing the connection between Indianapolis, Ind., and Louisville, Ky., are expected to be ready for operation shortly, has announced the rates of fare over the new lines, which have been filed with the Indiana railroad commission. Between Indianapolis and Louisville the single-trip rate will be \$1.90 and the round-trip rate will be \$3.45. Between Indianapolis and Seymour the rate will be \$0.95 for single trips and \$1.70 for round trips. The extension from Columbus to Seymour was opened this week. The line of the Indianapolis & Louisville Traction Company from Seymour to Sellersburg is practically completed.

THE ELECTRIC RAILWAY SITUATION OF TODAY.*

BY HENRY J. PIERCE, PRESIDENT INTERNATIONAL RAILWAY COMPANY,
BUFFALO, N. Y.

It would be well for the country, for the welfare of its financial institutions, for its business prosperity, for the stability of the investments of people both rich and poor, if, when those high in authority speak, they should not judge all corporations by the few who have done wrong, but also should bear in mind that the great majority of corporations are conducting their affairs honestly and in the interests of the people whom they serve.

Justice in public utterance is as essential as justice in private act. Fairness in official conduct is as necessary as honesty in daily business. In this practical age nothing should be done in the shadow of secrecy that cannot bear the light of day, and nothing should be done in the glare of publicity that cannot bear the close impartial scrutiny of honest private analysis.

We are indeed living in a practical age. Modern development moves on with giant strides. The resources of land, sea and air are made subservient to the comfort of man. The luxuries of a few years ago are absolute necessities now. A country would indeed be looked upon as lacking in enterprise which did not have the advantages of steam and electric transportation, of the electric light and telephone.

During the old home week celebration in Buffalo a few weeks ago the greatest curiosity was a street car drawn by horses, yet it was an exact reproduction of the mode of transportation furnished only so short a time ago as 1891. The very car had been pulled through the streets at that time by the horses which hauled it in 1907. The driver and conductor had performed similar service in horse-car days. The straw was on the floor to keep the feet warm. The four oil lamps were in their places. It seemed the product of a thousand years ago, compared with the 30-ton electric cars between which it was sandwiched—vehicles lighted with half a hundred electric lamps, heated by electricity, and which it would have taken the power of 100 horses to propel at speed.

Reconstruction Periods.

In 1891 the horse-car plant was sold for scrap and replaced by electricity. By 1896 increase in travel made it necessary to practically rebuild the entire system, requiring the installation of heavier rail, larger cars, up-to-date machinery, and within the past three years many electric railway systems have again, for similar reasons, been practically rebuilt. These expenditures could not be paid for out of earnings, and had to be provided for by new issue of bonds and stocks. Thus, while many electric railways could be replaced for less than their capitalization, yet the excess is accounted for largely in many cases by the cost of rebuilding to meet new conditions.

The dual duty of a public utility corporation is to provide good service to the people from whom its franchise was obtained, and to return to its stockholders a reasonable profit on their investment. The electric street railway may not increase its fare, yet wages have increased, and the cost of material has advanced over 40 per cent in three years. The public is ever expecting greater facilities, which require heavier track, larger cars, increased power, more car houses, more efficient and therefore higher-priced trainmen, better and more frequent renewal of pavements, extension of tracks into sparsely settled neighborhoods, while the state and municipalities are constantly increasing taxation.

Under this combination of circumstances one of four things must inevitably occur: 1. Poorer service. 2. Reduction in price of labor and material. 3. Increase in rate of fare. 4. Reduction in taxation.

The manufacturer or the private corporation may close its plant for a time when business is not profitable, or need not maintain the plant at a high state of efficiency; but the public service corporation is always in the public eye—it must keep on, it must keep up the quality of its service to the highest standard.

Labor and Service.

The business of an electric railway in fast-growing communities is increasing, to be sure, but not nearly in the ratio of increase of expense of operation, maintenance and necessary betterments. Of course, poorer service cannot be permitted under any circumstances; in fact, it should be constantly improved. No street railway man favors lower wages. I certainly do not. Labor earns its wage. Our men work faithfully, and their families are entitled to the comforts won by their toil. No thoughtful man favors reducing the price of

materials at the expense of the prosperity of the country, for good prices for materials mean good prices for the makers of materials—the manufacturers and the men who work for them. The comfort and happiness of our people are more closely allied with prosperity than is realized by some. Adversity means idleness, poverty and distress. Comforts are then no longer obtainable; necessities even are difficult to obtain; for when a workman's labor ceases his income stops, and when money is lacking, misery takes its place with those who depend for the necessities of life upon the earning of their daily wage. Where there is no daily wage there is apt to be no daily bread. Prosperity, therefore, is in itself the first necessity.

Increased Fares Not Practical.

A proposal to increase the rate of fare is not practical. Real estate may be developed and a building left for years without improvement, addition or even a coat of paint on its woodwork. Not so with a street railroad. The public, not unnaturally, insists on the newest type of cars, on more cars, on better and still better service, on greater comfort, on perfect hygienic conditions. An unpainted or old-time battered car would no more dare to run on a modern city street railway system than a caravel of Columbus would dare venture to cross the bows of the "Lusitania," in defiance of the new queen of the seven seas. In Buffalo there are buildings on the foremost streets which are three and four and even five and more times as old as the oldest type of street cars in the entire system. And Buffalo is no eyesore in this respect—not at all. The same is true in other cities. The public is more exacting with street railroads than with any other form of business.

Taxes Should be Reduced.

Public officials reflect the attitude of the public in this regard. Municipalities yearly require more and more from street railroads. Repaving, retracking and new paving, new tracks, new cars, care of street and other items, constantly increasing in number, heavily swell the total of expenditures. Added thereto are taxes; and all these requirements causing increased expenditures to the street railroad are in turn used as a basis for increase in taxes. Here we find the one feasible and valid method of relieving the existing situation. The municipality or state can lighten the burden. In view of the heavy expenditure yearly required and the tremendous cost of operation and maintenance, resulting in greater conveniences and facilities for the public and materially benefiting the municipality as a whole, as well as each individual citizen thereof, this added load of taxes could or should be greatly lessened or removed. The street railroad then could better fulfill the public demand and could turn to its owners for authority for further improvements, at the same time permitting a reasonable income on genuine investment.

Public Service Commission.

When the public service commission act was in process of passage I opposed it for two fundamental reasons—the bestowal of such vast powers for the regulation of the business affairs of corporate citizens, and because it denied the foundation principle of our republic that every citizen should have the unrestricted right of appeal to the courts. But the public service commission act has now become a law, and while if in the hands of unjust or arbitrary commissioners it would bring hardship and perhaps ruin upon the corporations affected, yet the wise choice of commissioners by Governor Hughes insures that while the interest of the people will be looked after, yet that corporations, which are citizens of the state, will undoubtedly be treated fairly, and no unjust demand be made upon them. I am confident that in requiring that betterments and changes be made in the plants of the corporations over which they have supervision, the commission will take into consideration the almost impossibility of raising money at this time, a condition largely brought about by unwise, cruel and sometimes unwarranted attacks made upon public utility corporations.

I believe that my fellow members of the New York state street railway association will take the same position for their companies as I do, when I say for the corporations which I represent that, now the public service commission act is law, we cheerfully obey it; that we will open our books to the commissioners, will promptly furnish them with all information that they ask which it is in our power to give. If we have made mistakes, let us know it and correct them. If conditions can be bettered, let us co-operate to the utmost with the commissioners to make them so. I am certain that investigation will in some instances result to our benefit; that the commissioners will find that the burdens of taxation placed upon us are too great to permit of our rendering the service to the people that we desire and which the commission would like to request of us.

*A address delivered before the Street Railway Association of the State of New York and the Empire State Gas and Electric Association at Madison Square Garden, New York, October 1, 1907.

Capitalization.

The majority of street railroads are no more overcapitalized than real estate is overcapitalized. I believe every fair and informed student of conditions will corroborate this. Whether it be a trolley line or a 10 or 20 story building, the method and proportionate extent of capitalization are the same. But there the similarity ceases, for after capitalization the building goes its way serenely, the initial cost being the final cost as well; but the street railroad through the long period of construction encounters difficulties on every hand, not only labor, but questions of consents and adjustments, and through each succeeding year the demands in service and maintenance and operation increase and multiply.

Capital requires and is entitled to a fair return on investment. It is estimated that fully 80 per cent of the street railways of the United States are not paying dividends. Capital invested in street railroads finds the electric railway situation of today a problem requiring the most serious consideration. And those who would blindly heap further burdens of expense on the electric railways of the country either know little of or care less for the best interests of the people at large.

I am not croaking. This is no caw of a black crow. It is no sandwich man placard reading, "Pity us! Pity us!" I feel that every man present here who is familiar, fully familiar, with the electric railway situation of today realizes the truth of what I have said. It is no rumble to foretell disaster. It is no calamity cry. I have endeavored briefly to outline conditions as we who are in the street railway business know them to be. I believe that today, considered from the business standpoint as between the electric railway and the "value received" which they give to the people in return for their fare, in most communities the people have the best of it; that it is the electric railways that are in need of the most help from their father (the state), their mother (the municipality); that they require the "first aid for the injured" from their doctors (the public service commission) to keep them out of the ravenous clutches of their "uncle," the money lender. The electric railway cannot sell its bonds, and the only money it can secure is what it can beg from its stockholders, borrow from the banks, or coax from its conductors.

Future Development.

The future? Show me a man who does not believe in the future, and I will show you a man who has not believed in the past and who is not apt to be believed in the present. Ours is a business whose growth and success depend upon fair and broad-minded management from within, and upon fair and broad-minded treatment from without. It is a great business, devoted to the service and convenience of the people, to the every-day necessity of the public, to the development of outlying sections and open country, to the growth of cities, and to the knitting together of communities; it is a business where the investor and the patron, capital and the customer, alike can be faithfully served and where the results achieved redound to the benefit of the entire state.

We have progressed steadily. From the bygone days of the horse cars we have advanced in tremendous development to the commodious electric car of today. Distances once requiring an hour now are traversed in 10 minutes. Country that was desolate is populous and quick of access. Cities that were sprawled in remote sections are compactly united, with no neighborhood inaccessible. We have done it under difficulties. We have met obstacles seemingly insurmountable; they have been overcome and the advance has gone on. We are entitled to help and not to hindrance. A vast work lies ahead of the electric railways—a work requiring official co-operation, a work requiring the confidence of investors and the support of capital.

Trolley lines are no experiment in the upbuilding of the country. They are welcomed and sought. Where they are wanted today, they should be built not later than tomorrow. The future years should hold in their history a wondrous record for electric railways—a record dependent on fair and liberal treatment of one of the foremost utilities of the world.

Suppose at this moment that every electric railway in the state were to be blotted out of existence—not a return in entirety to primitive conditions, but simply so far as street railroads and trolley lines are concerned. A glance at a map will show what disaster would be wrought—not with a view to invested capital, but to communities. The mere loss of power and stopping of cars for an evening hour throws a whole city into confusion, inconveniences thousands of people and causes complete rearrangement of countless plans. The withdrawal of suburban and interurban trolley service would well-nigh isolate whole sections of the state. Electric railways not only are essential to the development and prosperity of the state, but they are an institution, a utility, in closer constant contact with the people than any other form of services known to society.

Efficiency is requisite to the success of any electric rail-

way. It is a marvel to many how the electric railways, with their earnings consumed so relentlessly by the enormous expenditures for labor, material and taxes, still manage to keep in the forefront of modern improvements, alert always to obey the demand of the people for the newest and finest cars and facilities, in order that the service may be the best attainable.

There is, as I have said, a vast work in electric railway building yet to be done. It calls for an enormous outlay of capital. The people and the growth and development of the Empire state alike make the work imperative. Delay in perfecting or extending modern methods of communication and transportation means delay in commercial and social development and retardation of material prosperity. The multitude of difficulties attendant upon electric railway construction, its financing, operation and maintenance, create a condition which calls for freedom from what might needlessly harass, call for official aid and approval and for relief from any form of burden which properly can be lightened.

The electric railway situation of today, summed up, shows existing systems beset by tremendous expenses, which make relief from heavy burdens of taxation imperative. It shows the great need for extension of electric railways, with capital hesitant to enter where the risks are so numerous and the financial burdens so heavy, and the dividend returns on the investment practically nothing. It shows the whole nation eager for the closer communication of localities. Where trolleys were fought bitterly a decade ago, the opening of new lines today is the occasion for a holiday and celebration, with congratulatory speeches, blowing of whistles, ringing of bells, music and cheers of welcome.

It is well for the community; it is well for the passenger; it is well for the employee. In all fairness, should it not be made well also for the man whose money makes all this possible? Is he also not entitled to a fair return on his investment—a fair return, a moderate dividend? I tell you, gentlemen, the government of a state or city or town can far better afford to throw off the burdens of taxation in such an instance as this of an electric railway. In the country the farmer is allowed to work out his road tax, and why not let the street railway perform its full duty to the state and municipality through furnishing every reasonable facility for the comfortable, rapid transit of all the people, instead of compelling it to cripple its resources by paying money into the public treasury for the benefit of other taxpayers who do not represent one-tenth of those who daily utilize the street cars, and whose constant comfort would be thus vastly improved. There is a prosperity of greater possibilities and importance than for the taxable purposes of the moment. The broader and richer development, the greater growth, the revelation of larger commercial and social resources, all of which are allied with the existence and extension of electric railways, make it not only possible, but proper, for government to say: "We throw off the burden of taxation—you are too much service to the state to be hampered by tithes in this time of vast demands and colossal requirements, when you are called upon to do more than is asked of any other form of private business or public service in the whole world."

When we look over this vast nation and see what has been accomplished by the pioneers in electric railway building, the men who have established transportation facilities surpassing those of any other land, we feel a thrill of pride and see the hand of enterprise bidding us on to greater things. Far out ahead looms the banner of the nation's need in electric railway transportation. It is not for us to cry: "Bring back that banner to the line of what has already been accomplished." Rather it is for us to hail it with acclaim and cry: "Let us bring up the line of our achievements to the banner of the nation's head."

We can picture the future day—the day of accomplished deeds, the day of satisfied needs—when that which waited to be done waits no longer. Between now and then lies an era of tremendous endeavor, of ceaseless labor—and through it all we will have no time for needless turmoil, we want no senseless strife. We do want earnest, honest co-operation, not alone with the private investor, but also with the public official—and the day of complete success will come when the investor, builder, operator and official, all four act in a harmony and unison, based on a common confidence that all are working together for the common good.

St. Charles, Mo., is a thriving and prosperous city with over 12,000 inhabitants. It has no street car system, although connected by electric lines with St. Louis, Mo., a distance of 20 miles. The general prosperity of the city has caused one addition after another to be laid out and subdivided, and it now seems as if a street car system in the city would be a profitable enterprise. The city council is said to be ready to grant a trolley franchise to any corporation to construct and operate a system within the city. The city clerk is Charles H. Kansteiner.

PIPING AND POWER STATION SYSTEMS.—LVI.

BY W. L. MORRIS, M. E.

Class P2—Air Lines for Blowing Out Electrical Apparatus.

The earlier method of blowing dirt out of electrical windings was by use of hand bellows, but as the size of electrical apparatus increased and as higher voltages were used, the necessity for a more efficient air supply made the use of air compressors necessary. The cleaning of the electrical machinery is not merely a matter of appearance, but it is absolutely necessary to prevent short circuits. The higher the air pressure, the more thoroughly is it possible to remove the dirt. By making this cleaning operation simple and convenient, the attendant takes much better care of his apparatus.

The air pipe lines are generally 1-inch mains and $\frac{3}{4}$ -inch branches to hose valves. It is good practice to install a large number of hose connections, making the use of a long line of hose unnecessary. The hose should be $\frac{1}{2}$ inch in size with a small opening nozzle provided with a valve. The hose should be able to stand 60 pounds pressure. The union that connects with the hose valves should have two projecting handles so that the hose can be attached and detached without a wrench. The hose connection valves should be $\frac{3}{4}$ inch with a hose nipple reduced for the $\frac{1}{2}$ -inch hose. Ordinarily it will be necessary to have hose connections at each generator, converter, or other apparatus; also at oil switches, back of the switchboard and other places where dirt and dust accumulate.

Plants that use air-cooled transformers should be provided against picking up dust through the fan suction. If some form of a vacuum cleaner could be used on floors around electrical apparatus, many of the cleaning troubles would be solved. Most operators mop their wood floors with an oily mop with the idea of picking up all the loose dust. A floor having an oily surface will hold the dust and by cleaning the floor with a light oil instead of water, it is possible to keep down the dust. This is very evident, as using oil on the floor causes it to look dirty very soon after cleaning. This apparent objection is really an advantage, for the more dirt there is collected on the floor the less there will be deposited elsewhere. If the power station floor is of wood it should be well oiled with a vegetable oil before any mineral oil has a chance to stain it, and in this way bad discoloration will be avoided. Metal floors are easily cleaned and their appear-

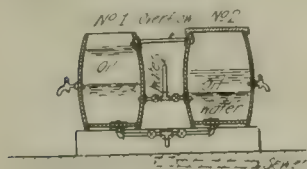


Figure 322 (P 2-1).

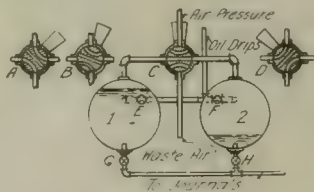


Figure 323 (P 3-1).

ance greatly improved by using oil. In fact, where there is no oil on a metal floor it will soon rust. Cement floors cannot very well be oiled and furthermore they are producers of dust. A cement floor must be cleaned with a soda solution to remove the oil and the floor kept dry at all times.

The use of oil for cleaning is not an expense, as the dirty oil can be placed in a barrel and allowed to settle; and by having a draw-off valve at the bottom, it can be drawn off when it settles. To remove all the oil from the settling tank, water is slowly fed in, causing the oil to flow out of the overflow. Figure 322 (P 2-1) shows two barrels fitted up for this purpose. Water is being fed into barrel No. 1 to overflow oil into barrel No. 2, which is the barrel for storage of the clean oil. No. 1 is the barrel for receiving the dirty oil. When cleaning the floors oil is taken from the No. 2 tank and the dirty oil is returned to No. 1 tank. At the end of the

operation No. 2 is partly empty and No. 1 nearly full. The oil is allowed to settle in No. 1 barrel and is then overflowed into No. 2. The washout in No. 1 barrel is opened and the barrel cleaned ready for receiving dirty oil when the floor is again cleaned.

Class P3—Air Lines for Oiling Systems.

The use of air as applied to oiling systems is shown in Figures 56, 58 and 60. The oiling system that is dependent upon air for its operation is a constant source of trouble, as it is then necessary to have an air pump always in service. When using compressed air for the oiling system compressors should be installed that are adapted to continuous operation. The use of both air and oiling systems should be considered in the nature of conveniences and not a necessity. Never-

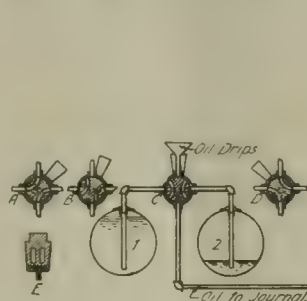


Figure 324 (P 3-2).

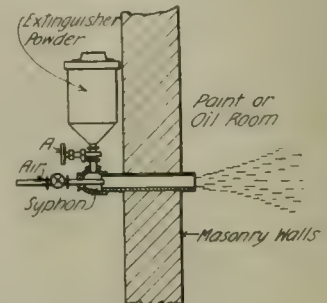


Figure 325 (P 4-1).

theless one frequently finds plants operating that have no other means of supplying oil to the engine than by an oiling system, which in turn depends on air to supply the necessary pressure.

Air may be used quite successfully to raise oil from a receiving tank to a gravity tank, but to do this requires a closed tank, which in itself is an objectionable detail. If tanks are to have air pressure upon them, they should be arranged, as shown in Figure 323 (P 3-1). Tank No. 1 is shown ready to go under pressure and tank No. 2 ready to go out of service. The position, a, is that of the valve previous to changing over, with pressure on No. 2 and No. 1 open to the atmosphere. The position, b, is intermediate with all openings closed. Position, c, is an equalizing position; that is, tanks No. 1 and No. 2 open to each other. This position is retained until both tanks are under the same pressure. Then the handle of the valve is moved over to the position shown as d, this being with pressure on No. 2, and No. 1 open to the atmosphere. Before changing over tanks, it will be necessary to close drip valve, e; also open valve, g. Then, when the air valve is in the position c, valve h can be closed and the air valve then thrown over to position d. As soon as pressure is off of tank No. 2, the tank is opened to take the oil drips.

It will be noted that by having separate valves e, f, g and h, there is considerable manipulation required. The operation of these tanks can be simplified by using another 4-way valve connected to the same handle as the air valve shown in Figure 323. The handle when toward either single tank indicates that tank to be under pressure and when in the middle position as equalized, there being but three positions assumed by the one operating handle. Figure 324 (P 3-2) shows the position of the oil valve when placed in unison with the air valve. The same letters in Figures 323 and 324 show a like position of the handle. The small port crossing the larger one may be obtained by drilling through the plug valve and placing a tube in the opening. Ordinarily a small port can be obtained by drilling and chipping, as shown at e in Figure 324.

To further secure the oiling system against trouble in case the air compressor is out of service, also to avoid fluctuating pressure, it will be necessary to use an air storage tank and check valve in the supply pipe.

Class P 4—Air Lines for Fire Protection.

Rooms containing inflammable material, such as benzine, paints, oils, etc., can best be protected with an air blower connected to a receptacle holding a fire extinguishing powder, as shown in Figure 325 (P 4-1). The syphon can be an ejector tee or a standard reduced tee, say 1 by $\frac{3}{8}$ by $\frac{1}{2}$ inch. The extinguishing chemical may be either dry or liquid. The amount discharged can be controlled by the valve, a. The chemical extinguisher is especially suited for such fires as flame up, as oil, paint, etc.

Class P 5—Air Lines for Signal Whistles.

The air system can often be used very satisfactorily to signal from engineer to switchboard operator, as the air lines run to practically all the machines and is easily reached for whistle branches. There should be a whistle at the switchboard so that the operator can give a signal; also a whistle at the engine so the engineer may call the attention of the board operator. The whistles should be shrill so that they can be heard above other noises. Whistle signals are far-reaching and can be used more effectively than a bell and are very easily maintained. Air is much preferable to steam for small whistles, as they can be located anywhere, are free from water and are ready to blow the moment the whistle valve is opened.

Class Q 1—Steam Drips from Mains.

While removing the condensation from pipe lines is important, it is not this that causes so much destruction to engines, but the water carried over in large quantities with the steam that must be given the chief consideration. Different systems for removing drips from pipe lines were shown in Figures 36 to 44. In designing a drip system it is necessary to consider these "slugs" and make such provision as will protect the machinery from damage.

The arrangement shown in Figure 326 (Q 1-1) is satisfactory, for handling condensation, but is not adapted for handling large quantities of water. The header as shown would with the flow of steam drain into the separator, and if this were of the ordinary size much water would be carried through to the engine. A safer plan is to take the steam from the top of the header and place the receiver separator at the engine throttle. The header would then hold back a large quantity of this water and discharge it through its own drip. To further insure the discharge of this water from the header, it would be advisable to take the steam connection for the reheater coil from the bottom of the header and allow any water to work its way through the coil to the drain. This is a very desirable way for safeguarding against the flooding of engine cylinders because the velocity of the steam passing through the reheater is high, the capacity of the coil is large and there is no mechanism to be injured by the water. As the heating capacity of the high temperature water is nearly equal to that of the steam, there will be but little difference in the reheating temperature.

Unfortunately the details that insure engine cylinders against flooding increase the condensation loss. This is true except for those steam lines that may be taken from the bottom of steam mains and feed the auxiliary service where water is not dangerous. Large headers or separators are a source of constant radiation loss and if used with superheated steam the losses from radiation in these become greater than the loss from friction. If superheated steam is to be used it will materially affect the design of the pipe work, the steam supply and drip system.

(To be continued.)

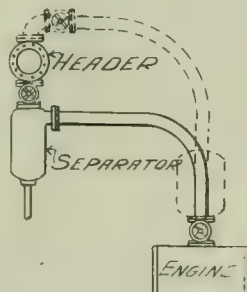


Figure 326 (Q 1-1).

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Stopping Cars for Funeral Processions.

Wilmington City Railway Company v. White, 66 Atlantic Reporter, 1009.—The supreme court of Delaware says that the alleged practice of the defendant company to stop its cars and permit a funeral procession to pass without interruption was not a custom or usage which had the force and effect of a law, binding upon the company. It was a course of conduct, if it existed, in the nature of an accommodation, indulgence or courtesy, prompted, doubtless, by considerations of respect, and, if known among drivers in funeral processions to exist, it was competent to prove it, though it was not pleaded.

Liability for Refusal of Conductors to Give Provided Transfers.

Snee v. Brooklyn Heights Railroad Company, 104 New York Supplement, 907.—The supreme court of New York, appellate division, second department, says that the complaint was dismissed in this case on the ground that the defendant having provided for transfers, and given its conductors transfer tickets to give to passengers, it was not liable to the penalty for the refusal of the conductor to give the plaintiff a transfer ticket. This was error. The refusal of the conductor was that of the defendant. Section 39 of the New York railroad law, which provides that any railroad corporation which shall ask or receive more than the lawful rate of fare, unless "through inadvertence or mistake, not amounting to gross negligence," shall incur a penalty of \$50, does not apply to the case. It is not to be construed with Section 104. Its genesis and context are different, and the reservation in it has reference to mistakes of fact, such as of the distance between stations, or the like. The present case was for the refusal of a transfer ticket, not for asking or receiving an unlawful rate of fare.

Opportunity for Extension to be Considered—Approach to Park Subject to Condemnation.

In re United Traction Company, 104 New York Supplement, 377.—The supreme court of New York, appellate division, third department, says that this was an application to confirm the determination of commissioners as to the public convenience and necessity of an extension of the petitioner's road 1,500 feet along Western avenue, in the city of Albany. Upon the trial evidence was offered tending to show that from the point where the proposed extension ended the petitioner owned a right of way along Western avenue for a long distance, and that it was proposed in due time to extend the road along its right of way to and beyond the city limits. It was claimed that this was error, that the evidence did not show that the petitioner owned the right of way for the proposed future extension, and that that was a subject which was prejudicial and ought not to have been before the commission. But the court thinks that it was immaterial whether the petitioner owned this right of way or not.

It was, the court holds, a proper circumstance to be considered by the commission that the territory beyond the 1,500 feet was such that it would permit an extension, and that an extension would be necessary. They had the right to take into consideration all the circumstances, the probable growth, the convenience of the people, and the fact that there was a territory beyond the 1,500 feet which at an early day must be accommodated, and that it could only be accommodated after this 1,500 feet was built upon. In the court's judgment, therefore, it was immaterial whether there was or was not a right of way along the proposed future extension. The fact that there was territory there upon which a road should or might be built was material, and one of the circumstances proper to be considered. If the petitioner owned the right of way, perhaps the road might be built earlier than it

otherwise would. If it did not own it, it would have to acquire it.

A plank road company, which formerly operated its road over a part of this 1,500 feet, was by law authorized to convey that part of its road to the commissioners of Washington park, and they were required to improve that portion of the road "as an approach" to the park; the statute providing: "But nothing herein contained shall be construed as authorizing said commissioners to close the said portion of the said road or to exclude the public from the use thereof as a highway." It was conveyed, and the park commissioners improved the road, planting trees alongside of it, paving it with stone blocks, and made it a high-class street approaching the park. The point in question was nearly a mile distant from the park. It was claimed that this part of the street thereby became a part of the park system, and not subject to condemnation for street railway purposes. It was assumed that, if it was a park, it was not the subject of condemnation for this purpose. But the court says that clearly it was not a park. It was subject to the highway law of the city, and was simply a street improved a little more than other streets, because it approached and was a good driveway to the park.

Right to Transfers Limited to Direct Routes.

Kelly v. New York City Railway Company, 104 New York Supplement, 561.—The supreme court of New York, appellate division, first department, does not agree with the conclusion reached by the appellate term, as reported on page 627 of the Electric Railway Review of May 11, 1907. It says that the law reads into all statutes and all contracts the element of good faith. The lawmaking power had in contemplation in the passage of Section 104 of the railroad law the practical efficiency of the means of transportation. The design was to permit a passenger to proceed along the line of connecting surface railroads, so that he might reach his point of destination with the greatest practical ease and economy. It was "to the end that the public convenience may be promoted" that this provision was inserted, and the public convenience requires of all street surface railroads, not only that they shall deliver each passenger at the termination of his journey, no matter how circuitous the route may be, but that such passenger shall be carried by the most direct and practical route to the nearest point to which he desired to go; regard being had to his purpose and convenience.

An individual may have the time to work out and indulge in freakish trips; but the public has no interest in them, and that was the purpose of the legislature in giving the right to enforce a private remedy, to the end that the "public convenience may be promoted by the operation of the railroads embraced in such contract substantially as a single railroad with a single rate of fare." The public convenience, not the indulgence of individual caprice, is to be served and this is to be accomplished, or "promoted" (to use the language of the statute), "by the operation of the railroads * * * substantially as a single railroad with a single rate of fare."

Is there any difference in a contract where a passenger buys a ticket between two named points, and a contract growing out of the payment of a single fare upon a street surface railroad pursuant to statute? Is not the contract implied that the company will carry the passenger from the point where he comes on board to the nearest practical point upon its lines to the proposed destination of the passenger by the shortest and most direct route and not by some fanciful, roundabout way? To the court's mind the inquiry carries its own answer.

While the refusal of a transfer is the overt act upon which the cause of action depends, it is the violation of the duty to the public which the law seeks to reach, and if there is no violation of that duty then the defendant had a right to refuse the transfer. The duty of the corporation is to carry, not beyond and back to the point by a circuitous route, but "between any two points on the railroads or portions thereof embraced in such contract any passenger desiring to make one con-

tinuous trip between such points," not for the gratification or whim of the idle or curious person, but "to the end that the public convenience may be promoted by the operation of the roads embraced in such contract, substantially as a single railroad with a single rate of fare." The law contemplates that a passenger upon a street railroad, like a passenger upon any ordinary railroad, wants to go somewhere as a practical matter—that he has a purpose in going to some given place.

Distinguishes Between Street and Interurban Railways—Former Cannot Give Latter Entrance to Cities.

City of Aurora and another v. Elgin Aurora & Southern Traction Company and another, 81 Northeastern Reporter, 544.—The supreme court of Illinois says that the chief characteristic of a street railway is that it is built upon and passes along streets and avenues for the convenience of those moving from place to place thereon. Its fundamental purpose is to accommodate street travel, and not travel to or from points beyond the city's lines. Commercial railroads embrace all railroads for general freight and passenger traffic between one town and another, and street railways embrace all such as are constructed and operated in the public streets for the purpose of carrying passengers with the ordinary luggage from one point to another on the street.

Here a company, which was also engaged in the operation of interurban lines, had authority to operate a line in a city as a street railway. Another company, chartered under the general railway act, was engaged in operating an interurban electric railway between that city and another. An agreement was made between them for the use by the latter company of the tracks of the former within the city. But it is held that the contract did not confer lawful authority on the latter company to transport freight, express, baggage and mail in its cars along the street car tracks in the city; nor even to transport its passenger cars and passengers over the line in question. The first-mentioned company did not have the right to authorize a railroad company organized to transport passengers between points outside of the city to enter the city and transact its business in and along the streets of the city over the lines of the street railway.

Again, the court says that a street railway is not an additional burden upon the street of a city, while a commercial railroad is a further burden upon such way. It follows that a street railway company may not lawfully carry the cars of a commercial railroad for the purpose of transporting therein the passengers of the latter over the lines of the street railway without the permission of the city authorities of the city in which the lines in question are located. If it were otherwise, the power to determine when, where, and in what manner interurban lines should enter a city and traverse its thoroughfares with passenger traffic would be lodged, in great part, not in the city authorities, but in the street railway company in every city where a street railway company is rightfully operated.

Where corporations chartered to operate interurban railroads desire to enter cities of this state and propel cars in and along the streets of the cities for the purpose of transporting their passengers or freight into the cities they must seek and obtain licenses to do so from the cities subject to such reasonable rules and regulations as the municipalities may find necessary or proper to establish.

The provision of the agreement under consideration in this case that the employes of the second company were to be deemed employes of the first while in the streets of the city, though they were to be paid by the second company, the court says had no magical effect to convert the interurban coaches into street cars, or the passengers who were making trips from other points to the city, or vice versa, into passengers of a street car line proceeding from point to point in the city. The authority of the city over its streets was not abrogated or at all diminished by the provisions of the contract.

News of the Week

Railroad Rates to Atlantic City.

As stated in Bulletin No. 4 of the American Street and Interurban Railway Association, as abstracted in last week's issue of the Electric Railway Review, those who desire to go to the convention from the Central Passenger Association territory or from western or southwestern points, must avail themselves of Central Passenger Association card orders if they desire to obtain the reduced rates from points in that territory.

In order to facilitate the distribution of these card orders among the street railway delegates who wish to avail themselves of the reduced rates, a limited number of these card orders have been sent to Robert McCulloch, general manager of the United Railways Company of St. Louis, St. Louis, Mo.; The Wilson Company, publishers, 160 Harrison street, Chicago, Ill.; the Electric Traction Weekly, Cleveland, O., and H. A. Nicholl, president Central Electric Railway Association, Anderson, Ind.

All of these card orders are numbered and the association has guaranteed that these orders shall only be used by delegates attending the convention.

Card orders for street and interurban railway company representatives may be obtained upon application to Bernard V. Swenson, secretary, 29 West Thirty-ninth street, New York City. Representatives of manufacturing companies may obtain card orders upon application to George Keegan, secretary of the Manufacturers' Association, Park Row building, New York City.

Six Fares for a Quarter in Lincoln, Neb.

The Nebraska railway commission has issued its decision with regard to the application of the city of Lincoln, Neb., for an order compelling the Lincoln Traction Company, the Citizens' Street Railway Company of Lincoln, the Omaha Lincoln & Beatrice Railway and the Capital Beach & Milford Railway to sell six tickets for a quarter and 10 tickets for school children for a quarter, and to issue universal transfers. The commission dismisses the application with regard to the other companies and orders the Lincoln Traction Company to sell tickets at the rates named. With regard to universal transfers the application is denied. It was shown by the evidence that the Citizens' company now sells six tickets for a quarter and that the other companies are governed by the steam railroad laws and may consequently charge a minimum of five cents. The commission, after an examination, values the property of the Traction company at \$1,400,000. The order goes into effect on November 1 and the company has announced its intention of complying without an appeal, although the officials have been quoted as saying that the valuation is \$500,000 less than the amount of cash invested in the property.

Will Urge Acceptance of Chicago Ordinance.

Representatives of the banks and trust companies which are trustees under deeds securing bond issues of underlying roads of the Chicago Union Traction Company met in New York on October 3 and issued a statement saying that it was the unanimous sense of the meeting that the Chicago Railways Company ordinance should be accepted and that steps should be taken at once to accomplish that end. Bondholders will be urged to deposit their securities as early as possible in order that a plan of reorganization may be effected.

A general bondholders' committee was appointed, consisting of J. N. Wallace, chairman; E. D. Hulbert, Henry A. Blair, Chauncey Keep, C. S. W. Packard, George P. Hoover, William H. Henkle, L. S. Owsley and William A. Mason. Those present at the meeting in New York were: John J. Mitchell, president of the Illinois Trust and Savings Bank of Chicago; E. D. Hulbert, vice-president Merchants' Loan and Trust Company of Chicago; William P. Gest, vice-president of the Fidelity Trust Company of Philadelphia; J. N. Wallace, president of the Central Trust Company of New York; and C. S. W. Packard, chairman of the committee of holders of the North Chicago Street Railroad first mortgage bonds.

Indiana Steam and Electric Roads Must Interchange Freight.

The Indiana railroad commission on September 27 rendered an important decision, holding that both steam railroads and electric interurban railroads are common carriers and must therefore exchange freight in carload lots or less at junction points where the physical conditions of both roads permit of such exchange. The decision is in the case of the Farmland Stone Company of Farmland, Ind., located on the line of the Indiana Union Traction Company, about six miles from Winchester, against the traction company and the Cleve-

land Cincinnati Chicago & St. Louis Railway, asking that they be compelled to interchange freight at Winchester for transportation to Farmland over the electric line. The company had been securing its coal in this way up to a short ago, when the steam road stopped the practice.

The commission orders the companies to resume the interchange agreement, beginning on October 20, taking the position that both classes of roads are amenable to the same laws. It is stated, however, that each case must be decided on its merits, as in some cases the electric roads are not suited for such traffic. The ruling is said to be regarded with great favor by the traction men of the state.

Universal Transfers Granted in New Orleans.

The New Orleans Railway & Light Company on September 28 announced that it would put into effect on January 15, 1908, a system of practically universal transfers between the various lines of controlled companies included in its system. This decision, as announced in a letter to Mayor Behrman by President E. C. Foster, followed a series of conferences between the city and company officials and was reached at a meeting of the board of directors on September 27. The mayor had previously demanded a system of half fares for school children, but after being shown the impossibility of granting this request he formally accepted the company's proposition.

Mr. Foster's letter stated that as the company had cut its October preferred dividend in half in order to use the earnings for development, and as the trust deed securing its 4½ per cent bonds binds the company to adhere to the rate of fare specified in the franchises, five cents, the directors could not see their way clear to granting the reduced fare.

The transfer system will apply to all the lines except the Canal-Esplanade belt line, the Tulane-St. Charles avenue belt line and the West End line.

New York Public Service Investigation.

Sensational exposures with regard to the affairs of the Metropolitan Street Railway were made before the public service commission on October 1 by Lemuel E. Quigg, who was called by the commission to testify with regard to expenditures made by him and checks drawn to his name which had been charged to the special construction account of the company. In examining the accounts of the company William M. Ivins, special counsel to the commission, found that about \$798,000 had been charged to this account in five years which could not be accounted for, although old check books showed that some of it had been paid to Mr. Quigg, an attorney, for "services."

Mr. Quigg, an attorney in the employ of the company and a former politician, stated that he had been engaged by H. H. Vreeland in 1899 as "adviser generally," and that from November 24, 1903, to date he had received from the company about \$217,000 for his services in "accelerating public opinion" and promoting and retarding legislation. A part of this money, \$151,246, was accounted for in a general voucher; \$66,061 was accounted for by separate vouchers for salary and expenses, such as office rent, telephone and telegraph calls, trips to Albany, etc. His work at Albany in behalf of the company he said was performed mainly before committees of the legislature. Many of these vouchers for salary, fees and expenses were introduced in evidence, some of them having been charged to franchise and property account, but most of them to construction account.

The witness then described how much of this money was expended in a campaign to manipulate public sentiment in favor of Thomas F. Ryan's plans at the time of the preliminary negotiations for a subway. He said that the Metropolitan interests submitted plans to the rapid transit commission for routes which were especially favorable to their plan of giving transfers between the subway and surface lines. These plans were opposed by the Belmont interests, in control of the elevated roads. Consequently Mr. Quigg caused to be organized a number of associations of property owners, whose interests would be promoted by the Metropolitan plans, and caused them to appear from time to time before the rapid transit commission, the board of estimate and committees of legislature in support of these plans. The associations were often provided with counsel paid for by Mr. Quigg and in many cases their arguments were prepared by him. He also caused to be prepared and circulated all over New York a petition asking the commission not to award a contract for the operation of the subway that did not provide for free transfers to the surface roads. This petition secured over 1,000,000 signatures and was calculated to prevent August Belmont from getting the subway contract.

On the following day Mr. Quigg continued his testimony along the same lines, explaining how associations had been formed to defeat various projects which were opposed by the

company, such as the third track on the Third avenue elevated line and the plan for connecting the East river bridges by a loop.

D. C. Moorehead, secretary and treasurer of the Metropolitan Street Railway, and Marvyn Scudder, special accountant for the commission, also testified at length with regard to the company's accounts, revealing a particularly blind system of bookkeeping.

Judge Lacombe of the United States circuit court, who appointed the receivers for the New York City Railway and the Metropolitan Street Railway, has directed them not to seek an appearance before the public service commission in its investigation of street railway affairs. The opinion says that the occupancy by the receivers "of the leased property is but temporary; presumably it will not extend—at least for operation—beyond a year, and it is to be hoped that it may be ended sooner. The former operators and owners of the roads are the persons from whom the information as to existing conditions and the probable results of proposed changes is to be obtained. It is to be supposed that the owners will continue to be represented at the hearing and to conduct their side of the investigation, because, to whatever extent the income of the property may enable the receivers to carry out the improvements called for by the commission, the ultimate burden of them all will fall upon the property."

The Cleveland Low-Fare Controversy.

For the past several days the chief interest in the Cleveland low-fare controversy has centered around the testimony presented in the common pleas court before Judge Lawrence in the case of the Cleveland Electric Railway against the Forest City Railway, in which it is sought to prove Mayor Johnson's financial interest in the low-fare companies and thus to invalidate the franchises. On September 25 depositions were presented from B. T. Cable of Rock Island, Ill., and C. M. Bates of Yardley, Pa., president of the New Jersey & Pennsylvania Traction Company, who are stockholders of the Forest City Railway. Mr. Bates stated that he owns 2,473 shares of Forest City stock; that he first became interested in the company in 1902 and that he did so on the solicitation of Mayor Johnson, believing it to be a good investment. He said that he did so on his own responsibility and was in no way guaranteed against loss by Mr. Johnson. Mr. Cable stated that in 1903 he turned over to Mr. Johnson about \$80,000 of railroad bonds, to be converted into money and used in payment for stock certificates, whenever the money was needed or Mr. Johnson saw fit. Later he had subscribed for more stock in the same way. He said he had taken an interest in the company as an investment on the basis of figures given by Mr. Johnson to show that the additional travel under 3-cent fares was sufficient to make up for all but 6 per cent in gross earnings.

On the following day Mr. Johnson was called to the stand and testified as to his motives in supporting the 3-cent fare movement. He related the history of the movement since its inception under the efforts of John Hoefgen in 1901 and said that after the latter had withdrawn he had sought for moneyed men to back the enterprise and had succeeded in inducing Mr. Bates and Mr. Cable to furnish funds, which were placed in Mr. Johnson's hands and turned over to the company at his discretion in return for stock certificates in the name of Mr. Bates or Mr. Cable. He said that he had never given these men any guarantee or had any interest in their profits, and that he had never owned a share of Forest City stock. He said he had never paid any obligation of the Forest City company or had any financial interest in its profits, although he had indorsed some of its notes, guaranteed some of its bills and had never made any claim for personal expenses incurred in transacting its business. Asked in regard to his motives and his reasons for attacking the Cleveland Electric Railway he said: "Because I felt that that was the point of attack; that that was the place to strike the first blow at valuable franchise corporations that I think corrupt city government. On this, being the most valuable one, earning the most money, I concentrated my efforts in opposing public service corporations in private hands."

On September 30 the mayor testified that he had no intention of extending 3-cent fares to points outside of the city limits.

On September 26 Horace E. Andrews, president of the Cleveland Electric Railway, sent to Theodore E. Burton, republican candidate for mayor of Cleveland, a letter in reply to a statement addressed to Mr. Burton last week by A. B. du Pont, president of the Municipal Traction Company. Mr. du Pont stated that the Cleveland Electric Company's own figures showed that the Central-Quincy lines, which were operated at a 3-cent fare from January 12 to April 23 of this year, showed a profit of 6 per cent. Mr. Andrews in his reply states that Mr. du Pont's conclusions are made from incom-

plete data and that the Central-Quincy lines during the period in question actually lost money, in spite of the fact that the traffic on those lines was increased in competition with the parallel lines operating at a higher rate of fare, and that the gross earnings of the parallel lines were reduced by \$15,190 during that time. Mr. Andrews also submitted figures showing the gross earnings of the Central-Quincy lines, including earnings from advertising, as \$70,261.82, from January 12 to April 23. He then deducted from this sum the \$15,190.62 reduction on the other lines, leaving \$58,341.38. Operating expenses, according to Mr. Andrews' figures, were \$60,607.89, for 353,782 car-miles, leaving a deficit from 3-cent fare operation of \$2,266.51. Mr. Andrews also said that the average fare paid on these lines was 3.12 cents, because many people paid their fares with seven-for-a-quarter tickets instead of cash, and that if account were made of this the deficit would be still greater.

At midnight on October 1 the Cleveland Electric Railway began the sale of street car tickets at the rate of seven for a quarter, the rate under which it is seeking a new 20-year franchise in exchange for its present grants, which expire in a few years. President Andrews states that this action is taken in response to numerous requests from citizens and in order to give the public a further test of this rate of fare.

Illinois Traction System Adopts Signal Change.—The Illinois Traction System has recently adopted a change of signals, using red flags for rear-end markers in the daytime, instead of green flags, the standard on steam roads. The reason given for the change is that the red flag shows up better against the olive green paint on the company's cars.

Chicago Electrical Show.—It is announced that the third annual Chicago electrical show, held by the Electrical Trades Exposition Company, will be held in the Coliseum on January 13-25, 1908. Homer E. Niesz, manager, 1006 Monadnock block, Chicago, is now receiving applications for space and former exhibitors are given the opportunity to use the same space at the next show that they have previously had.

Arbitration Committee in Philadelphia.—The Retail Merchants' Association of Philadelphia has appointed the following committee to arbitrate the differences between the Philadelphia Rapid Transit Company and the city of Philadelphia, regarding the payment to the city in lieu of car license and paving expenses: John B. Parsons, Mayor Reyburn, Samuel D. Lit, William T. Tilden and Meyer Goldsmith. The committee will investigate the company's books.

New Jersey Commission to Investigate Third-Rail System.—Announcement is made that the New Jersey railroad commission has appointed Alfred P. Boller of East Orange as civil engineer and retained the firm of Boller & Hodge as consulting engineers. Charles A. Mead of this firm has been selected as bridge inspector. The commission has announced its intention to investigate the third-rail electric system in use on the West Jersey & Seashore between Camden and Atlantic City, with a view to determining the best safeguards for the protection of the public on such lines.

Central Kentucky Traction Company's Line Placed in Operation.—This recently completed interurban line, which connects Lexington, Versailles and Frankfort, Ky., will be formally opened to the public on October 14, when, through the courtesy of the management of the Central Kentucky Traction Company, members of the Frankfort Business Men's Club and local press representatives will be entertained on a trolley trip from Frankfort to Versailles and Lexington. A trial trip has been made by officials of the road and everything is pronounced in readiness for the formal opening on that date.

San Francisco Bribery Case.—The trial of Tírey L. Ford, general counsel of the United Railroads of San Francisco, on charges of having bribed the board of supervisors to grant the company a franchise for the operation of its lines by overhead trolley system instead of by cable or underground contact shortly after the fire last spring, was begun before Judge Lawlor on September 23. The cases of President Patrick Calhoun, Assistant to President Thornwell Mulally, W. M. Abbott, Mayor E. E. Schmitz and Abe Ruef on the same charges have been deferred for trial until October 7. The prosecution is being conducted by Francis J. Heney, assistant district attorney. The particular charge against Mr. Ford in the first trial is of having paid Supervisor Thomas Lonergan \$4,000 to influence his vote on the franchise. It is not charged that Ford personally made the offer to Lonergan, but that Abe Ruef, ex-Supervisor Gallagher and ex-Supervisor Wilson were the intermediaries, most of the \$200,000 said to have been paid for the franchise having been divided among these men. Lonergan and the other supervisors all testified to having been paid \$4,000 each for their votes by Gallagher and Wilson. The latter in turn testified that they had been paid by Ruef

to approach the supervisors, but up to the present no evidence has been introduced to show that Ruef was paid by Ford.

Nashville Transfer Station Opened.—The new transfer station of the Nashville Railway & Light Company, Nashville, Tenn., was opened for use on September 28. The old transfer building, which, together with the methods of operation used in connection with it, was described in the Electric Railway Review of February 9, 1907, page 187, has been remodeled and considerably enlarged, and contains, besides waiting rooms for passengers, the operating offices of the company and a well-equipped lounging room for conductors and motormen, 40 by 80 feet. The station is located in the central part of the downtown district and all the cars in the city pass through it. In this way physical transfer privileges from one line to another are made possible. The addition of a new track in the remodeled station has greatly enlarged its capacity.

Information for Convention Exhibitors.—The American Street and Interurban Railway Manufacturers' Association is sending out two bulletins containing information and regulations for the use of exhibitors at the Atlantic City conventions, to be held October 14 to 18, 1907, giving directions for securing the necessary labor and various incidentals which will be necessary for preparing their exhibits. Kenneth D. Hequembourg will be director of exhibits at the Atlantic City conventions and has opened offices on the Steel Pier, on the second floor of the entrance hall, Bell telephone 460. The Steel Pier is being rapidly put into condition. All outside booths are now erected and the awning over the arcade will be in position in a few days. Exhibitors are urged to make their shipments at an early date, as there will be great congestion if the Eldridge Express Company is called upon to do a large part of the work the last few days before the convention opens.

American Society of Mechanical Engineers.—The American Society of Mechanical Engineers will hold its first monthly meeting this fall on Tuesday evening, October 8, at 7:45, in the main auditorium of the Engineering Societies building at 29 West Thirty-ninth street, New York. The subject of this meeting, "Industrial Education," is one in which manufacturers are very much interested. The college technical courses and the student apprenticeship courses will be discussed at length by men who have been in charge of theoretical and practical institutions. Prof. John Price Jackson has written a paper on the "College Technical Courses and Apprenticeship Courses Offered by Manufacturing Establishments." He gives data in the form of letters from several of the largest manufacturing establishments in America, in which they outline the courses offered by the factories, and explains the manner of conducting the same. Dr. Henry S. Pritchett, president of the Carnegie Foundation and president of the Society for the Promotion of Industrial Education, and Prof. Dugald C. Jackson of Massachusetts Institute of Technology and president of the Society for Promotion of Engineering Education, will deliver short addresses on the subjects allied to their societies. Other manufacturers have been invited to speak informally of their experiences and altogether it is expected that the meeting will prove interesting and instructive.

Electrification of Southern Pacific Suburban Lines.—The Southern Pacific Company has decided upon plans for the electrification of its suburban lines serving Oakland and other cities across the bay from San Francisco. In this territory there are the main line over the Oakland pier to Fruitvale, a distance of about seven miles, with branches running through Oakland north to Berkeley and south to Alameda, the so-called narrow-gauge line (which has been a standard-gauge track for some years) over the Alameda mole to Alameda, with branches north and east to Oakland and Fruitvale. A power house for the system will be built at Fruitvale. The line to Alameda will be the first to be equipped for electrical operation, as it is the intention to use the Alameda mole exclusively for suburban traffic. Contracts for power house equipment, aggregating over \$800,000, have been let as follows: Parker Boiler Company, Philadelphia, boilers; International Pump Company, condensers and steam auxiliaries; Westinghouse companies, steam turbines and generators; General Electric Company, motors and car equipment. The type of car to be used in the electric service is 71 feet 5 inches long, seating 80 passengers, operated in 6-car trains, and equipped with General Electric No. 207, 125-horsepower 600-1,200-volt motors. The arrangement of cars in a train will be as follows: Two cars, one at each end, equipped with motors, master controllers, air compressors and dynamotors for obtaining 600 or 1,200 volts, to be used in lighting and control circuits; two cars with motor equipment only to be placed next to the end cars, and two trail cars to be placed in the center, the center cars being equipped with bus and control lines.

Construction News

FRANCHISES.

Bemidji, Minn.—Carl C. Gowran, A. A. Carter and George W. Teitsworth have been granted a 25-year franchise to build and operate a street railway in Bemidji.

Billings, Mont.—At a special election, held on September 14, Yegen Brothers were granted permission to construct an electric railway in Billings and from there to several nearby towns. Construction must begin within nine months and at least three miles of track be completed inside of two years. It is stated that work will be started at once.

Morris, Ill.—The Chicago Ottawa & Peoria Railway Company, incorporated last April to build an interurban line from Chicago to Peoria by way of Ottawa, Ill., has accepted the franchise recently granted to it in Morris, Ill., and has deposited \$5,000 required by the ordinance, as a guarantee that the road will be built.

Cumberland, Md.—The decision of the court which recently awarded certain right of way for the construction of an electric railway between Meyersdale and Salisbury to the Pennsylvania & Maryland Electric Railway, has been appealed by the Meyersdale & Salisbury Street Railway Company, which originally owned the franchise. The Pennsylvania & Maryland company avers that the Meyersdale company had allowed its franchise to expire by inactivity and is now blocking any move toward the construction of the proposed electric line to Frostburg by the Pennsylvania & Maryland company. The controversy involves about \$500,000, as well as the future existence of one company or the other, and work on the road is suspended, pending the decision of the court of appeals.

Montgomery County, Indiana.—The county commissioners have granted the Chicago & Western Indiana Traction Company, the so-called "Educational Road," a franchise over the Romney road for the construction of its line from Crawfordsville to Greencastle, Ind.

Nampa, Idaho.—At a special meeting of the city council on September 21 it was decided to re-enact the franchise which was passed last fall, giving the Boise Valley Electric Railroad the right to operate its interurban line in Nampa. Under the terms agreed upon the road must reach Boise within 60 days and when the dividends shall have reached 7 per cent the city shall have 10 per cent of the profits above that sum. A large force of men has been put to work and it is stated that in all probability the line will reach Nampa within 40 days.

Pueblo, Colo.—N. Douthitt, who is promoting an interurban line from Pueblo to La Junta, has withdrawn the application for a franchise to operate the line through Pueblo. Considerable opposition has been directed against the measure by property owners along the proposed route through Pueblo.

Rosedale, Kan.—The Rosedale city council has granted a franchise to the Kansas City & Olathe Electric Railroad Company to lay tracks in Rosedale to a connection with the Metropolitan Street Railway. Arrangements are being made with the Metropolitan company to operate its cars over the Kansas City & Olathe line as far as Merriam, beginning at once. It is stated that the Shawnee extension of the new line will be in operation by January 1 next and the Olathe extension completed by next summer.

San Diego, Cal.—A franchise for a 6-mile extension of the South Park & East Side Railway on Fourth street has been applied for by E. B. Webster, president of the company.

Vallejo, Cal.—A franchise for right of way over the tidelands owned by the city of Vallejo and to cross the city and Georgia street wharves, has been granted by the city council to the Vallejo & Northern Railway, which is to build an electric railway from Vallejo to Sacramento.

RECENT INCORPORATIONS.

Dillsburg & Wellsburg Railroad.—Incorporated in Pennsylvania to build an electric railway in York county. The line will be 7½ miles long and will connect Wellsburg and Harrisburg, Pa. Capital stock, \$75,000. A. C. Hetrick is president.

Grand Traverse Railroad, Traverse City, Mich.—Incorporated in Michigan with a capital stock of \$450,000 to build an interurban line from Traverse City to Charlevoix, Mich. Incorporation papers also were filed for the Traverse City Street Railway with a capital stock of \$25,000. The incorpo-

rators are the same for both companies and are as follows: John B. Carter, president; Charles A. Deneen, secretary; M. S. Sanders, treasurer.

Minneapolis St. Paul Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—Incorporated in Maine to construct and operate an interurban railway in Minnesota and Iowa, connecting the towns named in the title. Capital stock, \$25,000,000. Eben W. Freeman, Portland, Me., president; M. H. Boutelle, Minneapolis, secretary.

Oklahoma Electric Terminal Company, Oklahoma City, Okla.—Incorporated in Oklahoma to build 12 miles of terminal railway in Oklahoma City at an estimated cost of \$5,000,000. Capital stock, \$2,500,000. Incorporators: Guy V. McClure, Oklahoma City; Charles Combs, Warren E. Moore, J. J. Johnson and Fred S. Combs.

Oklahoma Railway, Oklahoma City, Okla.—This is the new name of the Oklahoma City Railway Company, which recently filed amended articles of incorporation for the purpose of securing permission to build interurban lines to Guthrie, Norman and Yukon, with an additional line from Spencer or Choctaw City through Oklahoma City to Yukon. By the amended articles the mileage is increased from 12 to 125 miles, and the authorized capital stock from \$2,000,000 to \$6,000,000. The line north of Oklahoma City is now in operation as far as Britton and is being rapidly extended to Guthrie. The directors are: Anton H. Classen, John W. Shartel, George H. Brauer, Henry M. Brauer, Charles W. Ford, Edward H. Cooke and J. M. Owen, all of Oklahoma City.

Stonewall Valley Electric Railroad.—Incorporated in Colorado to build an extension to the Trinidad Electric Railroad from Cokedale, Colo., through the Stonewall valley into the Stonewall mountains. This extension of the Trinidad street railway system to the mountains will afford access by rail to one of the finest summer resorts in the state. Capital stock, \$100,000. Incorporators: P. M. Johnson, St. Elmo, Ill.; Frank P. Read, James McKeough and J. C. Huddelson, Trinidad, Colo.

TRACK AND ROADWAY.

Alaska Home Railway, Valdez, Alaska.—Blamey Stevens, chief engineer, Valdez, Alaska, writes that work of track-laying has been started on this proposed electric railway from Valdez to Fairbanks, Alaska, 400 miles. Surveys have been completed from Valdez to Summit, 30 miles, and are under way for the remainder of the distance. Nine miles of grading out of Valdez have been completed and this work is now in progress to Canyon Keystone, 15 miles. The line will be narrow gauge and it is proposed to build ultimately 1,000 miles of electric railway, to be owned principally by Alaskan interests. It is proposed to build only as far as Summit this fall, at which point the work will be suspended until spring. H. D. Reynolds, president, Valdez, Alaska.

Albany & Hudson Railroad, Hudson, N. Y.—This company has announced that plans are under way for an extension of its present line to the Hancock town line, where it will connect with the proposed extension of the Pittsfield Electric Street Railway from West Pittsfield, Mass. Right of way has been secured and it is stated that both of the extensions will be built the coming spring. The Albany & Hudson's extension will be $4\frac{1}{2}$ miles long.

Bartlesville (Okla.) Interurban Railway.—W. G. Thummel, chief engineer, writes that this company, which is building an electric line from a point two miles west of Dewey, I. T., to a distance of seven miles, has let contracts for two steel bridges over Caney river and Coon creek, one with a 160-foot span and the other with 100-foot span. Contracts have also been let for about 400 lineal feet of pile trestle work. Grading has been started and contracts have now been let for everything except tracklaying, which will be advertised soon. In about 60 days the company will be in the market for 60-pound T-rail and 73-pound grooved girder rail, also about 14,000 ties.

Danville (Ky.) Light Power & Traction Company.—T. M. Jenkins, general manager, states that this company will build one mile of track, the work to be done by company forces.

Davenport, Ia.—The preliminary survey for the Davenport-Manchester interurban line has been completed from Manchester to a point about two miles north of Northwest Davenport. From this point three separate surveys will be made into Davenport proper to determine the most feasible route into the city. The work of financing the road will be started as soon as the engineers make their report, and it is hoped to be able to start construction work next spring.

Elkins Light & Power Company, Elkins, W. Va.—This com-

pany, recently chartered, proposes to build an electric line through the counties of Taylor, Barbour and Randolph in West Virginia, at a cost of about \$1,000,000. The line is to be connected with the Morgantown Fairmont & Mannington Railroad, which will be extended to Wheeling, and from there a direct route will be afforded to Pittsburg. The proposed route will take in the cities of Grafton and Elkins, with principal offices at Elkins. Stephen B. Elkins, Elkins, W. Va., Richard O. Kerns, Henry Gassaway Davis and Young Elkins are interested.

Evansville & Boonville Traction Company.—It is announced that surveyors soon will begin the work of locating the route for an extension of this line from Boonville to Petersburg, Ind., by way of Lynnville, Winslow and Spurgeon, tapping the rich coal fields of Pike county.

Evansville, Ind.—Announcement is made that an electric railway from Evansville, Ind., to Bowling Green, Ky., by way of Henderson, Ky., is being promoted. Permission to cross the Ohio river over the Louisville & Nashville bridge will be sought, but if this cannot be obtained the cars probably will be taken across by means of a transfer ferry. The line will touch Livermore, Calhoun, Woodbury and other Kentucky towns on the Green river.

Finleyville Southern Street Railway.—This company has been organized to build an electric road from Finleyville to Bentleyville, Pa. A grade built several years ago by the Pittsburg Southern road will be used. Officers: President, M. J. Hayden, Washington, Pa.; vice-president, T. W. Hayden; secretary, S. C. Wilson; treasurer, J. C. Hayden.

Ft. Dodge Des Moines & Southern Railroad, Boone, Ia.—One hundred graders are at work on this line and tracklaying is being done as fast as the roadbed is made ready. The track already laid is being ballasted, the overhead work is in progress and it is believed that the line will be ready for operation into Ft. Dodge this week. J. L. Blake, general manager, Boone, Ia.

Ft. Wayne & South Bend Railway, South Bend, Ind.—Construction on this road, which has been financed by Chicago capitalists, will be started in the near future on the section between Nappanee and Syracuse, Ind., 16 miles, and it is hoped to have cars running between these two points by January 1, 1908. The road will be operated by steam until the receipt of its electric locomotives, which are now being built. The line parallels the Baltimore & Ohio Railroad for a portion of the distance. Perry A. Randall, Ft. Wayne, is president.

Ft. Wayne & Springfield Railway, Decatur, Ind.—At a special meeting of the directors of this company, held in Decatur on September 28, it was decided to extend the line from Decatur south to Berne, Ind., a distance of 12 miles. The cost of the extension will be approximately \$200,000, of which the stockholders present at the meeting subscribed \$67,000. The line as proposed will traverse a thickly populated district and will parallel the Grand Rapids & Indiana Railroad. W. H. Fledderjohann, president, Decatur, Ind.

Georgia & Tennessee Interurban Electric Railway, Chattanooga, Tenn.—This company has organized the Tennessee Construction Company to build an electric railway from Chattanooga to Chickamauga, Tenn. Samuel Smith of Chattanooga is president of the company.

Grand Valley Railway, Brantford, Ont.—It is stated that this company may soon award a contract for the construction of the line between Brantford and Port Dover, Ont., via Waterford and Simcoe, 34 miles. T. Andrews, chief engineer.

Greenville, Tex.—Preliminary steps have been taken by capitalists of Greenville, Bonham and Wolfe City, Tex., toward the organization of a company to construct and operate street railways in these cities and in addition to build an interurban line from Greenville to Bonham by way of Wolfe City. Freight, express and mail will be handled in addition to the regular interurban passenger traffic.

Illinois Traction Company, Champaign, Ill.—It is reported that this company intends further to extend its present system of interurban lines by the construction of an electric railway from the northern part of Illinois through Rock Island and from there south to Peoria to connect with the lines to Bloomington, Decatur, Springfield and East St. Louis. Engineers are said to be now at work surveying south from Freeport, Ill.

Indiana Columbus & Eastern Traction Company, Cincinnati, O.—The work of rebuilding the old Columbus & Lake Michigan steam road for conversion to electrical operation between Lima and Defiance, O., is said to be progressing rapidly. The track has been rebuilt but the work has been

delayed by lack of material for ballasting and a controversy with regard to the Second street bridge in Defiance.

Indianapolis Huntington Columbia City & Northwestern Railway, Syracuse, Ind.—The appraisers appointed to make a valuation of the property of this company, now in the hands of receivers, have recommended the abandonment of the project. The company proposed to build from Huntington to Goshen, Ind., and had laid about five miles of track and graded about ten miles more at the Goshen end. After about \$100,000 had been expended for right of way and the track and roadbed so far completed the appraisers valued the present assets of the company at \$9,640.

Indianapolis Newcastle & Toledo Electric Railway, Newcastle, Ind.—C. S. Hernly, vice-president of this road, is quoted as saying that the line will be in operation between Indianapolis and Newcastle by the latter part of November. When this portion is completed work will be pushed on the extension to Toledo.

Indiana Union Traction Company, Anderson, Ind.—Grading is well under way on the extension from Middletown to Newcastle, Ind., 12 miles, and it is intended to complete the line this year.

Jacksonville (Fla.) Electric Company.—Work on this company's improvements on its local street railway lines is progressing rapidly. The line on Main street will be double-tracked from First to Eleventh street with 60-pound rails and a double-track curve at the intersection of Bay and Main streets with a loop around Forsyth and Laura streets will facilitate the handling of passenger traffic, which heretofore has been considerably congested at this point. With the completion of the proposed extensions and improvements direct connection will be afforded with Springfield, the principal suburb of Jacksonville.

Knoxville (Tenn.) Railway & Light Company.—Satisfactory progress is reported on the repair work now being done on the city lines of this company. New switches at Fifth avenue and Gay street and at Park avenue and Gay street have been placed and the work of rebuilding the double track between Park and Fifth avenues is in progress. The heavy rails adopted as standard by this company have replaced the old light rails. The new double track in this section is being laid with 7-inch T-rail, with ties embedded in concrete.

Lykens Valley Construction Company, Pottsville, Pa.—This company has been organized to finance the construction of an electric railway to be built from Millersburg, Pa., to the upper end of the valley at Hegins, and from thence by two routes: one to Pottsville by way of Good Springs, Donaldson, Tremont and Forrester, connecting at Minersville with the terminal of the Union Traction Company's lines and its various connections. The other route will be from Hegins to Ashland by way of Mable, Weishamle and Gordon, connecting with the lines of the Schuylkill Railway and the lines of the Shamokin & Mt. Carmel Transit Company. W. E. Harrington of Pottsville, Pa., is president of the new company; D. N. Yoder of Hegins, treasurer.

Marquette Negaunee & Ishpeming Interurban Railway, Marquette, Mich.—This company, which has just been incorporated to build an electric line connecting the cities named in the title, has retained The Roberts & Abbott Company of Cleveland, O., as engineers. The Lake Superior Railway Construction Company has the construction contract. L. M. Sigler of Cleveland, president.

Meridian (Miss.) Street Railway.—This company has made an agreement with the Mobile & Ohio and Queen & Crescent railroads for the construction of a bridge over the railroad tracks which will be used by the electric railway to connect its north and south side divisions. It is estimated that the bridge will cost \$50,000, which will be divided between the interested parties. The bridge will also be used for wagons.

Meridian, Miss.—An electric railway which will connect Meridian with Lauderdale, Miss., 23 miles north of Meridian, on the Mobile & Ohio Railroad, is announced as one of the interurban propositions now under consideration in this section. If built the line would pass through a thickly populated, level country and it is believed that the necessary capital for its construction is available. Prominent citizens of Meridian are interested and negotiations with several construction firms are under way.

Missouri Traction Company, St. Joseph, Mo.—Money for the preliminary survey for this proposed interurban line is said to have been raised and application for a charter has been made. As proposed the line will be built from St. Joseph to Excelsior Springs by way of Plattsburg, about 50

miles, where it will branch to Mirabile and Kingston, Mo., in Caldwell county. George M. Morris, Mirabile; John I. McDonald and Horace G. Krake, St. Joseph, are interested.

Montgomery, Ala.—It is stated that arrangements have been made for the financing and building of an interurban electric railway in southeastern Alabama. Richard Tillis of Montgomery is promoting the new road, the main line of which will start from Geneva, passing through Hartford and Slocumb to Dothan, a distance of 40 miles. It is stated that the line later may be extended to Montgomery, touching Ozark, Clayton, Eufaula and other points in southeastern Alabama. Sixty thousand dollars has been subscribed by citizens here. The line will cost about \$500,000.

Niagara St. Catharines & Toronto Railway, St. Catharines, Ont.—This company, which has secured options on right of way for an electric railway from Welland to Port Colborne, Ont., has completed tracklaying to the Welland river and expects to operate cars the last of the month. It is stated that the cars will not enter Welland this year, but that a bus line will be run from the town to the present terminus until the line can be extended.

Northwestern Interurban Railway, Moorhead, Minn.—This company, which proposes to build an interurban line connecting Grand Forks, N. D., and Crookston, Minn., with local street railways in the two cities, has elected the following officers: Thomas T. Bubb, president and chief engineer; James J. Lambrecht, vice-president; E. Y. Wheeler, treasurer; Samuel F. Crabbe, consulting engineer; Thomas R. Brown, secretary. It is understood that the line will be contracted for in sections, each section to be fully completed and equipped before work on another is started. The general offices will be in Moorhead.

Oakland, Cal.—A. W. Maltby, representing eastern capitalists, is promoting an electric railway to connect Alameda and Contra Costa counties directly through the foothills. The feasibility of this plan depends upon whether or not permission can be obtained from the supervisors of both counties for the use by the new line of the tunnel through the hills which was built several years ago by both counties for wagon traffic. If an agreement can be reached over this point several miles will be saved and a rich country will be brought into close touch with the bay cities. The Ygnacio Valley Railway Company was organized two years ago for this purpose, but owing to the earthquake in 1906 eastern capitalists declined to finance the line, and nothing further has been done.

Oregon Electric Railway, Portland, Ore.—George B. Moffatt of Moffatt & White, New York City, who is the principal owner of the Oregon Electric Railway, states that at the rate the work has progressed in the past few weeks, the line to Salem will be in operation by December 1 at the latest. Much delay has been occasioned in the construction of the four concrete substations by scarcity of skilled labor in that section. The rolling stock equipment and the electric locomotives have been shipped and are expected by the middle of November.

Redlands Central Railway, Redlands, Cal.—General Manager J. H. Fisher is quoted as saying that his company expects to have cars in operation in Redlands by December 15. He states that most of the material has arrived and construction work is progressing rapidly. Five cars of rails have been received and more are expected. The cars, which were ordered some time ago, have been shipped, as well as some of the machinery for the power house. The Redlands Central traverses Redlands from east to west and as soon as the line is completed here it will be extended to Riverside.

Richmond & Tottenville Railway.—This proposed interurban line will be standard gauge and will connect the cities of Richmond, Rossville, Kreischersville and Tottenville, Staten Island, about 10 miles in all. According to the surveys just made the grade on some portions of the road will be unusually heavy, that near Kreischersville being nearly 7 per cent. The estimated cost of construction and equipment will be about \$400,000. Thomas B. McGovern of McGovern & Donnell, Broad Exchange building, and Cornelius G. Kolff, 50 Broadway, New York City, are interested.

Rogers Southwestern Railway.—Surveys for this interurban line, which will connect Siloam Springs and Eureka Springs, Ark., have been completed, with the exception of three miles between Siloam Springs and Rogers, and engineers are now at work surveying the remainder of the route. From a point seven miles south of Eureka Springs a branch will be run to Huntsville, the county seat of Madison county, which is at present without rail facilities. It is expected that work will be started from Eureka Springs this fall. Right of way in Main street, Eureka Springs, is being sought by both the Rogers & Southwestern company and a

syndicate which is negotiating for the control of the Citizens' Electric Company, for the purpose of connecting with the Missouri & North Arkansas Railway.

St. Louis, Mo.—The board of public improvements has approved the plans submitted by representatives of the Illinois Traction Company about two weeks ago for tracks on the following streets: Ninth to Branch street; a loop around Branch, Palm, Eleventh and Twelfth streets; tracks along Twelfth to an alley between Morgan and Lucas avenue, returning to Twelfth street. Freight houses are contemplated at Eleventh and Branch streets and Thirteenth and Morgan streets.

Sharon, Pa.—Senator James M. Campbell and H. Hilderbran of Pittsburg, Pa., are interested in a proposed electric railway from Mercer to Greenville and Sharpsville, surveys for which are now being made. The road will be built for high-speed operation and will be about 20 miles long.

Spokane & Inland Empire Railroad, Spokane, Wash.—Following its plans for enlarging its freight terminals this company has made application to the city council to purchase the site of the city crematory.

Trinidad Electric Railroad, Trinidad, Colo.—Frank P. Read, president of this company, writes that surveys are now being made for the extension of the present line to Cokedale, Colo., 4½ miles. Right of way has been secured, the contract for the grading has been let and work is to be started at once.

United Traction Company, Albany, N. Y.—This company has awarded the contract for excavating, filling and forming the 33-foot strip of land which it owns on the south side of Western avenue to Michael F. Dollard of Albany. When this has been completed the work of laying the tracks will be started.

Western Illinois Traction Company.—This company has just been organized to build and operate an interurban electric railway from Aurora, Ill., to Chicago by way of Naperville and La Grange, Ill. As planned the line will run east from Aurora, paralleling the Chicago Burlington & Quincy Railroad to the Chicago city limits, where it will turn north to the tracks of the Metropolitan West Side Elevated Railroad. John A. Schmidt, vice-president of the First National Bank of Naperville and the principal promoter of the new line, is quoted as saying that this will not be a continuation of the line now operating from Chicago to La Grange and Aurora, but will be an independent road. He states that right of way is being secured along the proposed route and that the necessary capital for its construction is available. Others interested in the new project are: John T. Allison, president Federal Stone Company, La Grange; C. S. Hassendig, Chicago; G. J. Schmidt, Naperville.

West Farms, Mass.—Eugene D. Parks, Russell, Mass., is said to be interested in a proposed electric line from Easthampton to Florence, Mass., by way of Loudville and West Farms, with a branch to Westhampton, about 12 miles in all. It is stated that an option has been secured on 300 acres of farm land in West Farms, which it is proposed to convert into an amusement park, to be operated in connection with the electric railway.

POWER HOUSES AND SUBSTATIONS.

Joplin & Pittsburg Street Railroad, Joplin Mo.—This company will soon let contracts for two substations, one at Chitwood and the other at Asburg, Mo.

Northern Texas Traction Company, Ft. Worth, Tex.—The power house of this company will have its capacity doubled at a cost of \$150,000.

Chicago Harvard & Geneva Lake Railway, Walworth, Wis.—It is reported that this company will spend \$600,000 in improvements to its power plant. H. T. Windsor, manager.

Russellville & Ozark Mountain Traction Light & Power Company, Russellville, Ark.—This company is to build a masonry and concrete dam across Illinois bayou near Russellville. Edwin Cook, engineer.

Texas Traction Company, Dallas, Tex.—This company is advertising for bids for the construction of four substations to be built along the line under construction between Sherman and Dallas.

Southern Pacific Railroad.—It is reported that this company will spend \$10,000,000 during the next six years to electrically equip a 35,000-foot tunnel in the Sierra Nevada mountains between Sacramento and Sparks, Cal. Power stations will be built on the Klamath river in Siskiyou county and the Rubicon river in the Hell's Hole country.

Personal Mention

Mr. Andral Van has been appointed claim agent of the Houston Electric Company, Houston, Tex., to succeed Mr. M. D. Fields, resigned.

Mr. A. H. Mann has resigned as master mechanic of the Evansville & Southern Indiana Traction Company, Evansville, Ind., effective on October 1.

Mr. D. G. Edwards, traffic manager of the Ohio Electric Railway, will remove his headquarters in the near future from Cincinnati to Columbus, O.

Mr. C. C. Lines, heretofore superintendent of construction of the Beloit (Wis.) Traction Company, has resigned, effective at once, to become connected with Fairbanks, Morse & Co. at Beloit.

Mr. James L. Richards has been chosen president of the subsidiary properties of the Boston Suburban Electric Companies, succeeding Mr. Samuel L. Powers, resigned to resume the practice of law.

Mr. Edward Droyles, Bellefontaine, O., has been appointed claim agent of the Ohio Electric Railway, which recently took over the properties operated by the Indiana Columbus & Eastern Traction Company and the Lima & Toledo Traction Company.

Mr. H. C. Kaercher, heretofore superintendent of the Juniata Valley Electric Street Railway, Huntingdon, Pa., has resigned to become assistant to Mr. H. A. Benedict, mechanical and electrical engineer of the United Traction Company, Albany, N. Y.

Mr. E. W. Norris has resigned as chief engineer of the Newport News & Old Point Railway & Electric Company of Hampton, Va., effective on October 1. Mr. Norris has been chief engineer of this company since the road was constructed several years ago.

Mr. George Stone, district superintendent of the Public Service Corporation of New Jersey, has been appointed division superintendent with entire charge of all the lines in Passaic county and extending to the Delawanna and Hackensack bridge in Bergen county.

Mr. V. R. Hughes, who resigned recently as chief engineer of the Pueblo & Suburban Traction Company, Pueblo, Colo., to accept a similar position with the Northern Colorado Power Company, Denver, Colo., has been appointed master mechanic of the American Beet Sugar Company at Las Animas, Colo.

Mr. Charles E. Fritts, electrical engineer of the Kansas City Railway & Light Company, has been appointed chief engineer, succeeding Mr. Charles N. Black, resigned to become vice-president and general manager of the United Railroads of San Francisco, as noted in the Electric Railway Review of September 21.

Mr. J. S. Kimes will hereafter have entire charge of the motormen and conductors on the lines of the Winnebago Traction Company at Oshkosh, Wis., with the title of trainmaster, effective September 28. His duties will include also the planning and maintaining of new schedules with a view to the permanent improvement of the city service.

Mr. James C. McPherson, assistant superintendent of the Pacific Electric Railway at Pasadena, Cal., has been appointed superintendent in charge of interurban traffic with headquarters at Los Angeles. Mr. J. F. Turner, superintendent of the Mt. Lowe division, will succeed Mr. McPherson as assistant superintendent, having under his jurisdiction both the northern and Mt. Lowe divisions.

Mr. Joseph O'Hara, whose resignation as superintendent of transportation of the Aurora Elgin & Chicago Railroad was announced in our issue of September 28, has accepted a similar position with the Washington Baltimore & Annapolis Electric Railway, a single-phase line which is completing an extension from Washington, D. C., to Baltimore, Md. Previously to entering electric railway work Mr. O'Hara was connected in various capacities with steam roads, including five years of service with the Grand Rapids Railway. From 1897 to 1899 he was employed in the freight traffic department of the Pere Marquette, resigning to become connected with the Eastern Ohio Traction Company, then under construction. Upon the completion of this road he accepted the position of superintendent, where he remained for four years, resigning in August, 1903, to become superintendent of transportation of the Aurora Elgin & Chicago Railroad, which at that time had just been completed.

Financial News

Chicago General Railway.—The property of this company was purchased at foreclosure sale on September 30 by the Southern Street Railway Company for \$2,626,053. The latter company was organized several months ago.

Hartford & Springfield Street Railway, Warehouse Point, Conn.—Earnings for the year ended June 30, 1907, were as follows: Gross earnings, \$175,882.89; operating expenses, \$102,579.40; net earnings from operation, \$73,303.49; other income, \$2,209.55; total income, \$75,513.04; interest and taxes, \$61,312.61; surplus, \$14,200.43.

Washington Arlington & Falls Church Railway, Washington, D. C.—Charles Hine was appointed receiver for this company on October 1. As the result of a wreck last summer suits aggregating \$400,000 have been filed against the corporation, which has \$100,000 capital stock.

Southwest Missouri Railroad, Webb City, Mo.—Earnings for the year ended August 31, 1907, with a comparison, were as follows:

Year ended August 31—	1907.	1906.
Miles of track operated.....	60	55
Total receipts.....	\$561,535.36	\$423,705.85
Total operating expenses.....	263,366.60	204,034.00
Net earnings.....	\$298,168.76	\$219,671.85
Interest charges.....	104,544.65	56,965.39
Surplus.....	\$193,624.11	\$162,706.46
Total number of car-miles.....	1,766,339	1,397,782
Total receipts per car-mile.....	.3179	.3031
Total operating expenses per car-mile.....	.1492	.1460
Surplus earnings per car-mile.....	.1069	.1164
Cost of power per car-mile.....	.0302	.0303

ELECTRIC RAILWAY EARNINGS.

American Railways Company, Philadelphia (Subsidiary Companies.

Gross earnings—	1907.	1906.
August.....	\$294,037.22	\$274,166.88
July 1 to August 31.....	596,191.38	550,441.44

Brockton & Plymouth Street Railway, Plymouth, Mass.

July—	1907.	1906.
Gross earnings.....	\$17,451	\$15,477
Net earnings.....	9,093	8,464
Surplus over charges.....	7,363	6,667

Duluth Street Railway Company.

August—	1907.	1906.
Total earnings.....	\$81,232.65	\$70,998.79
Operating expenses.....	37,059.15	38,262.44
Net earnings.....	44,173.50	32,736.35
Deductions.....	17,963.22	17,855.19
Net income.....	26,210.28	14,881.16
January 1 to August 31—	1907.	1906.
Total earnings.....	\$551,274.35	\$502,706.61
Operating expenses.....	274,184.95	262,728.05
Net earnings.....	277,089.40	239,978.56
Deductions.....	141,885.69	140,784.89
Net income.....	135,203.71	99,193.67

Galveston (Tex.) Electric Company.

July—	1907.	1906.
Gross earnings.....	\$38,818	\$33,441
Net earnings.....	18,786	15,968
Surplus over charges.....	14,620	11,802

Houghton County Street Railway, Hancock, Mich.

July—	1907.	1906.
Gross earnings.....	\$26,330	\$22,901
Net earnings.....	13,184	9,988
Surplus over charges.....	9,212	6,078

Houston (Tex.) Electric Company.

July—	1907.	1906.
Gross earnings.....	\$59,950	\$51,166
Net earnings.....	23,391	18,677
Surplus over charges.....	12,347	8,611

Jacksonville (Fla.) Electric Company.

July—	1907.	1906.
Gross earnings.....	\$34,537	\$27,524
Net earnings.....	12,886	10,532
Surplus over charges.....	8,870	7,107

Kansas City Railway & Light Company.

August—	1907.	1906.
Gross earnings.....	\$523,641.39	\$470,578.57
Operating expenses.....	263,230.14	230,576.48
Net earnings.....	260,411.25	240,002.09
Taxes and interest.....	155,905.99	143,864.12
Net income.....	104,505.26	96,137.97
June 1 to August 31—	1907.	1906.
Gross earnings.....	\$1,552,902.19	\$1,398,341.93
Operating expenses.....	810,017.20	709,240.38
Net earnings.....	742,884.99	689,101.55
Taxes and interest.....	463,733.65	429,350.16
Net income.....	279,151.34	259,751.39

Northern Ohio Traction & Light Company, Akron, O.

August—	1907.	1906.
Gross earnings.....	\$216,145.69	\$194,378.62
Operating expense.....	112,859.74	96,180.71
Net earnings.....	103,285.95	98,197.91
Fixed charges.....	43,521.62	40,589.34
Surplus for stock.....	59,764.33	57,608.57

Toledo (O.) Railways & Light Company.

July—	1907.	1906.
Earnings.....	\$213,057.16	\$197,756.19
Operating expenses.....	120,121.64	98,508.77
Net earnings.....	92,935.52	99,247.42
Miscellaneous income.....	932.09	917.91
Gross income.....	93,867.61	100,165.33
Deductions.....	67,432.69	59,571.17
Net income.....	26,434.92	40,594.16
January 1 to July 31—	1907.	1906.
Earnings.....	\$1,458,375.87	\$1,377,630.48
Operating expenses.....	854,173.57	685,480.62
Net earnings.....	604,202.30	692,149.86
Miscellaneous income.....	6,691.87	6,606.62
Gross income.....	610,894.17	698,756.48
Deductions.....	447,574.69	412,191.09
Net income.....	163,319.48	286,565.39

Twin City Rapid Transit Company.

August—	1907.	1906.
Total earnings.....	\$558,226.63	\$605,727.80
Operating expenses.....	260,782.17	253,523.86
Net earnings.....	297,444.45	342,103.94
Deductions.....	115,141.67	114,753.35
Surplus.....	182,302.79	227,345.59
January 1 to August 31—	1907.	1906.
Total earnings.....	\$3,978,826.45	\$3,683,286.25
Operating expenses.....	1,929,160.52	1,714,123.80
Net earnings.....	2,049,665.93	1,969,162.45
Deductions.....	921,600.00	869,394.49
Surplus.....	1,128,056.93	1,079,767.96

The decrease in August earnings is due to the fact that in August, 1906, the Grand Army of the Republic encampment caused exceptionally large earnings.

Dividends Declared.

Boston Suburban Electric Companies, preferred, quarterly, 75 cents.
Columbus Newark & Zanesville Electric Railway, Newark, O., preferred, quarterly, 1½ per cent.
Duluth-Superior Traction Company, Duluth, Minn., preferred, quarterly, 1 per cent.
Knoxville (Tenn.) Railway & Light Company, common, quarterly, 1 per cent; preferred, quarterly, 1½ per cent.
Louisville & Northern Railway & Lighting Company, New Albany, Ind., Class A, quarterly, one-half of 1 per cent; Class B, quarterly, three-fourths of 1 per cent.
Macon (Ga.) Railway & Light Company, preferred, 3 per cent.
Memphis (Tenn.) Street Railway, preferred, quarterly, 1¼ per cent.
Omaha & Council Bluffs Street Railway, Omaha, Neb., preferred, quarterly, 1¼ per cent.
Public Service Corporation of New Jersey, quarterly, 1 per cent.
Rochester (N. Y.) Railway, preferred, quarterly, 1¼ per cent.
Rockford & Interurban Railway, Rockford, Ill., common, quarterly, 2 per cent; preferred, quarterly, 1½ per cent.
Syracuse (N. Y.) Rapid Transit Railway, preferred, quarterly, 1½ per cent.
Toronto (Ont.) Railway, quarterly, 1½ per cent.
Utica & Mohawk Valley Railway, Utica, N. Y., preferred, quarterly, 1¼ per cent.
Washington Water Power Company, Spokane, Wash., quarterly, 1¾ per cent.

Manufactures and Supplies

ROLLING STOCK.

Ohio & Southern Traction Company, Columbus, O., has purchased a car.

Kenosha Electric Railway, Kenosha, Wis., which was reported in the Electric Railway Review of March 16, to be in the market for six cars for city service, is said to have recently purchased 15 cars.

Milwaukee Northern Railway, Port Washington, Wis., has placed orders for three snow plows, one to be built by each of the following companies: New York Car & Truck Company, Russell Car & Snow Plow Company and the McGuire-Cummings Manufacturing Company.

Worcester Consolidated Street Railway, Worcester, Mass., officially advises us that it will soon be in the market for cars for delivery next year. The details of the order have not yet been completed. The report that the company had ordered 25 cars from the John Stephenson Company, as noted in the Electric Railway Review of September 28, is misleading, as this order was placed last spring and the cars will soon be ready for delivery.

SHOPS AND BUILDINGS.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—Work is progressing rapidly on the terminal station at Princeton, Ind., previously mentioned in the Electric Railway Review.

Indiana Union Traction Company, Anderson, Ind.—A passenger station will be built at Elwood, Ind., by this company. It will cost about \$5,000.

Susquehanna Traction Company, Lock Haven, Pa.—This company has started work on an addition to its car barns.

Waterloo Cedar Falls & Northern Railway, Waterloo, Ia.—The car barns of this company at Waterloo were recently destroyed by fire. The loss, which was \$20,000, is fully covered by insurance.

TRADE NOTES.

Lorain Steel Company, Philadelphia, Pa., has received an order for 1,000 tons of steel rails from the Chicago City Railway.

Pittsburg Automatic Vise & Tool Company, Pittsburg, Pa., has appointed E. W. Buechling assistant manager of sales.

Cincinnati Electrical Tool Company, Cincinnati, O., has opened a warehouse and sales office at Eighteenth and Rockwell streets, Chicago. Oscar P. Wodack is in charge.

J. E. A. Moore, who has been connected with the Wellman-Seaver-Morgan Company, is now associated with John W. Seaver, consulting engineer, Caxton building, Cleveland, O.

Henry F. Kellogg has resigned as manager of the railway department of the Frank Ridlon Company of Boston, Mass., effective on October 1. Mr. Kellogg has been connected with the Ridlon company for a number of years.

Ridgway Dynamo & Engine Company, Ridgway, Pa., announces the reopening of its Chicago sales office at 824 Marquette building. F. S. Hickok, who has had extensive experience in the electrical and power plant fields, is in charge.

George E. Austin, president of the American General Engineering Company, New York, has returned from Europe, where he established an office at London in the Billiter building, Billiter street. J. H. Evans is in charge of this new branch.

Pittsburg Art Glass & Mosaic Decorating Company, Allegheny, Pa., has been awarded a contract for 4,000 copper deck lights by the American Car & Foundry Company. These lights are to be used in the steel passenger cars being built for the Pennsylvania Railroad.

International Engineering Company, Ft. Wayne, Ind., has been incorporated with a capital stock of \$200,000. The company proposes to manufacture and deal in electrical instruments and machinery. Incorporators: F. L. Jones, Charles H. Doebler and George H. Loesch.

Niagara Forged Steel Company, Buffalo, N. Y., is adding to its shops in Depew, N. Y., a 2-ton capacity billet mill for manufacturing open-hearth steel billets for forge shop use.

The company also is considering the erection of a steel under-frame and truck shop, 100 by 500 feet.

Jones & Laughlin Steel Company, Pittsburg, Pa., will begin the erection of four additional open-hearth furnaces at its south side plant. The improvement is said to involve an expenditure of \$1,000,000 and will increase the production of the plant about one thousand tons a day.

Massachusetts Chemical Company, Walpole, Mass., will exhibit at the American Street and Interurban Railway Manufacturers' Association convention at Atlantic City, N. J., October 14 to 18. The company will be represented by A. T. Baldwin, L. O. Duclos and A. E. Duclos, with a full line of samples, descriptive literature and souvenirs.

McClintic-Marshall Company, Pittsburg, Pa., has been awarded the contract for the erection of the superstructure of a new bridge that the Baltimore & Ohio is building over Monocacy river, at Frederick Junction, Md. Drake & Stratton Company, Philadelphia, Pa., will do the substructure work. Work will be pushed to completion as early as possible.

C. A. Ralston, formerly general sales agent of the Lima Locomotive & Machine Company, and more recently general superintendent of Hicks Locomotive & Car Works, has opened an office at 702 Fisher building, Chicago, and will deal in new and second-hand railway equipment. He has also been appointed representative of the Russell Car & Snow Plow Company for this territory.

Electric Railway Improvement Company, 6005 Carnegie avenue, Cleveland, O., has leased its well-known rail bond welding and brazing cars to the Toronto Railway, Toronto, Can., the Mexico Traction Company, Mexico City, Mex., the Louisville & Eastern Railroad, Louisville, Ky., and the Stark Electric Railroad, Alliance, O. The wide range of territory in which these cars were placed clearly shows the recognized value of the outfits for track bonding purposes.

Blake Signal & Manufacturing Company, Boston, Mass., will be represented at the American Street and Interurban Railway Association convention at Atlantic City, N. J., by E. J. Burke, C. C. Blake and George S. Hastings. The company writes that it will have a working exhibit of standard signal apparatus, together with a trained and competent train dispatcher, various types of railway telephones and standard blanks, etc., for telephone train dispatching. This exhibit will occupy spaces Nos. 228 and 230.

Model Stoker Company, Dayton, O., is installing furnaces in the power plant of the Union Light Heat & Power Company of Fargo, N. D. Among the installations that have recently been or are now being made in Chicago by this company are the following: New boiler plant at the Masonic Temple, new furnaces at Marshall Field & Co.'s wholesale house, new furnaces at the Hyde Park hotel, Chicago. The company also reports that it has recently completed the installation of 25 Model automatic furnaces at the rubber works plant at Akron, O.

Harold P. Brown, electrical engineer, 120 Liberty street, New York, will occupy spaces Nos. 111, 113, 111A and 113A at the approaching American Street and Interurban Railway associations' convention in Atlantic City, N. J. Mr. Brown will exhibit various types of rail joints bonded with standard plastic bonds, plastic plug bonds and semi-plastic plug bonds. These will be shown under test with a current of 3,000 amperes. Other features of the exhibit will be a special electric drill and magnetic clamp for use in rebonding rails without removing angle plates or disturbing the pavement, and a demonstration of the efficiency of Brown contact alloys on switches, busbars, trolley wheels, controllers, contactors, etc. Besides Mr. Brown, the following members of his staff will be in attendance: James Hollowood, G. A. Kroener, J. Maxwell Coote, Daniel A. Kelley, William Temple and John Roche.

ADVERTISING LITERATURE.

Allis-Chalmers Company, Milwaukee, Wis.—Folder No. 4009 describing "Reliance" Corliss engines.

Advertising Mirrorgraph Company, Hudson Avenue and Concord Street, Brooklyn, N. Y.—A circular describing thermoblink relay No. 6, which is a device for automatically lighting a reserve lamp in a signal circuit should the lamp that is burning give out. The device is particularly designed for electric signal circuits but may be used wherever there is a series lighting circuit. It is said to have been adopted by the signal department of the Southern Railway.

McKenzie Holland & Westinghouse Power & Signal Company, Ltd., London, Eng., is the name of a company incor-

porated under the British joint stock companies act. The nominal capital is \$100,000. Half of the stock is held by the Westinghouse Brake Company, Ltd., of London, which company holds the English patents of the Union Switch & Signal Company. It is stated that John W. Cloud and A. W. Rendale will be directors of the new company, representing the Westinghouse holdings.

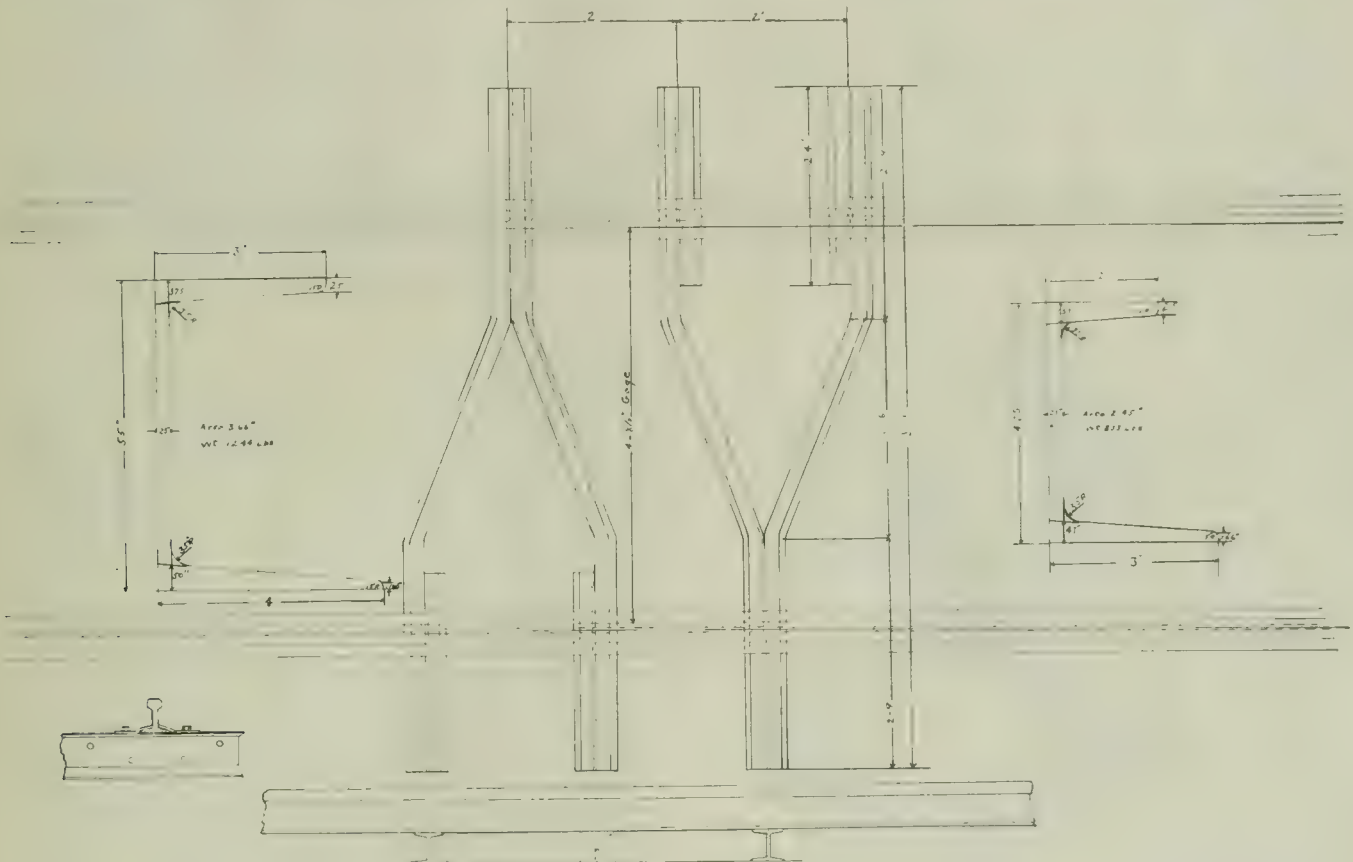
New York New Haven & Hartford Electric Railways.

Gross earnings for the fiscal year ended June 30, 1907, of the street railway lines owned by the New York New Haven & Hartford Railroad Company were \$10,638,058 and operating expenses were \$7,022,158, leaving net earnings of \$3,615,900. The annual report says: "The electrification of the New York division between Woodlawn and Stamford has been practically completed, and electric service has been inaugurated for local trains between New York and New Rochelle, and New York and Port Chester. The complete change

sole owner of the stock of the Rhode Island Company, which controls through leases 295 miles of electric railways situated in Providence and Pawtucket and in adjacent territory in Rhode Island, which feed and supplement your lines in that vicinity. The purchase of the stock of the Rhode Island Securities Company was made with an issue of 4 per cent 50-year debentures dated May 1, 1907, to the amount of \$19,911,000, of the Providence Securities Company (controlled by your company), which in consideration of such ownership guaranteed said issue of debentures as to principal and interest."

THE BENJAMIN PATENT STEEL TIE.

The accompanying illustration shows a steel tie designed for steam and electric railroads on which the National Brake Company of Buffalo, N. Y., which controls the patents on the design, would be pleased to receive suggestions or criticisms. The construction is intended to prevent either longitudinal or lateral movement when in the track. The longi-



The Benjamin Patent Steel Tie.

from steam to electric traction for all our passenger service on this section of our line should be made effective during the month of October, 1907. Since the last annual meeting 85,120 additional shares of the capital stock of your company have been issued at \$200 a share in exchange for 4 per cent debentures of the Consolidated Railway Company at par. This retired \$17,042,000 of indebtedness by the creation of additional capital stock of the par value of \$8,521,000. The merger of the New York New Haven & Hartford Railroad with the Consolidated Railway, on May 31, 1907, further added 300,000 shares of capital stock, making the total issued capital stock of your company on June 30, 1907, 1,218,781 shares, of which 247,977 shares are held in the treasury of subordinate companies, the capital stock of which is all owned by your company. The properties of the Connecticut Railway & Lighting Company, consisting of 193.48 miles of urban and interurban electric lines operating in territory contiguous to your company's electric railways, and of numerous city, gas and electric lighting plants, all located within Connecticut, were acquired by lease for 999 years at a varying rental from August 1, 1906, to August 1, 1914, and at a fixed rental thereafter. At the same time purchases were made of the stock of the Meriden Southington & Compounce Tramway Company, the New Milford Power Company, the Housatonic Power Company and of the stock and securities of the Rhode Island Securities Company. The latter company is the

tudinal movement is prevented by the ties being disposed in a V-shape. The position of the V-shaped figures alternate, so that the pressure of the ballast against the diagonal portions of the channel constituting the adjacent V will be in opposite directions, thus securely locking the ties.

The advantages claimed for this tie are: As no two bearings of the rails will come opposite each other, creeping or lateral movement is impossible. The ties supporting one rail alternate with those supporting the other rail, and, as no two rail bearings are opposite each other, the track is less rigid. A roaring or rattling noise under fast trains is impossible with these ties, owing to the manner of their construction. The ties are put in as a tie and one-half or three bearings. The construction of the Benjamin ties is such that the necessary bearing surface under the rail has unlimited strength. The bearing surface in the center of the track being of one-half width overcomes any tendency of the tie becoming center-bound. The rail-fastening plates or clamps are made with a shoulder adapted to bear against the edge of the base flange of the track rail, and have a portion adapted to rest on the base and extend to the web of the rail so that the track would be held to the proper gauge in case the nut should become loose. The clamp is not more than 3/8 inch in thickness, and thus the danger, in case of derailment, of the fastenings being sheared off is overcome, as the tread of the wheel would clear the clamp and nut.

THE USE OF SAND BLAST BY ELECTRIC RAILWAYS.

BY J. M. BETTON.

Although the sand blast has been used in electric railway work for a number of years its adoption has not been so general as would seem to be warranted by its efficiency and convenience. With only ordinary care and attention it will do good work, and it is especially adapted to electric railways because power for operating an air compressor is always available at any point. An air compressor, either direct connected to the motor or driven by a belt, is easily procured, as is also a steel tank to be used as an air receiver. Consequently there only remains to be selected a sand blast equipment with the proper nozzles, hose, couplings, etc.

Some companies prefer to make their own sand blast apparatus or to use anything that will throw a jet of sand, and perhaps in many cases, as power is so easily obtained, this may appear justifiable. However, it is well to recognize the fact that the machine that will last the longest, stand the knocks and rough handling that come to it, and that is the most economical in its use of air and sand in actual use is the best in the long run. On a street railway, as in any other sort of plant, the saving of small quantities of power and the stoppage of leaks are always worth while, and it is not workmanlike or good business to use a makeshift that wastes power, which always costs the company money. Good sand blasts are obtainable at prices which are more than reasonable when one considers the time and experimenting required to get up a home-made affair.

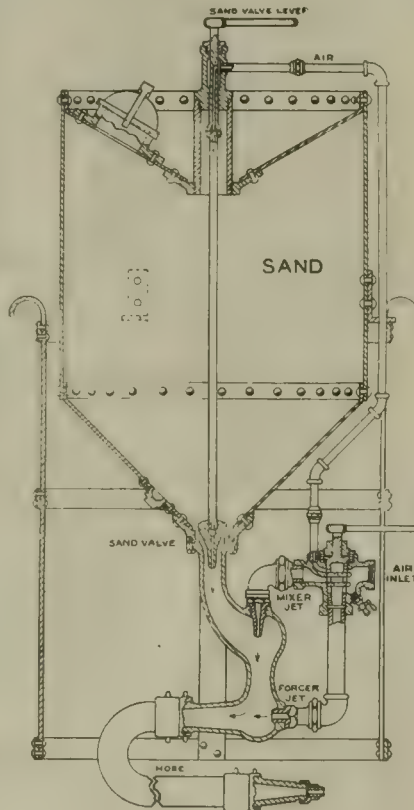
Sand blast outfits should be of such design that the air supply can be regulated, and if this is applied at several points instead of in bulk at one point, better economy will be obtained. One great advantage is that the air compressor, air receiver and sand blast can be mounted on a truck which will follow the work, obtaining its power from any feed wire.

Uses of the Sand Blast.

One of the most important uses of such sand blast outfits is in their use for cleaning the ends of rails previous to bonding. For this work, with a $\frac{3}{8}$ -inch nozzle and 35 pounds of air pressure, 100 cubic feet of free air per minute are required.

It will be noticed that the steel poles used to support the feed or trolley wires often become corroded for a foot or two upward from the base. If no remedy is applied the corrosion will in time undermine the strength of the posts and renewal will be necessary. All of the rust, dirt, scale and accumulation may be removed by the sand blast, leaving a new surface of the clean gray iron or steel, which may be protected by a covering of concrete or cement, thus materially prolonging the life of the pole. This work requires about 35 pounds of air pressure and can be done quickly with a $\frac{1}{2}$ -inch nozzle, using clean, dry and moderately fine sand and 179 cubic feet of free air per minute.

Similarly all steel structural work, such as bridges, viaducts and elevated railway supports, can be perfectly and quickly cleaned by the sand blast, using preferably a $\frac{1}{2}$ -inch nozzle and 35 pounds of air, increasing the pressure to about 50 pounds if the sand has to be carried to more than ordinary height. Corners, angles, recesses and other portions of the structure that cannot be reached in cleaning by hand can be cleaned as readily as the plane surfaces of the members.



Sand Blast.

In all such work the painter's gang should follow closely after the sand blasters, as oxidation is rapid and the object of cleaning by the sand blast is to expose the raw metal, which, being freed from rust, will hold the paint that otherwise would scale off. In like manner steel shapes in stock can be cleaned when wanted for use.

Another use of the sand blast is in the cleaning of the exteriors and interiors of burnt-out controller boxes on electric cars. These are usually cleaned by hand, but the sand blast will do the work four or five times quicker and with greater thoroughness. A pressure of about 25 pounds and a $\frac{3}{8}$ -inch nozzle, requiring 77 cubic feet of free air per minute, can be used to advantage.

The grids from storage batteries that have run down can also be cleaned with the sand blast previous to refilling, using a $\frac{3}{8}$ -inch or $\frac{1}{4}$ -inch nozzle and about 20 pounds air pressure, requiring from 31 to 69 cubic feet of free air per minute. This work should be done out of doors, and the grids should be wet, as the particles of lead and dust are injurious if inhaled.

The bodies of steel cars can be freed from old paint, rust, scale and dirt in the quickest manner by the sand blast, using a $\frac{1}{2}$ -inch nozzle under 35 pounds air pressure, requiring 179 cubic feet of free air per minute, and the running gear can be also thoroughly cleaned with the same pressure.

These are only some of the uses of the sand blast in electric railway work, and besides cleaning ornamental work, brasses, etc., its use can be greatly extended in the repair shop and along the line. Considering the ease of operation, the thoroughness of the work done and the very apparent economy over hand work, the use of the sand blast is bound to increase when it has the consideration it deserves at the hands of progressive street railway men.

INCREASING USE OF GRAPHITE PAINT.

Even the most casual observer cannot have failed to notice that within the past decade there has been a very radical change in the color of the coatings applied to railroad bridges, viaducts and other steel structures for the purpose of protecting them from corrosion and the elements. The change has been from reddish brown to grayish black.

And the reason for this is that the most exhaustive research, theoretically and practically, has disclosed the fact that the natural form of carbon—graphite—is now known and recognized throughout the world as the pigment best meeting all of the many and varied requirements essential to the production of paint that will effectually protect under all conditions the surface which it covers.

Graphite is an inert substance, absolutely unaffected by extreme heat, frost, steam, water, sulphur fumes, acids, alkali, brine, or, in fact, by any climatic or chemical condition, and these properties, together with its natural affinity for oil, its ability to withstand extremes of temperature, its density, the ease attending its application and the resulting saving of labor, its remarkable covering power and the consequent reduction in first cost, and last, but not least, its long life, which eliminates the annoyance and expense of frequent repainting—saves, in fact, the cost of several applications—renders it the ideal paint for either the primer or weather coats.

But to give this service in the greatest degree it must be pure, finely pulverized and thoroughly ground in the best of linseed oil.

Graphite paint, then, is desirable in exact proportion with its purity and to be of unquestionable quality its pigment should analyze not less than 85 per cent graphitic carbon of the amorphous variety, the remaining 15 per cent to consist principally of such silica as is naturally carried by the ore from which it is ground. These requirements are met by "Mexican" graphite.

These requirements seem to be the consensus of opinion among authorities in railroad painting, and as the railroad world is always alert to take advantage of new ideas which can be shown to save time and money and give best results, any radical departure from the beaten path is always first noticeable in railroad equipment to be ultimately copied as the standard of excellence by the smaller consumer—hence the gradual change from reddish brown to grayish black earlier referred to in the color of railroad bridges is now apparent.

There are today on the market many so-called graphite paints, but neither the brand of the paint nor the reputation of the maker should be taken as prima facie evidence of quality. The careful buyer will insist upon the manufacturer's guaranteed analysis, and the shrewd buyer will get as close as possible to the source of supply—the miner of the raw material—thereby minimizing his chances of getting paint loaded with worthless and harmful adulterants.

The United States Graphite Company, Saginaw, Mich., mines graphite and manufactures graphite paint. This com-

pany has had printed a very interesting booklet "About Graphite Paint," which, upon request, will be sent to those interested.

SOLDERLESS CONNECTIONS.

The New York Central & Hudson River Railroad Company has made extensive use of the Dossert solderless connector in its electrification work. It has used more than 1,000 straight 2-way connectors of all sizes up to 1,000,000 circular mils, and an even larger number of cable taps, in sizes from 350,000 circular mils up to 1,350,000 circular mils. These cable taps were used principally in tapping off from the third rail in series of three to the overhead cables.

Dossert & Co., 242-244 West Forty-first street, New York, have also made for the New York Central an emergency jumper clamp connector. In case of a break in the third rail the Dossert emergency jumper clamp connector is attached to the third rail on either side of the break, thus preventing a tie-up of the service until normal conditions are re-established.

WESTINGHOUSE COMPANIES AT THE NEW YORK ELECTRICAL SHOW.

The Westinghouse exhibit at the New York Electrical Show at Madison Square Garden, September 30 to October 10, covers nearly 1,000 feet of floor space, and is a joint exhibition of the numerous companies comprising the Westinghouse interests.

The main feature of the exhibit is the display of motors driving industrial machines. The following is a partial list of machines driven by Westinghouse motors:

Pipe cutting machine.....	Curtis & Curtis
A. B. C. rotary fan.....	American Blower Company
Vacuum cleaner.....	Sanitary Device Company
Exhaust fan.....	American Blower Company
Centrifugal pump.....	Watson & Stilwell
High-speed air compressor.....	Roteng Engine Company
Perforating machine.....	Simpson & Son
Blakslee dish washer.....	Blakslee & Co.
Commercial graphophones....	Columbia Phonograph Company
Stafford loom.....	Stafford Company
Singer sewing machine.....	Singer Sewing Machine Company
Day dough mixer.....	John Day Company
Ironing machine.....	American Ironing Company

Westinghouse motors are also used in connection with milking machines, supplied by Schimmel's Dairy Company.

The Westinghouse Electric & Manufacturing Company has an interesting exhibit of motors not in operation, consisting of back geared, belted, direct connected and vertical types, the motors ranging from $\frac{1}{8}$ horsepower to 50 horsepower in capacity.

The display of Westinghouse transformers comprises the oil-cooled, the air-cooled and the manhole types, ranging from 1 to 20 kilowatts.

The Nernst Lamp Company has a demonstration of its 110-watt, 110-candlepower lamps mounted on the company's special wall fixtures and brackets. This furnishes a brilliant display as a decoration and commercial light. The company is also giving demonstrations of lighting the glowers and general working of the lamp. Three glowers inverted lamps shown on the top of each column around the Westinghouse spaces crown the exhibit.

The Westinghouse Lamp Company is attracting much attention by an interesting display of lamp manufacture, the actual operation of tubulating the bulb and sealing in the filament is shown by the latest type of machine and operators from the company's New York factory.

Two special wattmeters are shown side by side, showing the consumption of current by a Tungsten and by a standard carbon lamp, each of equal candlepower. The instruments show a saving of two-thirds in favor of the Tungsten lamp. Display cases show the various stages of the lamp in process of manufacture from cellular material to the finished product.

Another case shows the numerous types of lamps manufactured by this company. Photographs of the Bloomfield factory are shown. The exhibit also includes lamps for decoration purposes from the miniature sizes to 5,000 candlepower, in which the incandescent Tungsten metallized filament is used.

The Westinghouse Machine Company has on exhibit samples of the large storage battery plates used for regulating fluctuations of load on street railway plants and also glass jars, rubber cells and detail parts used in connection with storage batteries. Storage batteries used for railway signal purposes and storage batteries of the automobile sparking type are shown. These storage battery plates involve the

most recent improvements and the capacity of them is guaranteed for 10 years.

Suspended in mid-air above the Westinghouse spaces are Cooper-Hewitt mercury vapor lamps, these being the only mercury vapor lamps hung in the building. The type K Cooper-Hewitt lamp, which is used in this display, is 45 inches long.

As might be expected from the wide diversity of apparatus for the application of electricity, the display of the Westinghouse Companies has attracted the keen interest of both technical and lay visitors at the show.

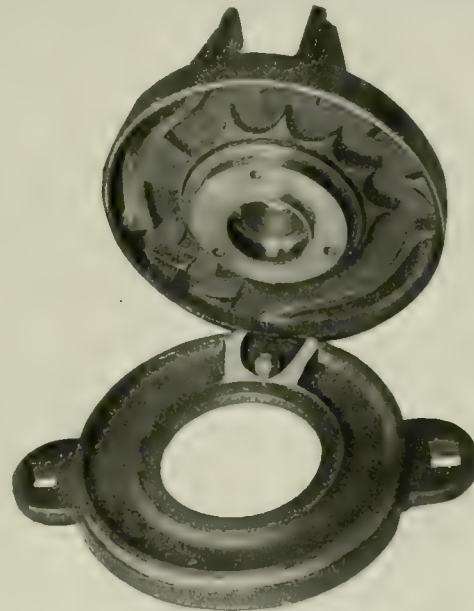
GOOD RESULTS OF FEED REGULATION.

There are many advantages to be obtained by solving the problem of how to properly regulate the feeding of platform controllers of the drum type. Some of these advantages are found in remarkable economy by reason of low current consumption, and small maintenance costs by reason of few overloaded motors. A device known as the Durkin No. 3, Ball Check Controller Regulator, manufactured by the Durkin Controller Handle Company, 1003 Arcade building, Philadelphia, is designed to solve the stated problem effectively. Many orders for these regulators are said to be placed by metropolitan companies that have witnessed the results of actual service tests extending over periods of from four months to a year. Some interesting results illustrating the value of regulators are reported in the following paragraphs:

One system has equipped 1,000 cars with the Durkin device as the result of a test extending over four months, during which it was demonstrated that in the item of armature re-

pairs there would be an estimated saving over the cost of equipping 1,000 cars of \$119,500 during the first year. The test was made with 20 cars having the Durkin regulator and 20 cars without it, all running from the same barn, with the same mileage and same general conditions. During four months the cars not equipped lost 29 armatures at \$40, a cost per car per year of \$174. For 1,000 cars the armature bill would be \$174,000.

Against this record the 20 cars protected by the



Controller Regulator Opened.

regulator lost but seven armatures in the four months, an expense of \$42 per year for each car, or a total yearly expense for 1,000 cars of \$42,000. Add to this the cost of equipping 1,000 cars, which would be \$12,500, and the difference would be a saving of \$119,500 in one year.

In another test made by a railway company, out of 41 cars equipped with Durkin regulators, not one car so equipped was turned in for repairs for any electrical trouble in a period of nine months. The same line had 18 other cars running under the same conditions during the same period, without regulators, and of the latter 30 per cent were laid up for electrical repairs.

When there are added to this the saving in current, the reduction of peaks in the power house load, the added safety and comfort of passengers, the avoidance of accidents due to hasty reversing and the many incidental advantages that come from regulated feeding, the sum total makes a formidable argument in favor of the regulator.

The simplicity of the regulator is an important recommendation. It has but three parts: A casting that is bolted to the controller dial, another casting covering and turning on the first, making a circular box, in which is inclosed a ball of chilled steel. As the top cover is swung around by the controller handle the movement of the steel ball in an irregular groove compels the exact pause required on each feeding point to insure the best results in any given type of con-

trolley. The action is positive and wholly automatic. With this regulator it is claimed that an inexperienced or reckless motorman cannot fail to feed in a manner that will safeguard the car equipment and obtain the utmost service from it. While the steel ball compels the motorman to feed his motors like an expert in starting or reversing, it offers no check in returning the handle to its first position; the current can be thrown off instantly.

NEW CARS FOR THE FT. DODGE DES MOINES & SOUTHERN RAILROAD.

The Ft. Dodge Des Moines & Southern Railroad (described in the Electric Railway Review of May 25, 1907, page 672) is

ment. The seating capacity of the car is 50 passengers—34 in the main compartment and 16 in the smoking compartment. The toilet room is located in the center of the car.

These cars are of the single-end type, with the motorman's cab at the baggage compartment end. The hot water heater is located in the baggage compartment. The cars are mounted on Baldwin class 84-25 trucks, weighing about 10,200 pounds each. The axles are $5\frac{1}{2}$ inches in diameter at motor bearings, journals $4\frac{1}{4}$ by 8 inches, with Symington journal boxes. The wheels are 36 inches in diameter, have 4-inch tread, $\frac{7}{8}$ -inch flange, and rims $2\frac{1}{2}$ inches thick. Among other equipments are two Nichols-Lintern air sanders and a locomotive type of pilot; and two couplers—an M. C. B. coupler and a coupler to connect with drawbars of city cars. The Knutson trolley retrievers are used. Each car is equipped for

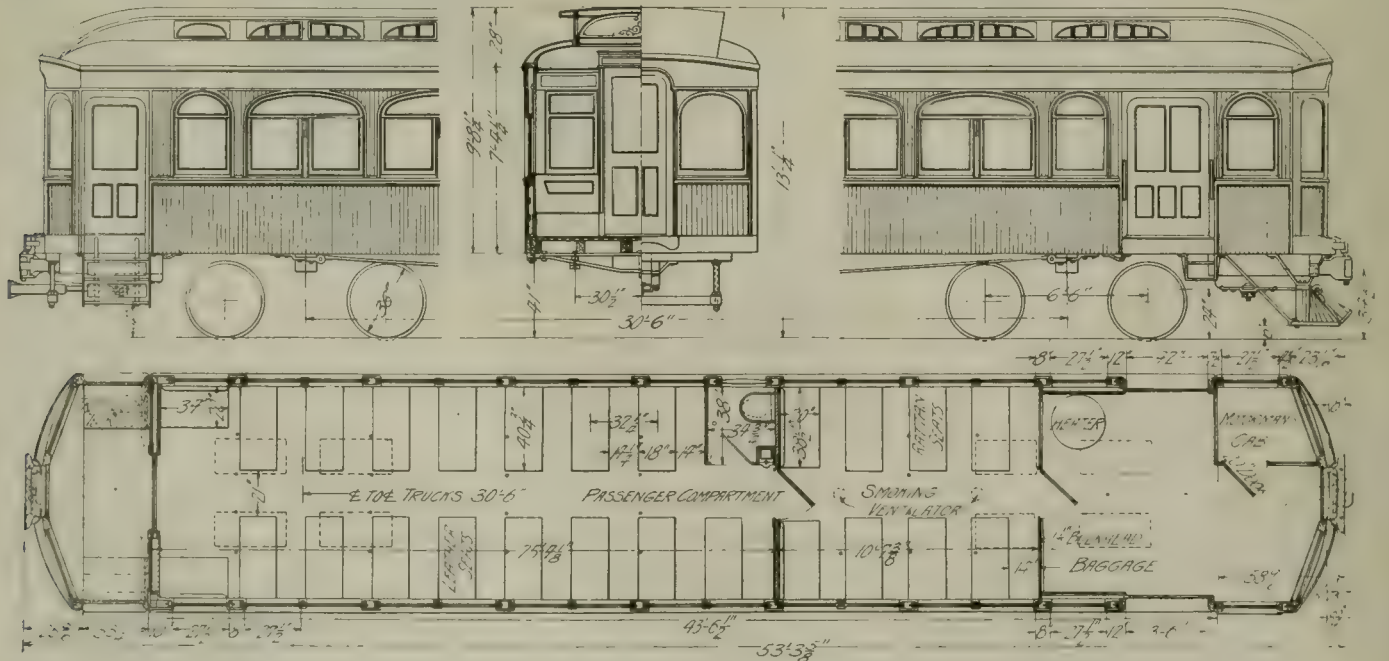


Ft. Dodge Des Moines & Southern Cars—Exterior.

receiving from the Niles Car & Manufacturing Company, Niles, O., 10 large interurban cars. A good general idea of the cars can be had from the accompanying halftone engraving and the zinc etching made from line drawings showing the floor plan and elevations. These cars are 53 feet $3\frac{5}{8}$ inches long over all and 43 feet $6\frac{1}{2}$ inches over end plates. The extreme width over all is 9 feet 10 inches. The height from rail to

four 75-horsepower Westinghouse motors and A. M. T. schedule air brakes.

The secret service of the Philadelphia Rapid Transit Company recently discovered a flourishing traffic in transfers being conducted by two conductors, stationed on street corners to give out transfers, and a newsboy. The conductors disposed of



Ft. Dodge Des Moines & Southern Cars—Floor Plan, Elevation and Section.

trolley board is 13 feet $1\frac{1}{4}$ inches. The cars are divided into main, smoking and baggage compartments. The windows are Pullman type and the finish is mahogany throughout. The ceilings are of the semi-empire type, painted green, with gold decorations. The seats are Heywood Brothers & Wakefield Company's No. 54 S. G. F., upholstered in leather in the main passenger compartment and rattan in the smoking compart-

large numbers of transfers to the boy, who in turn distributed them among other boys, storekeepers and saloonkeepers. It is reported that free transfers were being given with cigars, drinks, newspapers and even with loaves of bread sold at the bakeries. The offenders are being prosecuted and the company will make every effort to put a stop to such practices in the future.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 15

CHICAGO, OCTOBER 12, 1907

WHOLE No. 233

TABLE OF CONTENTS.

Editorial:		News of the Week:	
Funeral Car Service in Demand.....	425	—Railway Commissioners Consider Electric Railway Ac-	
High Car Steps.....	425	counting.....	446
Route Indication by Colors.....	425	—New York Public Service Investigation.....	446
Report on Brooklyn Bridge Congestion.....	426	Construction News:	
Reducing Overhead Maintenance.....	426	—Franchises.....	447
11,000 Volts on the Erie.....	427	—Recent Incorporations.....	448
Two-Man Car Inspection.....	427	—Track and Roadway.....	448
Electrification of the Rochester Division of the Erie Railroad.		—Power Houses and Substations.....	450
By W. N. Smith (Illustrated).....	428	Personal Mention.....	450
Receivership of New York Surface Roads Made Permanent....	436	Financial News.....	451
Annual Reports: Brooklyn Rapid Transit Company.....	436	Manufactures and Supplies:	
Rolling Stock for the Washington Baltimore & Annapolis Elec-		—Rolling Stock.....	452
tric Railway. By E. P. Roberts (Illustrated).....	438	—Shops and Buildings.....	452
The New Haven Trolley System.....	440	—Trade Notes.....	452
Increased Facilities for Funeral Car Service in Chicago (Illus-		—Advertising Literature.....	452
trated).....	441	The Meyers Car Fender (Illustrated).....	453
Piping and Power Station Systems—LVII. By W. L. Morris,		Christensen Air Brakes (Illustrated).....	453
M. E. (Illustrated).....	443	Economy Test of 7,500-Kilowatt Westinghouse-Parsons Steam	
Recent Electric Railway Legal Decisions. By J. L. Rosenberger..	445	Turbine (Illustrated).....	454

Funeral car service has for several years been a regular feature of operation in a few large cities. Naturally a service of this nature develops very slowly on

Funeral Car Service in Demand.

account of the sentiment against changing burial customs; but that the use of funeral cars is steadily, if slowly, increasing is shown by the fact that all the railway com-

panies having cars for funeral purposes find it necessary to increase this special equipment from time to time. There has been some opposition from the undertakers, which has usually been because they have interests in some livery stable that would be affected by the general use of funeral cars in place of carriages. The saving in expense should be a factor in further increasing the popularity of these cars, the charges being but a fraction of the expense of a hearse and carriages. Rates per car vary from \$10 to \$25, according to locality and distance, and the cars will accommodate between 30 and 40 people. The Metropolitan West Side Elevated Railway and the Aurora Elgin & Chicago Railroad in two years' time have developed in Chicago and vicinity a very satisfactory service, often handling as many as seven funerals in one day. It is believed that as the public becomes more accustomed to it electric cars will be more generally used in conducting funerals.

The Terre Haute (Ind.) Tribune voices a protest against high car steps. It says that such steps are a menace and that they make it difficult for elderly men and women and for many others to board cars. The Tribune points out that improvements in the cars doubtless necessitated higher steps, but it suggests that the general bet-

terment in rolling equipment has been accompanied by a gradually increasing inconvenience in the height of car steps. The problem is undoubtedly one that deserves attention, but like all other problems in street and interurban railway service it has been carefully considered with the hope that the objections may be overcome. At a meeting of the Street Railway Association of the State of New York in October last year the committee which reported on the proper height of car steps on passenger cars believed that an ideal condition

would call for a height of 17 inches from the top of the rail to the first step, of 14 inches from the first step to the platform, and of 10 inches from the platform to the floor of the car, making a total distance from the top of the rail to the floor of the car of 41 inches. The committee recommended that the maximum height between the top of the rail and the first step, with 33-inch wheels, be 18 inches and the minimum height 14 inches; that the maximum distance between the first step and the platform of the car be 15 inches with the minimum 12 inches; and that the maximum distance between the platform and the top of the floor be 10 inches, with the minimum 8 inches. The nature of the mechanical problem involved in high steps may be restated. Both city and interurban cars have increased in size and weight, affording more room and greater comfort and safety to passengers. The use of larger bodies necessitates heavier and deeper sills as supports. More room is also required for the motors of larger size which are now needed. As motors were as close to the wheels and as near the ground as possible the only direction in which they could expand was upward. Manufacturers were confronted with a public demand for large, easy-riding cars, and have been under the necessity of building them with sufficient structural strength and motive power capacity to permit of successful operation. Even now a mechanical disadvantage exists in that high cars must have their platform supported by knees. This cantilever extension of the sills makes it possible to depress the platform and bring the entrance steps lower than the floor of the car, but arbitrary clearances and mechanical elements must be recognized and therefore the lower step keeps its height of about fifteen inches above the rail.

The simplification of destination and classification signs is a subject that requires attention. Nearly all of the street railways use a conspicuous destination sign. Often the cars of the various lines are painted in distinctive colors and have colored lights for night designation. A plan of this kind works well when there are only three or four lines or routes, but where there are several routes and more than one class of trains the increase

Route Indication by Colors.

in the number of color combinations is objectionable. The usual steam railroad practice is to use only two colors for train classification; namely, green and white. As the steam railroads expect only their employes to understand the classification colors no particular confusion in their interpretation is experienced. Many of the electric railways find it advisable to mark their cars plainly, front and rear and on both sides. One elevated railway adopted a color designation for its trains, but found it necessary to supplement it with an indicator on the station platform which is caused to show a printed sign giving the destination and route of the approaching train. Even this method did not put a stop to patrons asking platform men and guards the destinations of the trains. Upon the recent opening of its Kenwood extension, the South Side Elevated Railroad of Chicago adopted a complicated system of train classification and destination indication using colored metal plates for day indication and colored lights for night indication. In all, these include 10 combinations, using four colors—green, red, orange and white. The other elevated lines in Chicago use only two colors for destination indicators, supplemented by painted signs at the sides of the cars. In the hope that the public will soon become accustomed to the color scheme of train classification, the South Side Elevated Railroad is distributing a card, printed in colors, showing the classification. The natural question to ask is, how long is it going to take the public to attain a working knowledge of a 10-combination classification and destination color system. Again, what provision is made for the color-blind and the ever-present strangers in the city?

The subcommittee of the New York public service commission appointed to investigate the traffic conditions on the Brooklyn bridge with a view to adopting some means of doing away with some of the congestion, has submitted a report, which, although it suggests no definite remedy for existing conditions, enumerates some of the various improvements now under way which will greatly relieve the situation. The question of how to handle the multitudes that must be transported daily between Manhattan and Brooklyn over the four tracks of the Brooklyn bridge presents one of the greatest operating problems in the world. The report says: "Human ingenuity cannot, in the space of a few months, bring relief to a situation, the fundamental cause of which is that too many lines of transit and too great a number of people are compelled to use it (the Brooklyn bridge). The only entire cure for the Brooklyn bridge crush is to deflect to other river crossings part of the people that are now compelled to use this bridge." The committee believes that while various devices might be adopted to mitigate the bridge crush, it would not be wise to insist on the adoption of minor alleviations which would run counter to the general plans the city has decided upon and which are now under way. The most important improvement now under way is at the Manhattan terminal of the bridge, which is being lengthened so that 6-car trains may be placed in pockets for loading and unloading. It is expected that when this work is completed in a short time passengers will no longer be required to change cars at the Brooklyn end. Plans are also being prepared for a rearrangement of the Brooklyn terminal so that empty cars may start from that point without crossing the bridge. Within a few months the Interborough tunnel from the Battery to Brooklyn will be completed and will deflect a considerable portion of the traffic from the bridge. Other reliefs mentioned are the Center street subway connecting the Williamsburg and the Brooklyn bridges, which will enable many of the passengers to board the cars before they reach the bridge, and the Manhattan bridge, now under construction. When all these improvements are completed it may be possible to make the trip from Manhattan to Brooklyn with com-

parative ease, but for the present at least it is evident that no relief may be expected.

REDUCING OVERHEAD MAINTENANCE.

Rolling stock and track repairs figure so largely in the total maintenance expenses of a busy electric road that it often is easy to lose sight of the possible savings in overhead repairs which may be secured if the conditions are favorable. Per mile of track the cost of trolley and feeder up-keep seems small in comparison with the other repair expenses, but this does not take account of its lost earnings and excess power supply following the occurrence and breaking of a blockade. No effort should be spared to forestall trolley breaks when once a company appreciates what they actually cost.

The causes of overhead failures are among the most difficult to determine in the whole range of electric railway operation. So generally does it occur that no trained eye sees an accident to the overhead work, that exact reports of the occurrences are extremely hard to get from employes. Wire breaks occur in the most peculiar ways, sometimes before the car has reached the spot. Again, the size of the wire does not always insure permanence of service. Defects in alignment are doubtless responsible for many breaks, but these can be largely guarded against by proper inspection and adjustment. Greater difficulty occurs in correcting overhead mishaps due directly or indirectly to the handling of the car at particular points.

Pulling the trolley from the wire while the current is on tends to reduce the strength of the wire at the point where the arc occurs, and if this occurs frequently the wire becomes unable to withstand the shock of the blows from trolley wheels and gives way. Under the best of conditions a trolley wheel running along a wire at high speed and held against it by a heavy pressure cannot be prevented from imposing constant shocks against the wire and its supports as the alignment and grade change, even very slightly. Too fast running through switches and crossings is one of the most prolific causes of breaks and also of tearing down the overhead structure on account of lost wheels and loose poles. It has been well said that neither automatic catchers nor electric switches will make good want of care on the part of trainmen in passing points where caution is to be observed, and trouble at such places not only means emergency repairs, but also permanent work of repair men to readjust and bring the deranged switch or wire into place, involving the use of heavy tackle and much time.

Referring to this subject a prominent railway manager recently stated that more than usual care is needed in the central part of a system, where curves, turnouts, etc., are numerous, not to operate through overhead frogs at high speed. The overhead work in these places is often balanced by the strain of the curves at the different corners, and a heavy pull from a trolley wheel caught in a span on one curve will affect the other at the further block equally as much. To construct an overhead system so as to prevent the wheel from leaving the wire is almost impossible, for there are other reasons for the jumping of trolley wheels aside from those residing in the overhead structure. The wheels themselves, the bases, track, springs on the trucks and car roofs and the tension in the pole all bear upon the proper operation of a trolley. A bad spot in a rail, if located close to a pole where the wire is held rigid, will often throw off the wheel, even though the car is traveling at moderate speed; and badly adjusted springs will have a similar effect, especially on imperfect track or above special work. A weak tension spring or a hard working switch which causes the trolley to jump at the curve, and bad trolley wheels are other causes of line failure.

On large city systems the skill of emergency crews will forestall many overhead troubles, and there is much to be

gained by the use of bulletins, caution signs and systematic records of the weak spots on the overhead system. Constant observation of the behavior of both wire, fastenings and wheels is essential for the fewest delays caused by otherwise preventable troubles.

11,000 VOLTS ON THE ERIE.

This issue contains a detailed description of the recent equipment of the Rochester division of the Erie Railroad for operation with single-phase electric power. Probably the most novel feature in this electrification project is the high voltage used, the difference of potential between the trolley wire and the track rail normally being 11,000 volts.

Those who have had experience from day to day with leakages and burning of poles supporting overhead construction carrying current at but 500 volts pressure may look with doubt upon a trolley line which in regular use carries current at 11,000 volts. It may safely be said, however, that the factor of safety of the high-voltage overhead construction is as large, if not larger, than many of the old types of overhead on which is carried but 500 volts pressure. Therefore the freedom from accidents should be greater.

The adoption of the catenary principle for the support of overhead working conductors has made possible the use of high voltages for electric car operation. It is learned from the description of the Erie electrification project earlier mentioned that great care has been taken to erect a permanent type of overhead structure. The trolley wire used is No. 000 grooved section, hung in spans of 120 feet and supported by a steel messenger which is insulated from T-iron brackets by 3-petticoat insulators $6\frac{3}{4}$ inches in diameter. Where this trolley carrying the high voltage passes under bridges the engineers have supported the wire by an ingeniously constructed auxiliary messenger wire that affords flexibility but yet offers no possibility of the wire carrying the high potential being raised by the current collector, so that it will strike the overhead structure. Even in the 500-volt trolley there is need for more flexibility in supporting the wire under bridges.

Another special detail employed on the Erie line is the method of tying the messenger wire to the tops of the supporting insulators. At first thought it would seem advisable on the score of stability to make a permanent tie at this point, but when it is considered that other trains than those propelled by electricity must operate over the same track it is seen that some provision must be made, so that should a pole or bracket fall it will not pull down with it the trolley and messenger wires. To provide against any damage in such an instance the messenger is fastened to the insulators with so small a tie as a No. 9 galvanized telegraph wire. When so fastened, should a bracket become detached from a pole for any reason, its weight and the shock of detachment would tear the tie-wire clear of the messenger and allow the bracket to fall entirely away from the wire, thus reducing the possibility of a steam railroad train colliding with it.

As a further precaution against any possibility that the overhead structure when damaged or falling might block the steam train service, each insulator bracket is grounded by a flat steel rod, which has its upper end connected to the bracket and its lower end attached to the track rail. With this precaution taken, should an insulator fail, the messenger wire and in turn the trolley would be grounded, the transformer station breakers opened and no possibility arise by which the high-tension current would set a pole on fire. If this precaution were not taken—though it is quite probable that the burning of a pole would not impair the electric operation—on the other hand, it is quite probable that it would become a dangerous obstruction to the passage of steam trains, and therefore the expense of grounding each bracket seems amply warranted.

Still another new construction detail, used abroad in the

Simplon tunnel electrification project and others, but as yet not generally used in this country, is the employment of tripartite steel poles for rendering the span construction self-supporting without the use of side guys. These poles comprise three rerolled steel rails, arranged much the same as the corner posts of a windmill tower, and having their bases anchored in concrete and their intersecting tops united by a collar, thus forming a structure with a wide base, which, in connection with the heavy concrete anchors, assures that the span construction can be supported without calling into play side anchors that in many instances would be objectionable on account of roadway clearances.

Taken as a whole, the electrification project of the Rochester branch of the Erie, as described by W. N. Smith, includes many engineering details of special interest, not only because of their permanent construction, but because the difficult problems attendant upon the use of 11,000-volt operating current have required much original work, that in this installation has been carried out in a comparatively short time and proven satisfactory by successful operation.

TWO-MAN CAR INSPECTION.

Considering the amount of manipulation and adjustment required in making a thorough inspection of a modern car equipment, the practice which has lately come into vogue of working in couples has much to commend it. One man can actually do all the work of inspection on a large car fitted with multiple-unit control and graduated-release brakes, but there is a considerable saving of time if he be given a helper to unlock the various boxes, manipulate the bolts, screws and trap doors, hold the light just where it is most needed, bring tools and lend a hand generally. The judgment of two men is often better than that of one, whether a certain wearing part should be renewed or allowed to make another run, and if one man is less experienced than the other the training which he gets in close association with a better qualified inspector is an excellent thing.

Some managers do not realize the mental intelligence which the rolling stock changes of the last few years have required in the understanding of the technical details of the equipment by the shop and inspection forces. It has not been an easy matter to master these details as improvements in control, brakes and motors have been introduced by the manufacturers, and from year to year there have been such important changes that often the men in the shop have had to learn entirely new details and put the old standards out of mind. Thus, pilot-motor control in multiple-unit trains is a thing of the past, and the inspector whose mind once knew every twist and turn of these particular circuits finds the present-day car a very different piece of mechanism, in which his former knowledge counts for little. There is no more important question in the shop than the capabilities of the employes, and in some quarters it is beginning to be realized that some sort of training for shop men is quite as essential as in the case of motormen.

Inspection in pairs gives a good chance to break in understudies, and should tend to produce less perfunctory work. Where record blanks must be used the helper can save the experienced man much time by handling the pencil himself. For a mere casual inspection that lasts but five or six minutes two men are of course unnecessary, but to facilitate the thorough examination of the closely packed pieces of apparatus now found on the under side of the average heavy car, the services of a helper are well worth thinking about. In cases where the inspection is divided among groups looking after trucks, motors, wiring, control and braking apparatus there is the same chance for co-operation, though care is necessary to plan the work so that there shall be no overlapping, as in the assembly of heavy stock on a large scale.

ELECTRIFICATION OF THE ROCHESTER DIVISION OF THE ERIE RAILROAD.

BY W. N. SMITH.

One of the most important electric railway developments of the present year was the change from steam to electrical motive power on a portion of the Rochester division of the Erie Railroad, which was effected on June 18, 1907. This electrification can justly claim the priority of application of several important features which are of interest in connection with the discussion now prevailing as to systems best suited

apart. The grades are light, and the curvature for the most part quite easy, the line being relatively quite straight.

The line was lately relaid with 80-pound rail, using joints of the Weber type. A single No. 00 protected rail bond is applied to each rail joint under the plate, one of the advantages of the high-tension single-phase system being that the relatively small current, combined with the high impedance of the main circuits, renders it unnecessary to resort to heavy bonding.

The electric service is devoted solely to passenger traffic, which is of the local interurban type. The freight service is handled exclusively by steam, as heretofore, as are also the



Electrification of the Rochester Division of the Erie—Overhead Construction at Mt. Morris Terminal.

for steam railroad electrification. This line was the first to operate electric cars on the single-phase system over the tracks of an operating steam railroad.

All of the construction described later, except that of the 60,000-volt power transmission line and the car bodies and trucks, was designed, executed and placed in operative condition by Westinghouse, Church, Kerr & Co., engineers, through whose courtesy the drawings and photographs which illustrate this article were furnished.

Route.

The section of track equipped is 34 miles long, extending from Rochester over the main line of the Rochester division to Avon, a distance of about 19 miles, thence 15 miles over the Mt. Morris branch. The railroad is entirely single track, with sidings at way stations, averaging three to four miles

through trains operating between Rochester and Corning, over the main line of the Rochester division, a distance of about 94 miles. The steam service between Rochester and Mt. Morris originally comprised three round trips daily. Instead of three round trips per day the electric service has introduced six complete round trips between Rochester and Mt. Morris, and three more between Avon and Mt. Morris.

Power Supply.

The power is generated at Niagara Falls, in the plant of the Ontario Power Company, and is transmitted at 60,000 volts, three-phase, over the lines of the Niagara Lockport & Ontario Power Company, which system has been fully described in former technical papers. The Iroquois Construction Company built a branch line from Mortimer, a little over four miles south of Rochester, to Avon, locating it upon

the Erie Railroad right of way for nearly the whole distance. The pole construction used upon this branch transmission line is of the A-frame type. There is an equilateral spacing of seven feet between each of the three wires. The insulator pins are grounded by copper wire. The neutral of the transmission system is grounded at the power station through a resistance. Lightning protection of the horn arrester type has been installed at every fifth pole. The conductors are of No. 4, hard-drawn, stranded copper cable. The standard length of span between poles is 220 feet. When crossing over the tracks a special construction is used, comprising No. 0 copper cables carried on steel towers, so reinforced by guys

inches across, the second 5 and the third 6 inches. A concrete column is in series with the first gap, an electrolytic arrester in series with the second and a 5-foot fuse of No. 18 copper wire in series with the third, that is to say, between one horn and the ground. Both horns of each gap are of ½-inch round iron. Between the line and the first arrester there is a hook type knife switch, and between the last arrester and the lead into the substation there is a No. 18 copper wire fuse in each conductor, placed horizontally upon the structure especially devised for it on top of a pole. These fuses are inclosed in wooden tubes about five feet long, wrapped with torpedo twine. The entire arrangement of light-



Electrification of the Rochester Division of the Erie—Rochester Terminal Yard, Showing Overhead Construction for Four Tracks.

that it is impossible for a failure of the line to result in dropping the conductors across railroad tracks.

Substation Building.

The substation building is located in the Y formed by the railroad tracks at Avon, and together with the car shed, is adjacent to the roundhouse and division repair shop. The building is absolutely fireproof, the doors and windows being of kalomein construction, and fitted with wire glass. The building is 39 feet 8 inches by 44 feet on the outside and 29 feet 10 inches high from the top of the foundation to the top of the parapets.

The arrangement of the 60,000-volt lightning arresters in the yard consists of three horn gaps, arranged one behind the other, on each of the three conductors, the first gap being 4½

feet across, the second 5 and the third 6 inches. A concrete column is in series with the first gap, an electrolytic arrester in series with the second and a 5-foot fuse of No. 18 copper wire in series with the third, that is to say, between one horn and the ground. Both horns of each gap are of ½-inch round iron. Between the line and the first arrester there is a hook type knife switch, and between the last arrester and the lead into the substation there is a No. 18 copper wire fuse in each conductor, placed horizontally upon the structure especially devised for it on top of a pole. These fuses are inclosed in wooden tubes about five feet long, wrapped with torpedo twine. The entire arrangement of light-

ning arrester gaps, fuses and switches is mounted upon 18 chestnut poles; and a suitable elevated platform, railed off and fitted with a gate to keep out trespassers, affords means of access to the apparatus when attention is required.

The three high-tension conductors enter the substation through glass discs held in 36-inch tile. Within the substation, the wires first pass through three 60,000-volt stick-type circuit breakers. Thence over bare copper conductors to the three oil-insulated choke coils and instrument transformers. The main connections finally terminate upon a set of copper busbars in the transformer room.

The 60,000-volt three-phase current is made available for single-phase distribution by means of three transformers of the Westinghouse oil-insulated water-cooled type, each of 750 kilowatts capacity. For the present installation two trans-

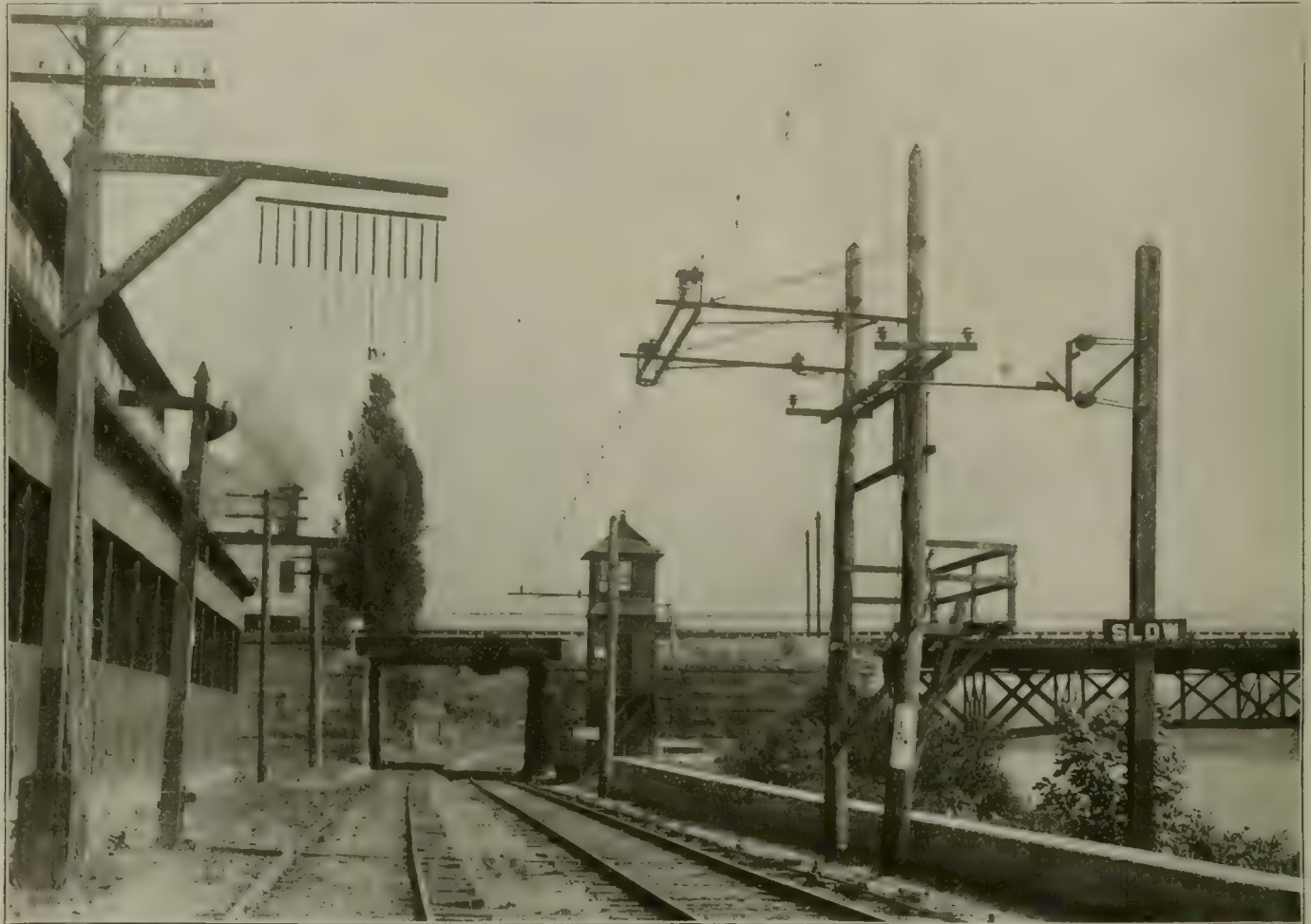
formers only are used at one time, the third being a spare. The high-tension connections are such that in case of one transformer failing while in service its connections can quickly be taken off of the busbars and put on the spare transformers. The low-tension windings also have six taps, permitting relatively small variations in the secondary voltage if such should be necessary to suit operating conditions in the trolley line. One end of each low-tension winding is grounded.

The transformer cases are so mounted that they can be moved along transfer tracks until directly under a 10-ton hand hoist, which is able to lift any part of the transformer that repairs may make it necessary to handle.

Transformer oil is pumped from a tank in the basement to a tank suspended from the roof by means of a steam pump

two trolley feeders, the third breaker, which is situated between the other two, being a spare.

The outgoing 11,000-volt feeders run up to the mezzanine floor, directly over the operating room, where they emerge from the building through perforated glass discs, set in 18-inch round tiles. Before emerging there are tapped to them two Westinghouse low equivalent lightning arresters, set in brick compartments, and reinforced by two electrolytic lightning arresters of the 11,000-volt type. A set of call bells is provided so that when the automatic breakers open a bell is rung in the inspection shed adjoining. Also, if the temperature of any transformer runs above normal, a bell circuit, connected to a thermometer in the top of the transformer tank, is similarly made to operate. The station itself does not re-



Electrification of the Rochester Division of the Erie—Overhead Construction at Clarissa Street Bridge, Rochester, Showing Trolley Section Insulator and Bridge Wiring.

supplied from the boiler room in the adjacent division roundhouse, where steam is always available. From the upper tank oil is fed by gravity into either transformer. The water circulation is by gravity, the supply coming from the railroad company's water tank system. The necessary transformation from three-phase to two-phase fits in very well with the natural subdivision of the electrified line, into two sections, one of which is about 19 miles in length, north of Avon, the other about 15 miles in length, being to the south of Avon. The connections were therefore laid out to operate the sections upon separate phases of the two-phase secondary system. Either the T or V connections can be used, the latter method being employed at present. Each one of the active transformers therefore feeds a separate section.

The low-tension busbars run along the wall of the operating room, and directly beneath them are three type E Westinghouse automatic oil circuit breakers, one on each of the

quire the continuous presence of an attendant, which is needed in the case of a rotary converter substation. The working force is so organized that the car repair men are always available for manipulating the substation circuit-breakers, and the cost of attendance is thereby reduced to a minimum.

Catenary Trolley Construction.

The overhead trolley construction is in many respects unique. It was the first catenary installation to operate regularly at 11,000 volts. Nearly all of the construction is of the bracket type, except at the railroad yards at Rochester, Avon and Mt. Morris, and for some distance at Mortimer, where there is a siding on each side of the main track, which prevented the use of bracket construction there. The poles, which are of chestnut, are given about 12 inches rake and are tamped with cobblestones.

The brackets are of an entirely original design, the details

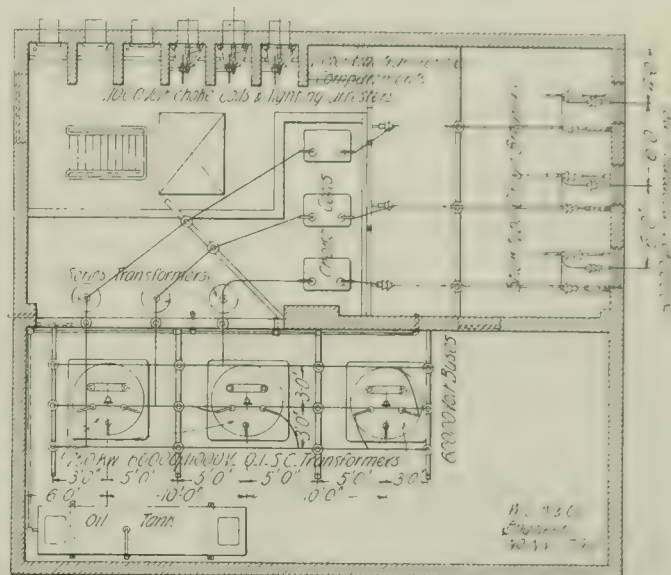
of which are illustrated herewith. The whole construction is extremely rigid and is strong and conducive to a long life. Where necessary, at switches, extra long brackets are employed, being lengthened by splicing and an extra truss rod being attached by means of a clamp to the outer end of such a bracket and run to the extreme top of the pole. The insulator pins are of malleable iron, of a special type to be noted in an illustration. The brackets and pins were furnished to the engineers' designs by the Electric Service Supplies Company.

The insulators are of the R. Thomas & Sons manufacture, $6\frac{7}{8}$ inches in diameter and 6 inches high, made in two parts, but of the 3-petticoat type and known as No. 3029. As most of the overhead work was done during the winter months and had to be rushed, a quick-setting cement of litharge and glycerine was used in place of Portland cement, which not only enabled rapid work in construction, but obviated troubles due to the freezing of hydraulic cement while setting.

The messenger wire is of "extra high strength" steel, furnished by the American Steel & Wire Company. It is of seven strands and is $\frac{7}{16}$ inch in diameter. The trolley wire is No. 000 B & S grooved copper. The spans on the straight-line track are 120 feet in length. The maximum deflection from the center line of the track, on curves, is 7 inches each way. The catenary hangers are the Electric Railway Equipment Company's drop-forged type. Both trolley and messenger ears are secured in position by jam nuts. This type of suspension was developed especially for this installation, and is so constructed that there is no possibility of parts coming loose and falling apart on account of vibration. It is also very quickly and easily adjustable on the trolley wires. The

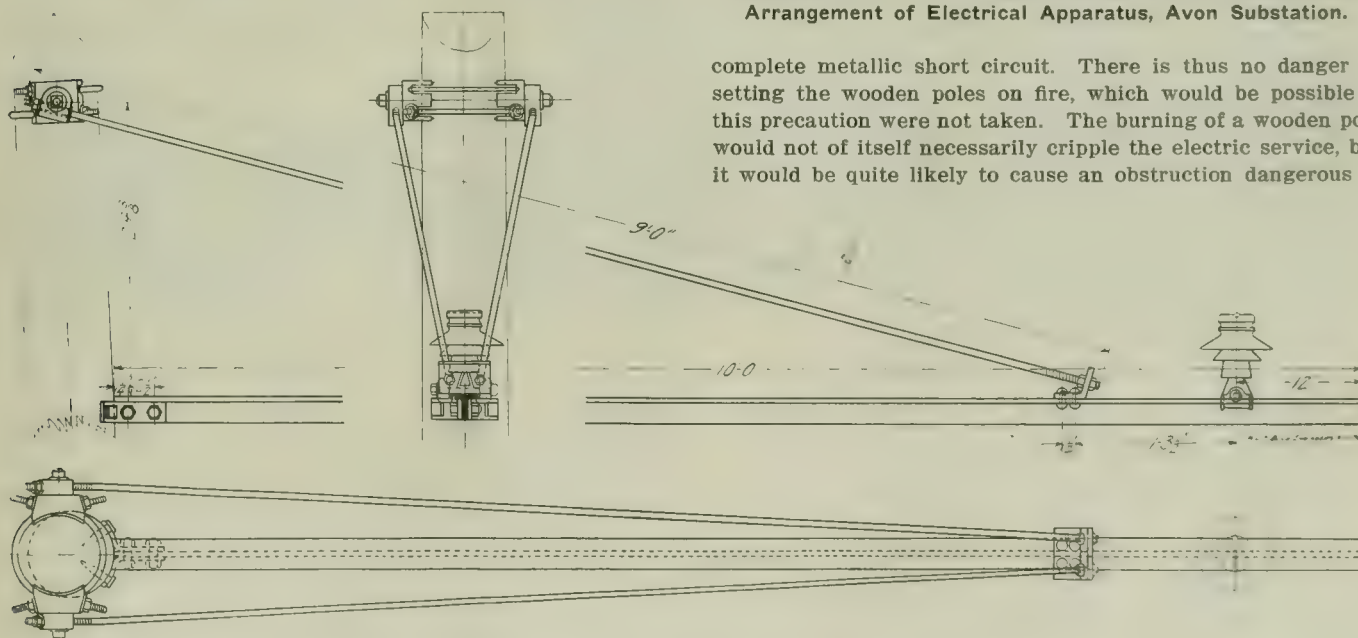
automatically place any check upon the steam service, so that accidents to steam trains must be guarded against, as a steam train might easily be wrecked by an obstruction which would automatically prevent power from being supplied to an electric train. This was one of the reasons for installing the system of "ground rods" from the brackets to the rails, which is carried out very consistently throughout the installation.

Every bracket is grounded to the rail, so that an insulator failure will instantly throw off the power, as it will cause a



Electrification of the Rochester Division of the Erie—General Arrangement of Electrical Apparatus, Avon Substation.

complete metallic short circuit. There is thus no danger of setting the wooden poles on fire, which would be possible if this precaution were not taken. The burning of a wooden pole would not of itself necessarily cripple the electric service, but it would be quite likely to cause an obstruction dangerous to



Electrification of the Rochester Division of the Erie—Catenary Trolley Bracket.

hangers are spaced every 10 feet. Steady strains are used only on curves and turnouts and were not found necessary on tangent track.

The tie wires are of No. 9 Extra BB. galvanized telegraph wire, because it was thought best not to make too rigid an attachment between the messenger wire and the insulator; so that if a bracket became detached from the pole for any reason, its weight and the shock of detachment would tear the wire clear from the messenger and allow the bracket to fall entirely away from the wire and reduce the chance of steam railroad trains colliding with it. An accident to the electrical equipment of a railway operating both steam and electric trains may shut down the electric service, but will not auto-

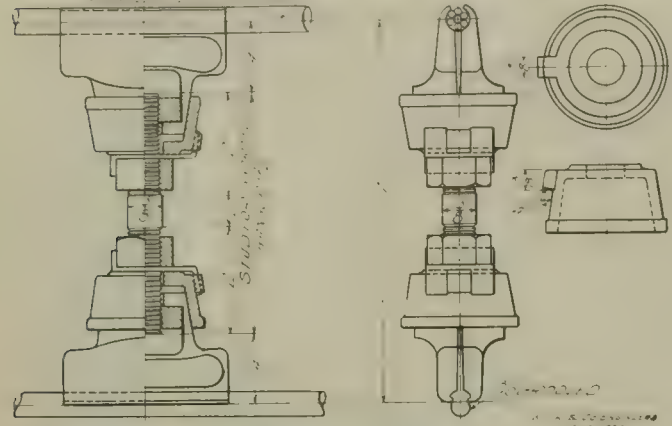
the passage of steam trains, which are, of course, independent of any disturbances on the electric motive power system. Up to the present time, however, there have been no cases where the overhead construction has caused any obstruction to the passage of the steam traffic. The ground rods consist of $\frac{3}{8}$ by 1 $\frac{1}{4}$ inch flat steel, their upper and lower ends being bolted to track rail and bracket, respectively.

The span construction, used where conditions absolutely required it, is as nearly as possible similar to the bracket construction, and uses the same type of pin and insulator.

In the Rochester yard the span construction was special on account of the distance between supports (which reaches a maximum of 94 feet, where spanning seven tracks, four of

which are electrified), and also on account of the uncertain nature of the soil.

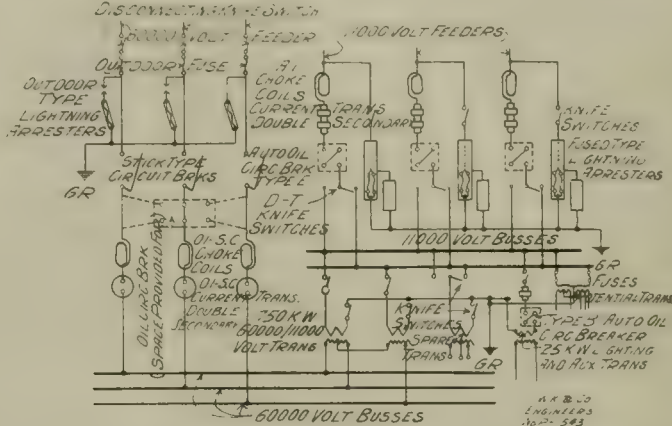
For the long spans, where it was impossible to use guys of the usual type (the river bank being on one side and the main highway, which gives teams access for loading and unloading of freight cars, on the other side), it became necessary



Electrification of the Rochester Division of the Erie—Catenary Trolley Hanger.

to use self-supporting span construction, and this was done by using the "tripartite" type of steel pole, set in concrete. This type of pole being constructed of rerolled Bessemer steel rails, is less subject to rust, and consequently more durable than any other available type of metal pole, and all of its surfaces are always open and easy of inspection. On account of the great tensile strength of the material there is consider-

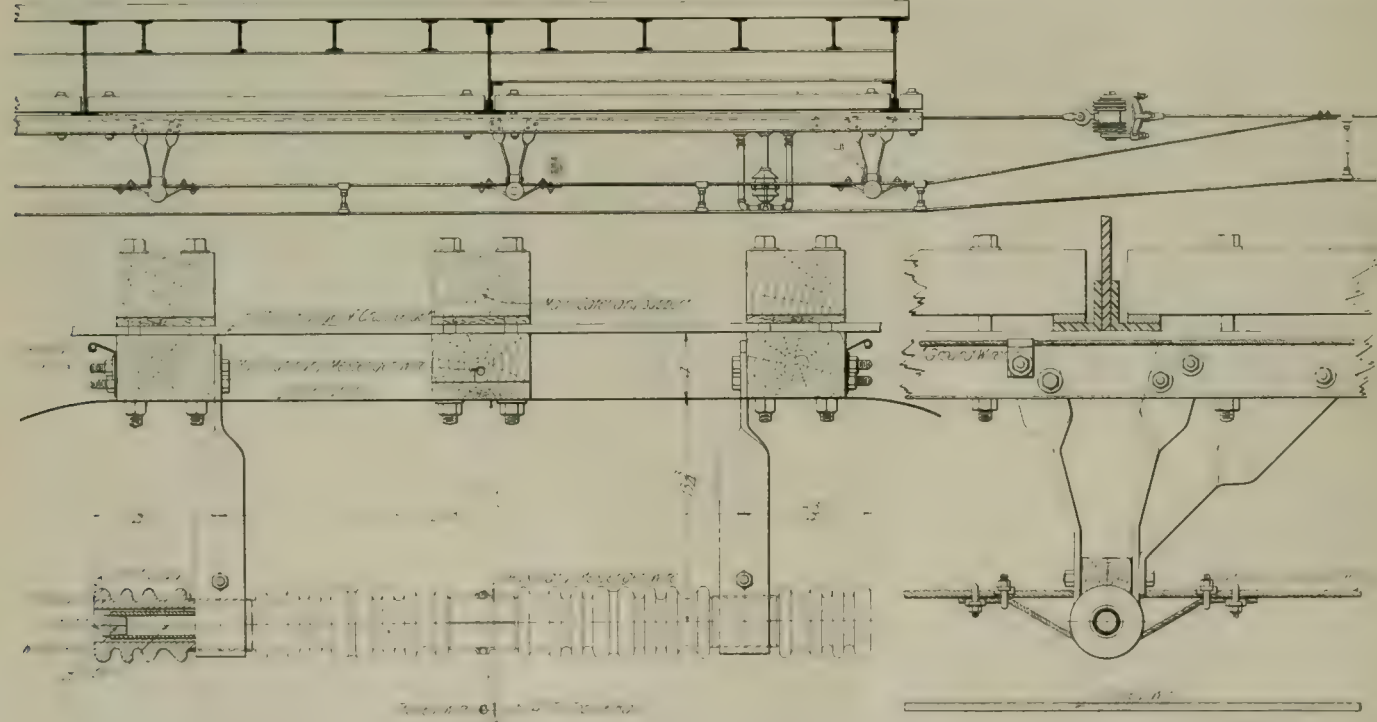
streams and two low bridges over the Erie right of way necessitated the employment of special construction at these points, particularly at the bridge at Clarissa street, on the outskirts of Rochester. The original clearances here were so low that the roadbed had to be excavated out and the track lowered about two feet, the minimum clearance between



Electrification of the Rochester Division of the Erie—Diagram of Connectors, Avon Substation.

the rails and the trolley wire being finally 18 feet. The messenger is fastened to a horizontal spool type insulator mounted at the center of a substantial piece of turned oak, which is long enough to carry two more similar insulators, one on either side of the center one, the details being shown in an accompanying illustration.

At either side of these overhead obstructions it was neces-



Electrification of the Rochester Division of the Erie—Trolley Construction Under Low Bridge.

able saving in weight, and the fact that it was a standardized product enabled quicker delivery to be made than though special riveted poles of structural steel shapes had been especially designed for these locations. Similar construction was also used at Avon, where guying of the side poles was not always possible.

The presence of several through truss bridges over

sary to provide warnings for brakemen upon the tops of freight cars, as substitutes for the warnings of hanging pieces of rope previously used. In an accompanying illustration is given a view of the Clarissa street bridge, showing both the old arrangement of ropes and the new one, for electrified tracks which supplanted it. It will be noted at this point only one of the two tracks is electrified track; but to insure that the place

shall be absolutely safeguarded, the electrified track is fitted with warning signs of the type shown. They consist of the well-known type of horizontal suspended swinging wooden rod, mounted with its axis at an angle, so that it swings up as it is pushed to one side. The pantograph trolley is fitted with a set of springs on each side, one of which strikes this warning sign a blow as it passes under and instantly throws it to one side. The blow is struck upon a heavy leather strap held taut by a coil spring of steel wire in tension, the whole contrivance being fastened to the lower half of the pantograph trolley mechanism so that it is at the right height for striking the warning sign. The swinging rod is mounted upon the pole by means of insulators, effectually preventing any leakage to the ground, even though a car might stand still directly under the sign and make contact with it for an indefinite length of time.

Nearly all the telephone and telegraph wires which formerly crossed the tracks have been put underground, particularly in the case of the leads composed of only a few wires, but where the line is crossed by heavy telephone trunk lines they have been protected by the basket type of construction,

section insulators, made by the Westinghouse Electric & Manufacturing Company. They are of the overlapping type, made of impregnated wood, and are of sufficient length to insure insulation at 11,000 volts. One of the breakers, that opposite the substation at Avon, is different from the above-mentioned type, in that it is not of the overlapping type, it being necessary to absolutely separate the two halves of the trolley line in order to utilize the separate phases of the trolley current in each half.

The conditions of electric traction upon this line are such that no feeder is necessary besides the trolley wire, and consequently there is no necessity for feeding the sections separately. A jumper is therefore provided at each section insulator, in which is placed a hook-type knife switch that can be operated in case it is desired to cut that section out. Normally, however, the switches are closed and the effect of the jumpers is to make the trolley wire continuous.

Another detail peculiar to the catenary type of trolley construction is the "deflector"—a sort of mechanical fender placed in the angle formed by the intersecting trolley wires at



Electrification of the Rochester Division of the Erie—Four-Car Electric Train.

so designed as to effectually prevent a broken telephone wire from falling across the messenger or trolley wire.

The telegraph department of the railroad company, in connection with the signal department, constructed a private telephone line of two copper wires between Rochester and Avon, with instruments at all signal towers and stations in the dispatcher's office, and at the substations and car shed and master mechanic's office. This telephone system is run upon the trolley bracket poles, transposed every third pole, and has worked satisfactorily.

Lightning protection for high-tension single-phase railway lines not having as yet been standardized, only a part of the line was equipped with line lightning arresters, which are of a swinging-fuse gap type of construction, made by the Westinghouse Electric & Manufacturing Company. On the other half of the line lightning arresters were not installed. Although the extent to which this type of arrester is fully protective is hardly established as yet, it can be stated that at no time since regular operation started has any injury to the car equipment resulted from lightning, though there were several severe storms during June and July.

The trolley line is divided into seven sections: one comprising the Rochester terminal, one the Avon yard, three sections in the main line between Rochester and Avon, and two sections south of Avon. The sections are divided by trolley

switches. The object of the deflector is to prevent the end of the pantograph shoe, when traveling under either wire from becoming hooked over the other.

Cars.

The cars equipped with electric apparatus are six in number, and together with their trucks were furnished by the St. Louis Car Company. The electrical apparatus was installed upon the cars and trucks by the engineers at the railroad company's car shops in Buffalo, N. Y. The cars are 51 feet 4 inches over bumpers, 40 feet over corner posts, and 29 feet 4 inches between truck centers. They are 8 feet 9 inches wide over sheathing and 13 feet 8½ inches in height above the rail. Four of the six have two passenger compartments, the other two having a baggage compartment about fourteen feet long, and a small smoking compartment with six seats, besides the regular passenger compartment.

The bottom construction of the cars comprises side sills of 5 by 8 inch yellow pine, with 6-inch steel channel and fillers, intermediate sills of 4½ by 6 inch yellow pine, and center sills of 6-inch I-beams, with fillers. All the cars have upper and lower truss rods and needle beams of 5-inch I-beams. End sills are 8 by 6 inch oak. The flooring is double and trap doors are fitted over the motors.

All the lower side windows are equipped with sash bal-

ances and the interior of the car is finished in mahogany, with light green veneering in the ceiling, of a very pleasing appearance. The seats are of the "walkover" type, upholstered in dark green plush in the main passenger compartment, and in rattan in the smoking compartment. There is a continuous basket rack on either side over the windows. The end doors are of the sliding type. The vestibule doors are of the sliding type and trap doors are fitted over the steps. Each vestibule is fitted with a double-acting swinging door so arranged as to form the motorman's cab, and when not so used it is folded back to completely inclose the control apparatus and brake gear, and leaves the vestibule unobstructed for passengers.

Each car is fitted with a 50-candlepower headlight, at each end, on top of the hood, and it is also fitted with a gong, air whistle, and with a standard train air signal used by the Erie Railroad. The toilet is in the center of the car, adjacent to the partition between compartments. The "Standard" steel type of platform buffer is used, and the regular M. C. B. coupling, air hose connections and safety chains are provided, so that the cars can couple up to any of the standard Erie Railroad rolling equipment.

There being an open space between the abutting vestibules when two motor cars are coupled together, due to the rounded and projecting buffer beams of the platforms, this opening being nearly 18 inches in width, which is wide enough to allow a person to fall between the cars, there were provided canvas curtains about five feet high, with snaps attached which enable them to be quickly stretched across the space, one on each side of the vestibule end door, so as to insure the safety of trainmen and passengers when walking from one car to another, with the train in motion.

The trucks are both alike, wheel base being 6 feet 8 inches. The axles are 6½-inch diameter. The trucks are of the standard M. C. B. swing bolster type, with heavy framing. The brakeshoes are inside hung.

The heating equipment consists of 32 of the Consolidated Car-Heating Company's electric heaters of the truss-plank type and 450 watts capacity each in the main portion of the car and two "No. 192 M. S." heaters in each cab.

Electrical Equipment.

The electrical equipment of the cars consists of four No. 132-A Westinghouse single-phase railway motors, with a nominal rating of 100 horsepower each, the gear ratio being 20 to 63. The suspension is of the nose type, and solid gears are pressed upon the axles.

The control system is of the Westinghouse electro-pneumatic type, which is sufficiently well known not to require detail description. The pantagraph trolley mechanism is so connected with the control circuit through the line relay that any interruption in the supply of high-tension current through opening of the line switch or main circuit-breaker immediately causes the trolley to be lowered by applying the air to the main cylinders in the trolley base.

The transformer is of 200-kilowatt capacity, and is of the oil-insulated type. It has three high-potential and eight low-potential taps, the latter running from 300 down to 110 volts, which latter pressure current is provided for heating, lighting and auxiliary purpose.

The high-tension wiring of the car is done mainly with varnished cambric cable, drawn through loricated iron conduit. A small amount of high-grade rubber cable is used, but it is thoroughly protected with varnished cambric tape wherever there is danger of a brush discharge to ground breaking down the insulation.

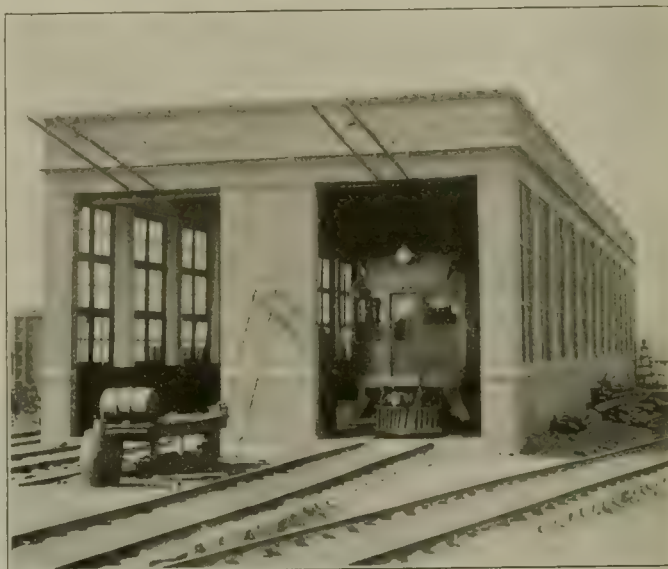
Current from the main motor circuit is led through the motor limit switch, which makes effective the functions of the interlocks on the switch group, and renders it impossible for the successive switches to be thrown in unless the limit switch is closed.

The control circuit includes a master controller in each vestibule, the train line wires and their connections to the

valve magnets and interlocks a storage battery supplying current for these wires, and a motor generator set, which is used either to charge the batteries or to actuate the control system.

There is a push button upon each side of the bottom of the master controller case. That on the right-hand side is used for dropping the trolley and opening the line switch. When the button on the left-hand side is pressed the switch group is stepped up to the last or high-speed notch and remains in that position until the handle of the controller has been returned to the off position.

There are four distinct notches on each side of the controller, the first corresponding to the coasting position, with the power off, the others enabling such gradations of speed as may be desired. Reversal is effected by moving the controller handle to the opposite side of the center or dead



Electrification of the Rochester Division of the Erie—Car Inspection Shed.

point. If the controller stops on the dead point, as it will if released by the hand, it will immediately apply the brakes.

In one vestibule there is located in an asbestos-lined compartment, inclosed with steel doors, a slate switchboard panel upon which are carried all the switches and fuses for the control of the battery and motor generator set, the lighting circuits and heaters, and also the main connection from the low-tension side of the transformers to the auxiliaries. The jumpers for connecting the cars and the receptacles are of the 12-point type, there being 12 wires in the main control circuit.

The low-tension wiring between the transformer and switch group and motors is all inclosed in a boxing of "Transite," to insure its protection against mechanical injury, as the inductive effect of heavy currents at low potentials renders the use of iron conduits impossible for this part of the wiring.

The air brake and electrical equipment were placed upon the cars by the engineers, at the Buffalo car shops of the Erie Railroad.

Car Inspection Shed.

Adjacent to the substation is a car inspection shed, a brick building that will accommodate four cars. It is 136 feet 6 inches long, 30 feet 5 inches wide and 20 feet high in the clear, between the track and the bottom of the roof girders, and 24 feet high from the top of foundation to the top of the parapet. The general style of construction is similar to that of the substation. Two tracks run clear through the building, and the ends of which are inclosed by rolling steel doors of the Wilson type. One of the two tracks is provided

with a pit about 110 feet long and 4 feet 4 inches wide in the clear, and 3 feet deep from the top of the rail to the top of the convex brick floor.

A trolley hoist is provided at the rear end of the building, traveling across it on the bottom flanges of an I-beam attached to one of the roof girders. A third track, not connected with the outside tracks, runs up and down the middle of the building between the two car tracks. A transfer table is located in a cross pit situated about midway of the building, by means of which a car standing on the floor track may have a truck taken out from under it and shifted over to the center track, on which it can be run under the trolley hoist in case repairs are needed. The sides and bottom of this transfer pit are made of concrete.

The facilities for effecting electrical repairs are supplemented by the regular division repair shops, located alongside the steam locomotive roundhouse at Avon, which are equipped with the usual complement of machine tools. At the Rochester terminal a concrete inspection pit 60 feet long is provided on one of the sidetracks close to the passenger station.

Operation.

The equipments described were intended to be sufficient for operating single-car trains with one stop per mile over the entire road, at an average schedule speed of 24 miles per hour, or to haul one trailer making stops about $2\frac{1}{2}$ miles apart, at the same scheduled speed. The company has furnished shelters where the public highways cross the line, there being 22 of these flag stations, besides the regular intermediate way stations at which steam trains stop, six in all, or a total of 28 stations at which electric cars may be required to stop. Practically the electric cars stop at all the regular way stations, but only at a portion of the flag stations. A single passenger coach is frequently attached to a motor car, and on some trains baggage, milk or postal cars are required, making a 4-car train. The service has proved immensely popular throughout the Genesee valley, the territory served, and it is intended to increase the number of motor cars in order to handle the business a little more comfortably next season. It is found that the electric trains on their 34 miles of line can be depended on to keep to their running time rather better than the steam passenger and freight trains, operating over the main line.

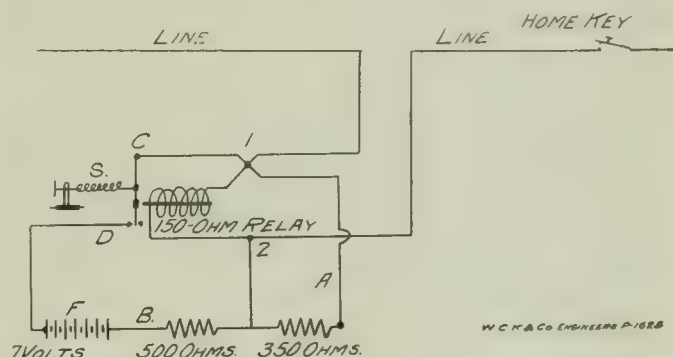
The railroad company has installed a positive block system for insuring the safety of trains with the frequent headway at which they are obliged to be run upon the single-track road, which must also handle steam passenger and freight traffic at the same time. The blocks extend between the regular way stations, or if such blocks are too long, switch towers are added, making the blocks average about four miles in length from one end of the line to the other. Without going into details it may be stated that the function of the positive block system is to absolutely prevent more than one train at a time from occupying a block. The sidings are fitted with interlocking switches controlled by the block operators in the towers, or in the way stations, and the movement of trains is thus regulated with the greatest care. The towers are all connected by the private telephone line, while the way stations retain the usual telegraphic communication with the train dispatcher's office at Rochester. By means of the telephone communication it is instantly possible for a train crew to get in touch with the chief dispatcher and be properly located, but all train orders are transmitted by telegraph and written out on Form 31, as is the uniform steam railroad practice throughout the country.

Telegraph System.

As is well known, the single-phase trolley system causes interference with telegraph lines along the right of way, and unless both the electrostatic and electromagnetic induction are properly compensated, there is always danger of tele-

graphic communication being seriously affected. The static effect is particularly annoying, as it is absolutely continuous, as long as the trolley line is charged, whether or not there are any cars moving. Various means were proposed and tried by the Western Union Telegraph Company for the elimination of the "static," which always causes the telegraphic relays to chatter, but the most successful thus far known is that due to the inventive genius of E. W. Applegate, quadruplex expert for the Western Union Telegraph Company, who has developed a very simple means for overcoming static interference. Mr. Applegate worked upon the theory that it was useless to try to compensate for the static, and that the thing to do was to "pacify" the instrument by additional devices.

The Applegate "static pickup" comprises a back-contact relay and a high-resistance shunt, connected as shown. The current enters the relay, 1 and 2, through a 150-ohm coil or magnet, attracting the armature, C. When the line opens by any operator opening his key, the armature, C, falls back and through the back contact, connects point C and D by the aid of a spring, S. The shunt, A, consists of 350 ohms of carbon stick and provides a better path for the static than do the



Electrification of the Rochester Division of the Erie—Diagram of Applegate Static Pick-up for Telegraph Relay.

magnets, pacifying the magnets to a certain extent. When the line opens and the armature connects with the back stop, C and D, both the A and B shunts are in with the main line and pick up the static which escapes through shunt A, relieving the agitation of the armature so that it can respond to the closing of the line.

The shunt, A, robs the relay of the main-line battery current very materially, so that it responds to the home key sluggishly. Consequently the auxiliary battery, F, is inserted in shunt B. When the armature, C, falls back, this battery acts upon the magnets, and assists its prompt response to the home key, or to any other operator, to such an extent that the shunt, A, does not cause noticeable drag. No matter what the line static may be, these shunts "pacify" the instruments and the static is not felt.

The armature spring is adjusted high enough to overcome the wave of static that escapes A and B shunts. The aid of the 7-volt battery overcomes this adjustment and leaves the relay very prompt and satisfactory.

The resistance of the shunt, A, must be determined by the distance from the ground and battery at each end of the line. The nearer to the ground the less is the resistance of the shunt, as in close proximity to battery and ground the static is more pronounced, and the effect of the main battery upon the relay is likely to be correspondingly diminished.

By this arrangement all the telegraph wires are "singled" and metallic circuits, the necessity for which was at one time pending, were discontinued and the repeater service which they necessitated was also discontinued, and there is now a spare wire between Rochester and Mt. Morris through the entire zone of static interruption.

Speech over the telephone line is very clear and distinct,

and although the wires and instruments have a heavy static charge, a few simple precautions enable it to be of great use to the operating department. It is intended to carry portable telephones upon the cars.

Organization.

The single-phase system was recommended for the electrification of this division by the electric traction commission of the Erie Railroad, and after authorization by the company was installed under the general direction of J. M. Graham, vice-president and head of the construction department of the Erie.

The engineering and the construction work were carried out and the system brought into operative condition by Westinghouse, Church, Kerr & Co., which organization designed and erected the buildings and the catenary trolley construction, bonded the track and installed the electrical apparatus in the substation and on the cars.

The adjustment of the telegraph system was carried out jointly by the Western Union Telegraph Company and the telegraph department of the railroad company.

The order was given to the engineers on June 6, 1906, and although the intense activity in construction work all over the country at that time rendered it difficult to secure materials and labor promptly, the work was pushed so rapidly that about 7½ months later, on January 22, 1907, the first official trial trip was run between Avon and Rochester. The severe winter weather thereafter prevailing delayed the completion of the work until spring. During April and May the whole equipment of substation apparatus, lines and cars was thoroughly tried out in a course of experimental operation, which also enabled the railroad employes to become familiar with the new system. On June 18 commercial operation began, and has since continued permanently with marked success.

RECEIVERSHIP OF NEW YORK SURFACE ROADS MADE PERMANENT.

Judge Lacombe of the United States circuit court at New York rendered a decision on October 8 making permanent the receivership of the New York City Railway and the Metropolitan Street Railway until the business of the corporations has been wound up. The decision says:

It is now suggested that there was "collusion" in the proceedings resulting in the decree appointing temporary receivers. There is no collusion apparent in any legal sense. It is of course manifest that the complainants and the defendant were entirely in accord and arranged together that the suit should be brought to the federal court and that the averments of the bill should be admitted by the answer. But there was no colorable assignment of some claim to a citizen of another state, nor any distortion of facts to mislead the court. On the contrary, examination of the books shows that the financial situation is precisely as was averred in the complaint.

The controlling element in the operation of the property by the receivers will be the circumstance that such property is devoted to the public service. The traveling public is to be first considered; the service already performed by the roads must be kept up and improved upon so far as may be. In the matter of improvements the receivers are fortunately relieved—at least in part—from the burden of devising improvements in the system, by the existence of the public service commission. The directions of the commission will be carried out by the receivers so far as the income from operating the roads will permit. Whether they should also undertake to borrow money in order to complete such changes is a question which can be determined subsequently, when it is known just what those changes are.

The receipts from car service will be devoted first to maintenance, including all necessary repairs and replacements so as to avoid breakdown at any point, and to operation. Next in order are certain fixed charges in the nature of rentals agreed to be paid for the use of the roads comprising the system and interest falling due on various mortgage bonds of such roads, which, by the terms of the leases, the New York City Railway has covenanted to pay.

It would seem to be to the public interest, because of

facility of transfer, that the roads which were being run by the city railway when receivers were appointed should be operated as a unitary system; certainly the question is too important a one to be decided until investigation and experience shall have produced such reports from receivers as will give an accurate and complete view of the situation. For the present, therefore, the receivers will continue to pay such rentals and mortgage interest.

This will not include the rental to the Third Avenue Railroad, which will fall due the last of this month. Before default is made in any case (except the one above referred to and the rental due October 15 to the Metropolitan Street Railway) petitions will be filed setting forth all the facts bearing on the question and asking instructions, and a day will be fixed on which not only the parties to the suit, but all in any way interested (including the public service commission as representative of the traveling public), will be heard as to the most equitable and the wisest course to be pursued.

The receivers will forthwith employ an accountant of the highest standing to make an investigation of the books and papers, and also an expert engineer of like standing, not heretofore connected with these roads, to make a thorough investigation of their physical condition, so that the receivers may be able to prepare an exhaustive report as to the liabilities and assets, condition of the property and cost of operation.

A committee of New York bankers has been organized in the interest of holders of the 4 per cent refunding bonds of the Metropolitan Street Railway.

Directors of the Interborough Rapid Transit Company issued on October 4 a statement designed to "prevent any apprehension." The statement relates to the independent position of this company and the Interborough-Metropolitan Company with respect to the surface lines.

ANNUAL REPORTS.

Brooklyn Rapid Transit Company.

Although gross earnings in the year ended June 30, 1907, increased 4.92 per cent over the previous year, operating expenses were 9.81 per cent higher, and the result on net earnings from operation was a decrease of 1.45 per cent. Operating expenses required 59.16 per cent of gross earnings, as compared with 56.52 per cent in the preceding year. The earnings compare as follows:

Gross Earnings	1907.	1906.	Increase.
Year ended June 30			
Passenger	\$18,413,983.27	\$17,586,721.57	\$827,261.70
Freight, mail and express...	349,538.93	309,554.67	39,984.26
Advertising	118,421.16	145,807.50	2,616.66
American Ry. Traffic Co....	439,640.79	431,244.36	8,396.43
Total	\$19,381,587.15	\$18,473,328.10	\$908,259.05
Operating Expenses—			
Maintenance of way and structure	\$ 860,075.38	\$ 815,147.34	\$ 44,928.04
Maintenance of equipment...	1,786,731.06	1,642,799.00	143,932.06
Operation of power plant...	1,655,400.38	1,609,534.19	45,866.19
Operation of cars—trainmen's wages	3,238,970.65	3,036,966.45	202,004.20
Operation of cars—other expenses	1,554,849.58	1,214,370.83	340,478.75
Damages and legal expenses	1,126,248.34	973,103.94	153,144.40
General expenses	643,898.78	603,288.52	40,610.26
Freight, mail and express expenses	233,667.33	203,961.90	29,705.43
American Railway Traffic Company—expenses	365,863.26	342,205.20	23,658.06
Total	\$11,465,704.76	\$10,441,377.37	\$1,024,327.39
Net earnings	7,915,882.39	8,031,950.73	*116,068.34
Inc. from Other Sources—			
Rent of land and buildings..	\$ 68,490.32	\$ 59,656.41	\$ 8,833.91
Rent of tracks and structure	125,865.31	97,302.93	28,562.38
Miscellaneous	360,810.30	166,976.28	193,834.02
Total income	\$ 8,471,048.32	\$ 8,355,886.35	\$115,161.97
Deductions—			
Taxes	\$ 893,782.14	\$ 882,862.02	\$ 10,920.42
Interest and rentals—net...	5,132,604.28	4,730,072.21	402,532.07
Total deductions	\$ 6,026,386.72	\$ 5,612,934.23	\$413,452.49
Net income	2,444,661.60	\$ 2,742,952.12	*\$298,290.52
Special appropriations	442,063.37	580,342.87	*138,279.50
Surplus	\$ 2,002,598.23	\$ 2,162,609.25	*\$160,011.02

*Decrease.

From the surplus for last year there was appropriated \$12,127.65 for depreciation adjustments and \$371,825.24 for discount on bonds sold, while in the year ended June 30, 1906, appropriations were made from the surplus as shown, of \$500,000 for a contingent reserve fund, \$571,246.66 for discount on bonds and \$522.98 for old accounts written off. The increase

in the expenditures for damages and legal expenses of 15.74 per cent is due in large part to the fact that the number of cases disposed of during the year increased about 36 per cent for the reason that the capacity of trial courts was increased about 40 per cent by the election of additional judges.

Some of the percentages in the report will be of interest. While passenger revenue increased 4.87 per cent, the revenue from freight, mail and express increased 12.92 per cent and from advertising 1.79 per cent. Maintenance of way and structure expenditures were 5.51 per cent higher than in the preceding year and maintenance of equipment 8.76 per cent higher. Expenses chargeable to operation of power plants were 2.85 per cent larger. The cost of trainmen's wages increased 6.65 per cent, while other expenses incident to the operation of cars were 28.04 per cent larger. The expenses charged to freight, mail and express were 14.56 per cent above those of the previous year.

The passenger traffic increased 13.1 per cent over the previous year, 511,839,437 passengers being carried. The average gross revenue per passenger carried was 3.6 cents, as compared with 3.89 cents in the preceding year, or a loss of 7.5 per cent. The average net revenue from operation per passenger was 1.48 cents, as compared with 1.7 cents in the previous year. The reduction is accounted for partly by an increase of 41.2 per cent in the number of transfers collected. The daily average number of cars operated was 2,093, against 1,922 for the previous year, an increase of 9 per cent. The passenger car mileage was 68,273,181, an increase of 4,615,858, or 7.2 per cent. The new cars placed in operation during the year had a greater seating capacity than the old cars and this fact should be considered in connection with the foregoing statistics.

President Edwin W. Winter says that in addition to the steadily advancing cost of labor and materials, the influence of the exceptionally unfavorable weather which prevailed during a good part of the year affected earnings and expenses. The extent of the unjust burden in taxation against which this company has been defending itself is treated at length. An abstract of the comment of Mr. Winter upon this subject follows:

The burden of taxation continues to be heavy and, as we believe, is unjustly discriminative against the property of public service corporations. Official efforts in recent years seem to have been stimulated to devise as many methods as possible of imposing taxation, direct or indirect, upon corporations possessing public franchises, such impositions being unequal as compared with the burdens which other property has to bear, resulting in the double, treble and even quadruple taxation of the same class of property and crippling the power of the corporations to furnish such additional transportation facilities as would compensate the people to a far greater extent than the benefit to be derived in the swelling of the city and state revenues. A million dollars of excessive taxation would pay the interest at 5 per cent on \$20,000,000 invested in extensions of lines or enlargement of facilities, the expenditure of which, judging from the history of transportation in Brooklyn, would so encourage municipal development as to yield to the city many times \$1,000,000 in taxation by reason of increased assessed valuations. Our policy and practice have been not to resist the payment of any tax which is lawful and not excessive or unequal. With one or two exceptions we have not contested any tax during the last 12 years where the courts have not finally sustained our position in whole or in part. The attitude of resistance, however, whether justified or not, is not an agreeable one, and we prefer not to assume it except as we are compelled by the enormity and inequality of the burdens imposed. The system is liable for 13 different kinds of taxes and impositions, of which only three and part of the fourth are taxes upon physical property. The remainder are impositions or burdens solely upon the intangible property of the system—upon the right to exist as corporations and to occupy public streets and places.

The aggregate of these taxes and impositions for the calendar year 1907, as already assessed, or as estimated where the precise amount is not at present ascertainable, is \$2,252,000. Of this amount \$677,000 is not charged as taxes on the system's books, but is included in other operating expense accounts. An additional sum of \$245,000 represents

taxes, which under Section 46 of the tax law, as construed by the court of appeals, are to be credited against the special franchise taxes, and therefore should be deducted from the total. This would leave \$2,006,000 of direct or indirect taxes to be paid during the year, if the assessments all stand without reduction, of which \$1,329,000 would appear in the tax accounts of your corporation. There was charged during the fiscal year ended June 30, 1907, against taxes by all companies \$893,782.44, but that amount is not properly comparable with the taxes actually paid during the fiscal year or with the taxes actually assessed during the fiscal year, because the various kinds of taxes accrue from different periods, and the larger part of the increased taxes for the current calendar year is not payable until October next.

The only taxes in litigation at the present time are those affecting the companies' tracks and lands constituting private rights of way, and special franchise taxes. As to the former there is still to be paid, if the assessments stand in full, except as already reduced by decisions of a referee, \$114,100.68, and there is reserved on the books for payment of this balance when determined \$173,952.42, or an excess charge, if no reduction is obtained by litigation, of \$59,851.74.

As to the special franchise taxes for the years 1900 to 1906, inclusive, all down to and including the year 1904 have been paid in full, less rebates authorized by Section 46 of the tax law, with the exception of the taxes against the Coney Island & Gravesend Railway Company and the taxes in the borough of Queens against the Brooklyn City and the Brooklyn Queens County & Suburban Railroad companies, which are in litigation.

Under the heading "Additions to and Improvement of Property" many details are presented. Fifteen wrecking cars and 12 cars for the transportation of scrap metal have been constructed out of obsolete equipment. Each surface car has been equipped with an additional fare register for the registration of transfers. At the close of the year the combined rated capacity of the power stations aggregated 73,660 kilowatts, an increase of 25 per cent over the previous year. The combined capacity of the substations aggregated 47,000 kilowatts, an increase of 40 per cent. Over 12 miles of underground conduits were constructed, 63.5 miles of high-tension feeder cables and 20.4 miles of low-tension feeder cables installed in subway conduits, and 60 miles of overhead cables erected.

Many improvements have been made on the elevated structures and tracks. The reinforcement of 23,000 lineal feet of structure has been completed and work is progressing on 17,500 feet additional. The cleaning and repainting of 46,000 lineal feet of structure were finished and work is under way on 12,000 feet additional. Electro-pneumatic interlocking signals have been installed at four locations and an additional signal plant is under construction.

On account of construction expenditures chargeable to capital account or for the purchase or exchange of securities there were issued during the year \$6,867,000 of first refunding mortgage 4 per cent bonds. At the beginning of the fiscal year the treasury held \$943,000 of these bonds, making a total available of \$7,810,000. Of these \$3,186,000 were sold during the year, leaving on hand on June 30, 1907, \$4,624,000. In addition there had been expended to the close of the year \$4,844,935.25, for which bonds may be issued. From the date of the first refunding mortgage, July 1, 1902, there have been received from the trustee \$32,702,000 bonds. During the intervening period the company exchanged \$979,000 of these bonds for securities of constituent companies and sold \$28,078,000 bonds, realizing therefor \$23,223,044.35, or \$4,854,955.65 less than the amount expended for additions, improvements and betterments and the acquisition of property under the terms of the mortgage. The outstanding stock of the Brooklyn Rapid Transit Company is \$45,000,000, and there are outstanding stocks of constituent companies aggregating \$835,909. The balance sheet shows the following: Insurance reserve fund, \$51,428.27; depreciation reserve fund, \$23,190.79; contingent reserve fund, \$238,416.05. The total track mileage is shown at 578.521, of which 508.496 miles are surface and 70.025 miles elevated road.

ROLLING STOCK FOR THE WASHINGTON BALTIMORE & ANNAPOLIS ELECTRIC RAILWAY.

BY E. F. ROBERTS, PRESIDENT THE ROBERTS & ABBOTT COMPANY, CLEVELAND, O.

The Washington Baltimore & Annapolis Electric Railway is rapidly approaching completion. The main line between Washington and Baltimore is double track and constructed for high speed. At the Washington end there will be a terminal station at Fifteenth and H streets, N. E., at which connection will be made with the cars of the Washington



Washington Baltimore & Annapolis—Exterior of 57-Foot Local Car.

Railway & Electric Company, and at Baltimore the Washington Baltimore & Annapolis Electric Railway has a terminal building in the retail center, its cars passing through such building. In addition to the main line there is a single track 20-mile road, which is now being operated by steam, connecting Annapolis Junction and Annapolis, and crossing the main line approximately at right angles at a point about 15 miles south of Baltimore. At Annapolis Junction it connects with

A few of the factors taken into consideration were:

1. High-speed service with close headway between Washington and Baltimore.
2. High-speed service between Annapolis and Washington and between Annapolis and Baltimore.
3. Local service over the main line (termed the Washington Baltimore & Annapolis) and the cross line (termed the Annapolis Washington & Baltimore).
4. Excursion business in trains to Annapolis and to Benning racetrack near Washington. Such trains sometimes to consist of steam coaches owned by the Annapolis Washington & Baltimore, or possibly obtained from connecting steam roads. Also freight trains on the Annapolis Washington & Baltimore.

Relative to the first and second classes of service, it was considered essential that even with close headway and fast schedule each train should have liberal seating capacity, and consideration was given as to whether to make the normal train one large car or two smaller cars. The running speed required for the proposed schedule is 60 miles per hour on level track and it is evident that in order to give smooth riding at such speed, even with excellent track, a large and heavy car with liberal wheel base is required, and such car bodies and trucks are also required in order to provide sufficient room and strength for the alternating-current equipment.

Consideration was also given to the possibility and practicability of operation in trains on city streets, there being, however, an unusually small amount of city street operation. Thus, it was decided to provide large cars for through service.

Relative to the third character of service, it was decided that a smaller car would be most suitable, and geared for slower speed, because with frequent stops the high speed required by the through cars would be impossible to attain.

For the operation of the fourth class, box car type locomotives were decided upon, which motor cars are to act not only as locomotives for the purpose stated, but also to be loaded with freight or to be used on maintenance work.

Because of the different characters of service, including service under steam railway conditions and with steam railway passenger coaches and freight cars, it was decided that all cars should have Master Car Builders' couplers and auto-



Washington Baltimore & Annapolis—Exterior of 60-Foot Local Car.

the Baltimore & Ohio Railroad, and at Odenton with the Pennsylvania Railroad, and just east of Odenton it crosses the main line of the Washington Baltimore & Annapolis. This line is being electrified and will be operated in connection with the main line.

Single-phase alternating-current motors will be used. The trolley voltage will be 6,600, and the trolley wire supported by catenary suspension.

It may be of interest, not only to note some of the reasons for the final design of cars, but also to consider some of the plans which were not followed.

matic air brakes, even though such coupler makes it impracticable to operate in trains on city streets except by the use of a link, or auxiliary radial coupler.

In order to avoid carrying several sizes of repair and maintenance parts, it was decided to have all trucks identical, and also the motors, the only difference being the number of motors per car, the gear ratio and the truck springs.

Relative to the design of the high-speed cars, it should be noted that because these cars will not stop between terminal points, except some which will stop to make connection at Naval Academy Junction on the Annapolis Washington &

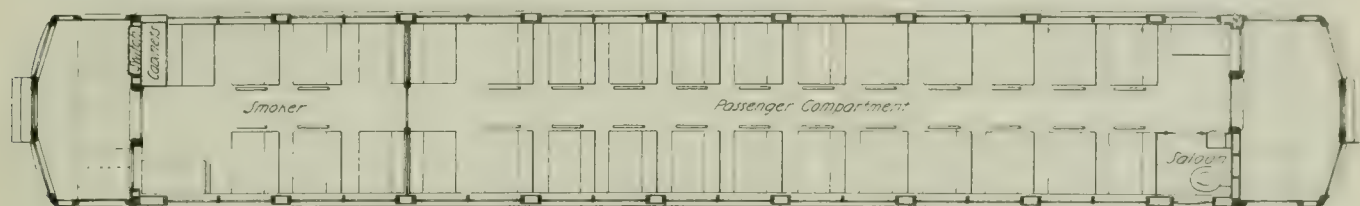
Baltimore with cars for Annapolis, practically all the loading and unloading will be done at the terminal stations, and consequently considerations which affect time of country stops do not apply to such cars.

It was at first expected that single-ended cars would be allowable, and studies prepared early in 1906 were on such basis. When the final plans and specifications were prepared the conditions were somewhat changed from those originally contemplated, as it was found impracticable to obtain terminal facilities at one end which would allow the operation of single-ended cars as first considered. In addition, the terminal station at Baltimore requires that passengers load and unload on the left side of the car, therefore it was advisable to have two doors on such side. It was finally decided to provide double-ended cars with end doors in the vestibules of the high-speed cars for the convenience of train crews when

usually the case on interurban cars when operating in terminal cities.

On account of the foregoing it is expected that the lamps will be operated under better conditions than are usually obtainable by electric roads, and that the lamps will neither be strained at times, nor at other times be run materially below normal.

In order to obtain a satisfactory light for reading and at the same time give a reasonable general illumination, 16-candlepower lamps are placed over each seat, being on small brackets extending slightly toward the center of the car from the inside of the lower portion of the deck sash. The lamps hang vertically, and each bracket is provided with a holo-phane shade, designed to give a uniform illumination three feet from the floor. For reading purposes it is of course desirable that the light should be thrown on the printed page



Washington Baltimore & Annapolis—Floor Plan of 60-Foot Limited Car.

operating such cars in trains, which trains may consist of trailers in addition to two or more motor cars.

It was also decided not to have a side compartment for the smoker, but, as is the usual practice, to have same extend entirely across one end of the car. Such arrangement of the smoking compartment for double-ended cars is ordinarily very inadvisable, as when such compartment is at the rear end of the car, passengers for the general compartment must pass through same, but this will not be necessary, because of the operating conditions described.

Seating Plans.

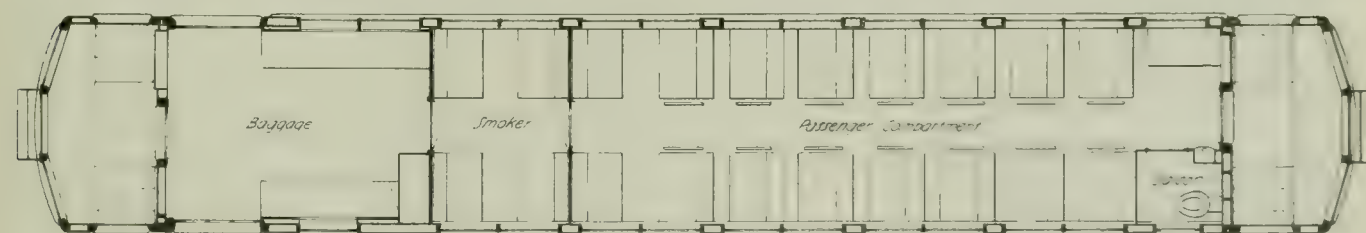
Owing to the high character of service which must be provided in order to compete with the steam railway service,

and the minimum amount of light from other sources reach the eye. This is especially true as to the direct rays from the source of light, but it is also true as to light reflected from sources other than the printed page; therefore, the design is intended to give a satisfactory reading light with sufficient general illumination to produce a pleasing effect without glare.

The floor of the car is covered with Greenwich, English, linoleum. The roof of the car is covered with copper and grounded to the trucks.

Wheel Trolley for 6,600 Volts.

The earlier design contemplated pantagraph trolley for alternating current and 2-wheel trolleys for direct current, these being placed at the rear end of the car; two being re-



Washington Baltimore & Annapolis—Floor Plan of 57-Foot Local Car.

and also owing to the fact that these cars will be for through service, especial attention has been paid to comfortable seating, the seating arrangement being the starting point in the design of the cars. The seat spacing is unusually liberal. The seats are long, with arm rests and high backs. Considerable aisle width will not be necessary for the character of service contemplated, whereas, if such service were for short rides and frequent stops, shorter seats, less knee room, no arm rests and wider aisles would be preferable.

Lighting.

Especial attention has been given to the artificial lighting. Owing to the fact that the trolley wire voltage is 6,600 and the Washington Baltimore & Annapolis main line is double track 80-pound rail, the line voltage over the entire alternating-current portion of the system will undoubtedly be comparatively uniform and constant. Also the direct-current voltage will be higher and more uniform and constant than is

quired, because within the District of Columbia rail return is not allowed, and one wheel only being used when in Baltimore. Decision to use double-ended cars necessitated placing two trolley wheels at each end, and the car was designed to also carry a pantagraph, but owing to results obtained by the use of trolley wheels on alternating-current roads, it was decided not to place the pantagraph at present, and to ascertain the results obtainable with trolley wheels and to await the development of the most satisfactory form of pantagraph.

Because of the foregoing one trolley base at each end of the car has been insulated for high voltage, and later, if a pantagraph should be installed, such trolley will be useful for emergencies, in addition to being in regular use when within the District of Columbia.

Dimensions of High-Speed Cars.

The general dimensions of these cars are as follows: Length of the body over corner posts, 51 feet 1 3/4 inches;

length over spring buffers, 62 feet 2 $\frac{3}{4}$ inches; length smoking compartment, 12 feet 7 $\frac{5}{8}$ inches; length general compartment, 38 feet 6 $\frac{1}{8}$ inches; width car body, inside, 8 feet $\frac{3}{4}$ inch; width over all, 9 feet $\frac{3}{4}$ inch; height from bottom of side sill to top of monitor roof, 9 feet 6 inches; height from rail to top of monitor roof, 13 feet $\frac{1}{2}$ inch; limited by an undergrade crossing.

The general plan comprises two end platforms with doors and steps on each side of same, and with a toilet room adjacent to the vestibule of the main compartment, and with a seating capacity of 50 in such compartment. The smoking compartment has a seating capacity for 16, and in one corner of this compartment is placed the high-tension cabinet, which contains protective and selective apparatus for the motor control circuits.

Detail Design.

The detail design of the car is as follows: Platforms are on through sills, the floor being flush with the floor of the car. The side sills are 5 by 7 $\frac{3}{4}$ inches, bolted to $\frac{5}{8}$ by 7 $\frac{3}{4}$ inch steel plate and 1 $\frac{3}{4}$ by 6 inch subsill. The center and intermediate sills are 6-inch 12 $\frac{1}{4}$ -pound steel I-beams, with 2 $\frac{5}{8}$ by 6 inch fillers. The window arrangement is shown in the illustration.

The ceiling is the full empire type. The interior finish is mahogany, the design being intended to furnish an exceptionally rich and attractive appearance with minimum of projections to catch dirt and designed to conceal shrinkage openings at joints.

The reversible seats are the Hale & Kilburn Manufacturing Company No. 199 EE, pressed steel oval pedestal, wall and aisle ends and arm rests. The length over all of the seats is 38 inches, the cushions being 18 inches wide, with spring edge; the backs being corrugated with head roll 26 inches high and provided with grab handles. All upholstery is in green leather.

The curtains are pantasote, with Curtain Supply Company's Forsyth No. 88 fixtures, and the window fixtures are O. M. Edwards & Co.'s 7 $\frac{1}{2}$ D1. All glass for side and end windows and doors is plate, and the glass for the Gothic side and deck sash is cathedral. The Gothic frames are coppered zinc.

The cars are equipped with Crouse-Hinds Type A alternating-current-direct-current headlights, Dayton Manufacturing Company's No. 8 gravity water closets, Ham air sanders, Edwards trap door fixtures, Dayton Manufacturing Company's Rex individual parcel racks, Knutson No. 2 trolley retrievers, Royal fire extinguishers, Adams & Westlake No. 187 signal lamps and Peacock Type C hand brakes. The Wallace Supply Company furnished most of the bronze trimmings.

The trucks are Baldwin 90-40 M. C. B. type, with 7-foot 6-inch wheel base, weighing 14,900 pounds each. The wheels are Standard Steel Works steel tired, with cast-steel centers and are 37 $\frac{1}{2}$ inches in diameter, each weighing approximately 1,000 pounds, tires 2 $\frac{1}{2}$ by 5 $\frac{1}{2}$ inches, 4 $\frac{1}{4}$ -inch tread, 1-inch depth of flange and 1 $\frac{1}{4}$ -inch thickness of flange. The axles are 6 $\frac{1}{2}$ -inch diameter, 7 $\frac{1}{2}$ inches at gear seat, the journals being 5 $\frac{1}{2}$ by 10 inches. The center and side bearings are Baltimore Ball Bearing. The journal boxes are The T. H. Symington Company M. C. B. The brakes are inside hung, shoes and heads M. C. B. type. The brakeshoes are American Brake Shoe & Foundry Company's "Diamond S."

The air brake equipments are Westinghouse Traction Brake Company's A. M. M. type automatic, as to the braking mechanism, the General Electric Company furnishing the motor-driven compressor C. P. 52, governor M. B. and wiring. The Westinghouse Traction Brake Company also furnished the automatic air couplers. The drawbars are Gould No. 65 M. C. B. head.

The weight of the car body is 40,000 pounds and total weight of the fully equipped car is 97,200 pounds.

The electrical equipment of each car consists of four G. E.

alternating-current motors, each rating at 125 horsepower. Each motor weighs approximately 5,800 pounds, and the auxiliary equipment per car weighs about 14,000 pounds. Under and to one side of the car is placed a commutating switch for changing from alternating-current single to direct-current double trolley, or vice versa, at the District of Columbia line, being required because of the use of double overhead trolley within the district. Selective switches are provided to change automatically from alternating-current to direct-current operation, or vice versa at the end of private right of way in Baltimore.

Nineteen cars of the above type have been provided.

Local Cars.

The local cars, four in number, are of the same general character of construction as the through cars, but are 54 feet 11 $\frac{1}{8}$ inches long over bumpers, and the body is divided into three sections—general passenger, smoking and baggage and express compartments. As these cars are slightly lighter and are equipped with only two motors the weight is 73,600 pounds.

As these cars will make a large number of stops, consequently not only the schedule, but also the maximum speed will be materially less than for the through cars, and each car is equipped with two motors of the same rating as those used for the through cars. It is expected that for the greater portion of each day 15-minute headway will be required for through service, but only possibly 2-hour headway for local service.

In addition to the above cars two box car type locomotives will be furnished, the electrical equipment for each being four motors, with same rating as for the passenger cars, and geared for the same speed as the local cars.

These cars have two sliding doors on each side, and also end doors to permit loading of theater scenery.

The general dimensions of these cars are as follows: Length over buffers, 56 feet 8 inches; width over all, 9 feet $\frac{3}{4}$ inch; height from bottom of side sills to top of roof, 9 feet 4 inches.

In addition to the above flat cars, box cars, etc., are provided for general purposes. The Niles Car & Manufacturing Company, Niles, O., is furnishing all the motor cars above described from plans and specifications prepared by the Roberts & Abbott Company, engineers.

The president of the Washington Baltimore & Annapolis is George T. Bishop, Cleveland, O. The syndicate managers are George T. Bishop and John Sherwin, president of the First National Bank, Cleveland, O. The vice-president and general manager is J. N. Shannahan, Baltimore, Md.

The New Haven's Trolley System.

An official statement issued at New Haven recently shows that the Connecticut Company, which is a holding corporation for the New York New Haven & Hartford Railroad Company, now operates 640 miles of street railways in Connecticut, of which 411 miles are owned and 229 miles leased. It serves in the state 15 cities and 35 towns, besides five towns in New York state. The Rhode Island Company operates 311 miles of street railway lines, of which 44 miles are owned and 267 miles leased. It serves in Rhode Island three cities and 13 towns. The two companies together operate 950 miles of street railways and have an equipment of 2,637 cars, of which 37 are express cars. The number of express cars is soon to be greatly increased and the express business expanded. Along with that business a large development of freight business is also planned, working in connection with the steam system of the New Haven railroad company.

The tenth biennial convention of the Amalgamated Association of Street and Electrical Railway Employees of America has been in session during the past week at New Orleans.

INCREASED FACILITIES FOR FUNERAL CAR SERVICE IN CHICAGO.

The funeral car service which the Metropolitan West Side Elevated Railway Company, of Chicago, started in June, 1905, and which was described in the Street Railway Review of July 15, 1905, page 447, has steadily increased in popularity

At first it was thought that elevators would have to be provided for raising the casket from the street to the elevated platform, and two stations were thus equipped, but since that time many funerals have been easily handled from stations not provided with elevators and the necessity for providing them is not apparent. When the funeral is a large one and calls for more than the funeral equipment readily available.



Chicago Funeral Cars—Exterior of Metropolitan Car.

until at the present time six cars are equipped for this service. When the first car was put into service it was with a good deal of doubt as to its ever becoming generally used; but from time to time it has been found necessary to increase the equipment adapted to this class of service. In the first car equipped portieres were put across one end of the car and the casket taken in through an extra wide window which was

regular motor cars are stripped of their advertising signs and attached to the funeral train. Under the present arrangements funerals are handled from any station reached by the Metropolitan trains and taken to practically any cemetery on the system or on the Aurora Elgin & Chicago Railroad, the usual time being two hours for a round trip. Nearly all the funerals are handled by one crew especially chosen for



Chicago Funeral Cars—Exterior of Aurora Elgin & Chicago Car.

provided with hinges. The only other change necessary was the addition of trolley poles, making it possible to operate over lines not equipped with the third rail. When the service was first started only two of the cemeteries could be reached by these cars, but tracks have since been built, so that practically all of the cemeteries in the district served by the Metropolitan and the Aurora Elgin & Chicago can be reached

this work. The minimum rate for funeral car service is \$15. When the funeral train is composed of more than one car the charges are \$15 for the first car and \$12.50 for each additional car. The new car will be chartered for \$25. Trains are often made up of two, three and five cars; and in one instance a 10-car train was necessary. This funeral was handled as one train until the cemetery was reached when the train

was broken up to facilitate unloading. About 22 funerals per week are handled at present.

The funeral car service is under the direction of a funeral bureau jointly maintained by the Metropolitan West Side Elevated Railway Company and the Aurora Elgin & Chicago Railroad. As practically all of the traffic is handled over

to Bellwood station at the junction with the main line, but on holidays and Sundays solid trains are run from the Fifth avenue terminal in Chicago direct to Mt. Carmel, 15 miles.

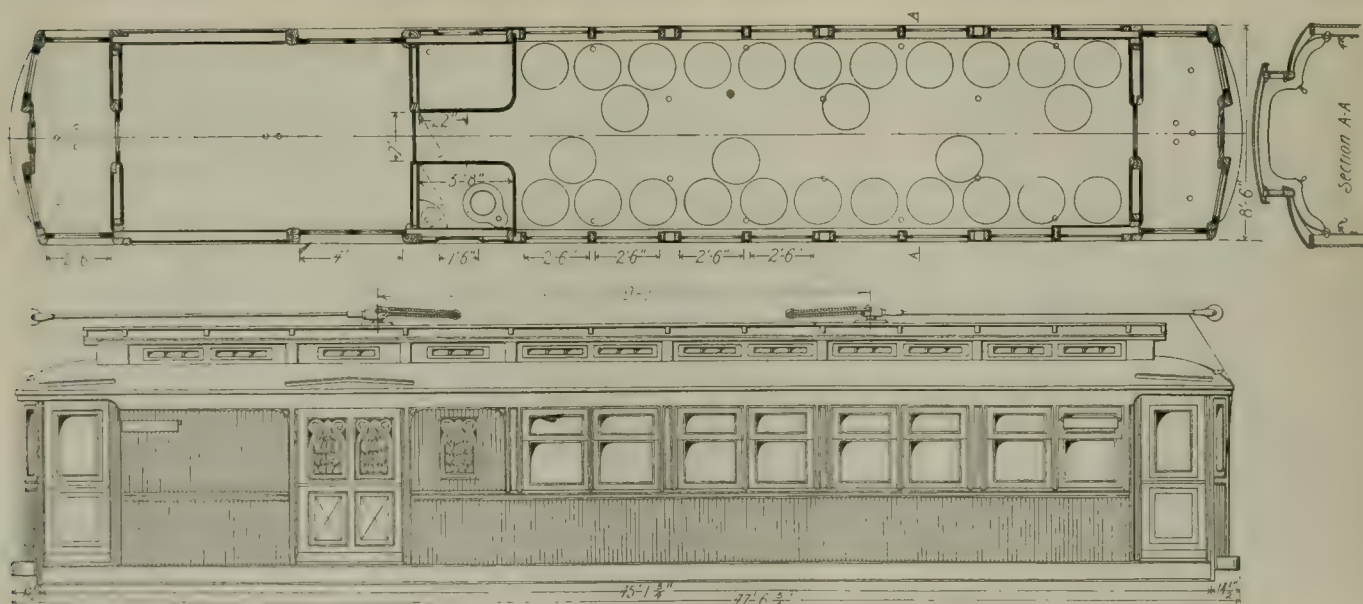
To meet the growing traffic the Metropolitan recently designed and had reconstructed at the shops of the Pullman Company a funeral car adapted to the needs of the service



Chicago Funeral Cars—Terminal Building at Mt. Carmel Cemetery.

part of both systems, this arrangement is found to be very satisfactory. In order to give proper facilities at Mt. Carmel cemetery the Aurora Elgin & Chicago Railroad built a branch nearly two miles long to reach the cemetery, this extension passing Oak Ridge cemetery, which is about half a mile from Mt. Carmel. At the cemetery terminal a station of artistic design was erected. This building has walls of cement on

as they appeared after two years' operation. The accompanying halftone engravings give a general idea of the interior and exterior appearance of the car. The zinc etchings from line drawings show how the various details are worked out. The car itself is 47 feet 6 $\frac{1}{4}$ inches over bumpers and 45 feet 1 $\frac{3}{4}$ inches over the vestibules. The car is divided into two compartments. The compartment reserved for caskets, at



Chicago Funeral Cars—Floor Plan and Elevation of Metropolitan Car.

steel lath. It contains a dining room, a commodious waiting room and a ticket office. The platform is long enough to accommodate four cars, thus, with an additional smaller platform, giving excellent unloading facilities. The accompanying halftone gives an idea of the architectural style of the terminal building, which was built at a cost of \$5,500.

During week days a shuttle car operates from Mt. Carmel

one end of the car, is 11 feet long and is provided with a sliding door four feet wide at each side of the car. A sliding door separates the casket compartment from the vestibule. The car is provided with sufficient accommodation for 32 people. Between the main compartment and the casket compartment are located a lavatory and a storage closet. There is a sliding door between the casket and the main

compartments. In the vestibule are found the usual sliding doors of the type used on all of the newer Metropolitan cars with the exception that these doors are hand operated instead of having pneumatic control.

The finish of the car throughout is in polished weathered oak inlaid with narrow strips of black and light yellow. The floor of the main compartment is covered with a finely figured green carpet and the floor of the casket compartment is covered with green linoleum. The ceiling is painted a very light yellow. All the door and window hardware is of statuary brass finish. The general color scheme is quiet and pleasing. The main compartment is heated by Consolidated Car-Heating Company electric heaters placed along the floor at the sides of the car. It is provided with 28 rattan chairs, the style of which is shown in the accompanying illustration.



Chicago Funeral Cars—Interior of Metropolitan Car.

The car is lighted by 25 incandescent lamps having frosted globes.

The equipment of the car is the same as that for all Metropolitan motor cars. The motor truck is equipped with two 160-horsepower motors with 34½-inch wheels on a 6-foot 6-inch wheel base. The trailer truck is provided with 31¼-inch wheels on a 5-foot 6-inch wheel base, the trucks being 33 feet 7 inches apart on centers. The Westinghouse system of multiple-unit control is used. The car weighs approximately 32 tons.

The Aurora Elgin & Chicago Railroad funeral car is entirely different from the previously described Metropolitan funeral car, although it is used in the same service and will often be run in connection with the Metropolitan cars. It is a standard car remodeled in the shops of the Aurora Elgin & Chicago Railroad to suit the requirements. This car is painted black with green trimmings and the words "Funeral Car" appear in gold letters on the side panels.

The casket compartment accommodates two caskets and is built with its floor at the window sill level. The interior of the compartment closely resembles that of a hearse, in that the same nickel-plated rollers and stop pins are provided, and two doors opening down are provided with rollers to facilitate placing a casket in the car. These openings are practically square and will accommodate a casket up to 32 inches wide.

Directly back of the casket compartment is the mourners' compartment. A leather seat extending the full width of the car accommodates five people and wicker chairs with leather upholstered cushions will seat six people. Next to this partition is the standard lavatory found on the cars of this road. The main compartment has seating accommodations for 30 people. At present walkover type rattan seats are used. The finish of this car is baronial oak inlaid with neat marquetry. The ceiling is painted a light yellow. This car will be provided with regular Metropolitan electrical equipment.

PIPING AND POWER STATION SYSTEMS—LVII.

BY W. L. MORRIS, M. E.

No one feature of station operation causes so much water to be carried into steam lines as high water in the boilers. As soon as engineers realize that feed regulators do more than save trouble for the fireman, they will use them as they would a damper regulator, to save cost of operation, and then the ever-repeating difficulties arising from high and low water will almost entirely be eliminated. Regulators are now in the market which do not require floats and have an excess of power available to handle feed valves. The amount of attention required to keep them in good order is small compared with the labor of constantly watching the water level and regulating the feed valves. By using feed regulators it is possible to carry a much lower water level, thus insuring drier steam and imposing less work on the drip line. With a uniformly low water level it is nearly impossible for boilers to throw any great quantity of water. Where the boiler water is bad, carrying the water level low considerably reduces the danger of water being carried over into the steam line.

It is well to remember that superheat will remain in the steam only when the steam is handled at high velocity—6,000 to 10,000 feet per minute. If the steam velocity is low, even with a superheat of 200 degrees, all or part of this will be lost before the engine cylinder is reached. This condition calls for special consideration in the design of steam lines, as follows:

1. The steam lines should be as short as possible.
2. The size of the pipe should be small to reduce the radiation losses so that they will be approximately the same as frictional heat losses.
3. The line from the boiler to the engine should be free from abrupt turns.
4. Such portions of the steam lines as carry steam moving at a low velocity should be provided with drip connections.
5. Large receivers, separators, etc., should not be used.

Where drip connections are necessary, the best method is to have small pockets in the Y-fittings and take the steam from these pockets to a drip separator and from the drip separator to the auxiliaries, as shown in Figure 327 (Q 1-2).

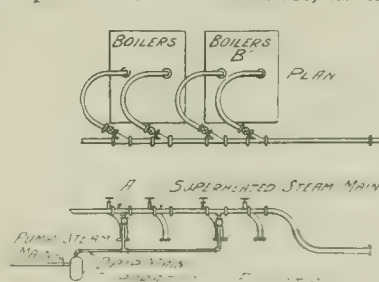


Figure 327 (Q 1-2).

Ordinary Y-fittings are objectionable, but as they offer much less resistance to steam flow their use is desirable for superheated steam. The boiler branches should have long bends and no elbows, because the friction of one 5-inch, 90-degree elbow is about the same as that of a full length of a 5-inch pipe. In Figure 327 it will be noted that water cannot lie in the end of a steam main, as shown at A, when boilers B are alone in operation, because steam is flowing to the auxiliaries at all times.

In regular operation there will be little or no drip to care for in the arrangement shown in Figure 328 (Q 1-2), but when starting a plant with no steam flowing to its steam machines there will be as much drip as though superheaters were not used.

Class Q 2—Steam Drips from Separators.

Nearly all separators include some method of diverting the flow of the steam and rely for separation upon the inertia of the heavy particles to cause them to leave the steam at the point where flow is diverted. This form of separator is shown in Figure 328 (Q 2-1) as No. 1 and No. 2. The area of discharge is maintained practically the same through the separator as in the pipe itself. Another method for obtaining like result is to decrease the flow in the separator and allow

the condensation to drop out, as shown in No. 3, Figure 328. This requires an extremely large device. A very efficient separator is one in which the principles of these two are combined. No. 4 and No. 5 show different types embodying this idea. No. 4 takes up about three times the space of No. 5 and the velocity of the steam at the turn is one-third greater. The area of the steam passage in No. 5 is 14 times the area of the pipe. No. 5 has the advantage that the resistance of the separator is immeasurable on account of its large port area. The steam is divided into thin films as it makes the turn, and the condensation has the least possible distance to travel to get out of the flow. As the separator is relatively small in size it can be very easily and favorably located.

In laying out a drip system some method should be provided so that this pure water of high temperature will not

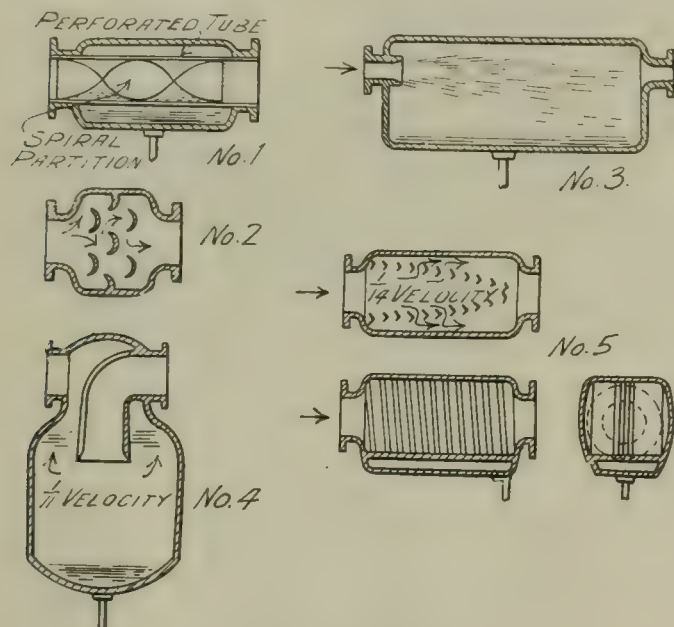


Figure 328 (Q 2-1).

be wasted to the sewer. The usual method of discharging this condensation into the heater is not generally economical. If an economizer is used it will be best to discharge the drips directly into the boilers, as was shown in Figure 36.

Class Q 3—Steam Drips from Boiler and Engine Branches.

Various forms of boiler branches are shown—Figures 78 to 88. The different engine branches as shown in Figures 74 to 77 usually require drains. These drains can nearly always be connected with the sewer and should be closed except when starting up.

Class Q 4—Steam Drips from Auxiliary Steam Main and Gravity Return.

If the auxiliaries are placed far from the main steam line it is necessary to put in an auxiliary steam main. In some installations auxiliaries are operated at a lower pressure, making use of a reducing valve necessary. A usual method is to locate the auxiliary main in such a way that the drips from the main steam header will flow to the auxiliary main and thus work through the pumps and other devices where water can do no particular harm. Figures 40, 41, 42 and 44 show these different systems. In Figure 40 all the drips are shown as collected in a drip main and delivered to an elevated receiver or separator, which discharges its drip back to the boiler and by gravity and the steam to the auxiliary steam main. Figures 41 and 42 show a large-sized auxiliary main, which takes the steam from the various drip pockets to the steam header. The auxiliaries take their steam from the top of the auxiliary main and the condensation flows into an automatic drip receiver and pump, which returns the drips to the boilers. In Figure 44 an overhead receiver-separator is used.

Figure 329 (Q 4-1) shows the general arrangement of this overhead receiver-separator. The connection to this separator is made at a low point in the drip main to insure regular working conditions. It is necessary to take a small amount of steam from this overhead separator, which may be used for a heating system, or, if economy is to be disregarded, may be discharged to the atmosphere. A large flow, however, would maintain the pressure in various parts of the system that would somewhat simplify operation.

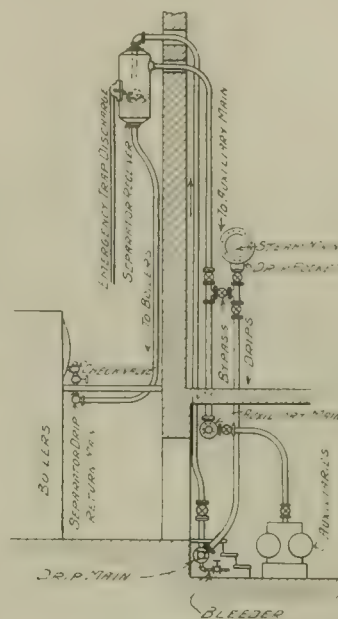


Figure 329 (Q 4-1).

Where there are numerous drip pockets which drain a common drip main they are likely to be of different heights, producing different pressures. The pockets which are under lower pressure will then have sufficient head in the drip branch so that the weight of the column of condensation will exceed this pressure difference, thus insuring a discharge even with the lower pressure branches. For instance, the reheating coil in the low-pressure receiver may have five pounds pressure at its drip discharge and it may be located within a foot of the basement floor; there are two means of removing such drips, the simplest being to pass the highest pressure drips through the coils and in this manner make them all low-pressure drips. The other method is to use a float-operated resistance in the high-pressure drip pockets, thus causing a decrease in pressure in the drip branch as soon as condensation is discharged, and permitting the low-pressure drips to discharge.

Referring to Figure 329 it will be noted that a trap discharge is provided for receiver-separator, this trap operating only when the water in the receiver rises above a certain level. This water line can rise, when all boilers are shut off from the return drip system and also when there is no flow of steam to the auxiliary main. Whenever the riser to receiver-separator fills with water the weight is increased until it becomes heavier than the column to the boiler; then the water ceases to return to the boiler, the steam condenses in the overhead receiver, the water level rises and discharges water from the trap. No water passes the boiler check valves until steam again flows to the auxiliary main.

In practice there is always a feed pump running and this alone is sufficient to operate the drip return system. The amount of steam required for the feed pump is about the same as the amount of condensation. Many drip return systems are operated by allowing the steam to waste to the atmosphere at the drip receiver, the amount required being about one-twentieth of 1 per cent of the steam generated. In practice a greater loss is necessary to insure the successful handling of drips when the boilers are throwing over water. It is to insure an abundance of steam to raise the drips without an accompanying loss that steam from the drip receiver is delivered to some piece of steam apparatus in constant operation. Instead of using the trap to discharge from an overhead receiver, a pressure relief valve can be used, opening and relieving the steam pressure whenever there is no machinery using steam. This type of drip return is more satisfactory than any pump return drip system and is being extensively employed.

(To be continued.)

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Care Required When Road is Blocked with Snow and Cars Behind Time.

Jenison v. Rhode Island Suburban Railway Company, 67 Atlantic Reporter, 367.—The supreme court of Rhode Island holds that more than ordinary care was imposed upon the railway company at a place where the road was so blocked with snow as to render it practically impassable for teams, except along the track. The company, knowing this, should have proceeded very cautiously when running over this part of the road, where it might have expected to meet or overtake loaded teams. And this duty was more imperative the car being behind time.

Duty to Give "Fair" Chance to Board Car Does Not Begin Until It is stopped.

Schwartz v. New York City Railway Company, 105 New York Supplement, 1.—The supreme court of New York, appellate term, holds that an instruction was erroneous from which the jury were justified in drawing the inference that the defendant was negligent in not bringing the car to a stop, so that the plaintiff might have "a fair and reasonable chance to get aboard the car." It says that the duty, which the justice declared the defendant was under, did not arise until the car had been brought to a stop or the plaintiff had been invited to board it.

Injury from Foul Ball to Passenger on Car Stopped Near Ball Field.

Reid v. Rhode Island Company, 67 Atlantic Reporter, 328.—The supreme court of Rhode Island says that it was necessary to stop a car on which the plaintiff was a passenger on a certain street until a certain hour to permit another car to pass. On this occasion, instead of stopping the car at the usual place, which was further down the street, the conductor stopped the car directly opposite the home plate of a ball field, where a game of baseball was in progress, as it appeared from his own evidence, that he might watch the game. Two or three minutes after the car was stopped a foul ball struck the head of the plaintiff, who was sitting in the car with her back to an open window, and injured her more or less severely. The court overrules exceptions to a verdict in her favor for damages for the alleged results of the blow.

Validity and Operation of Agreement for Arbitration Between Companies Demanded by Mayor.

Chester City v. Union Railway Company of Chester, 66 Atlantic Reporter, 1107.—The supreme court of Pennsylvania says that when the city granted to this company a franchise the ordinance reserved the right to grant permission to any other railroad company to run over the tracks of this company on a certain avenue. When this ordinance was presented to the mayor he declined to approve and sign it until this company had agreed to a plan for arbitration of any dispute with such other company, a formal agreement therefor being executed by this company and the mayor and city clerk on the same day the ordinance was signed by the mayor and became effective.

In this case the company claimed that the agreement for arbitration, not being part of the ordinance, was not binding on it, and that, even if it were, the agreement of submission was revocable. Neither claim could be sustained. Whether the mayor of the city had any authority to impose conditions of consent additional to those called for in the ordinance itself was a question that did not arise. The company agreed to them. The city was not under any obligation to grant the use of its streets at all, and did so only by virtue of the

ordinance. The ordinance became valid by the mayor's approval, and his approval was in consideration of the agreement for arbitration. That agreement was, therefore, part of the consideration for the city's consent, and binding on the company.

Nor could the company's claim of the right to revoke the agreement of arbitration be sustained. While such agreements are in general unfortunately under the ancient precedents held revocable, yet, while they are part of the condition of the municipal consent, the corporation takes the consent cum onere (with the burden), and cannot thereafter revoke or repudiate any part of the condition.

But the failure of the arbitrator appointed by this company to come to an agreement with the arbitrator appointed by the other company as to the third did not empower the city to declare a forfeiture of its franchise. If the company or its arbitrator was acting in bad faith, and his failure to agree on a third arbitrator was a mere device to escape substantial compliance with the agreement, that fact should have been judicially established by a bill in equity or other proceeding. It could not be assumed by the adverse party and action taken on that assumption.

Furthermore, the city was not a party aggrieved. It had exercised its reserved right and had no further legal interest in the matter. The party aggrieved, if the action of this company or its arbitrator was in bad faith, for the purpose of defeating an apparent compliance with the agreement for arbitration, and therefore the party to ask for remedy, was the grantee of the second franchise which was thus interfered with.

May Acquire Existing Roads Whether Legally Operated or Not.

Mayor, etc., of Jersey City v. North Jersey Street Railway Company, 67 Atlantic Reporter, 113.—The court of errors and appeals of New Jersey holds that the traction companies act of that state of March 14, 1893, authorizes companies incorporated thereunder to acquire and operate actually existing street railways, whether or not they are at the time being operated with legal authority. The constitutionality of the act was attacked upon the grounds: (1) That the act delegates to the owners, lessees, or operators of a street railway, whether legal or not, the power of creating a franchise to operate it perpetually, a power which the legislature alone can exercise; (2) that it violates the constitutional provision against private, local, or special laws granting an exclusive privilege, immunity or franchise, or granting the right to lay down railroad tracks. But the court holds that section 1 of the act, embodying the authority above referred to, is a constitutional enactment.

Right to Transfer as Between Long and Short Service Cars.

Baron v. New York City Railway Company, 105 New York Supplement, 258.—The supreme court of New York, appellate division, first department, holds that Section 104 of the New York railroad law, requiring companies which have entered into contracts with other companies for the use of their roads to give transfers, relates only to railroad companies that have entered into contracts or leases with other roads to insure a continuous passage from a point upon one road to a point upon the other road embraced in the lease or contract. The right of a passenger to a continuous trip over a road owned or operated by a railroad company, when no contract or lease has been entered into between such railroad company and others operating other railroads, does not come within this section. It does not require the giving of a transfer from a short-service to a long-service car. But under Section 101 of the railroad law it is the duty of the company to transport for a single fare a passenger whose fare is accepted on any car to any point upon its line reached by cars running in that direction, regardless of whether or not the car boarded by the passenger is a short-service or a long-service car.

News of the Week

Railway Commissioners Consider Electric Railway Accounting.

At the annual convention of the National Association of Railway Commissioners, held at Washington, D. C., on October 8, the report of the committee on "Construction and Operating Expenses of Electric Railroads," offered by W. O. Seymour of Connecticut, chairman, was considered. The burden of his report was that the committee could find no way at the present time to harmonize the methods of accounting practiced by steam and electric roads, as each appeared to be satisfied with its own system. The committee asked to be discharged from further consideration of the matter. W. F. Ham of the American Street and Interurban Railway Accountants' Association said he wanted to invite the various commissioners to attend the meeting of that association next week at Atlantic City, and in case they could not do so that at least their accounting officers be sent in the hope that some good might come out of it. Mr. Decker of New York thought the work of the committee ought not to be called finished. It was too important a matter to be given up without further effort, and although he moved the adoption of the report, he trusted something would be done to keep at it until some form of harmony was established between the accounting systems of the two kinds of roads. Mr. Kilpatrick of Illinois saw a great difficulty in accomplishing anything in this direction on account of the fact that many electric roads were engaged in selling light and power in addition to acting as common carriers. With the understanding that another committee would be named to make another attempt to solve the riddle, the report offered by Mr. Seymour was adopted.

New York Public Service Investigation.

The investigation of the New York street railway corporations by the New York public service commission of the first district has been confined during the past two weeks principally to the financial aspects of the Interborough-Metropolitan merger and particularly to the accounts of the Metropolitan Securities Company.

L. E. Quigg, who, as reported in last week's issue of the Electric Railway Review, testified before the commission with regard to his employment by the Metropolitan Street Railway and later by the Interborough-Metropolitan to "accelerate" public opinion in the company's interest, continued his testimony on October 3. He said that he was responsible for the appearance before the commission of various organizations of the Bronx who advocated the third-tracking of the Second and Third avenue elevated lines, and that he had caused the organization of the committee of 100, which had been so prominent in demanding certain transit changes. He said he had employed men to effect these organizations and that large numbers of citizens had appeared before the board who had been paid for doing so. He also testified with regard to his work for the company before the legislature at Albany, the expenses for which had been charged to construction account. In some of the movements with regard to which he had constructed or accelerated public opinion he had changed sides after the Interborough-Metropolitan merger and had advocated certain changes that he had previously opposed as a representative of the Metropolitan Street Railway.

Edward P. Healy, a republican district leader, and James L. Wells, formerly president of the tax board, were named by Mr. Quigg as his assistants in the work. Mr. Quigg stated that the petition signed by 1,000,000 people, asking that no contract for subways be let without a provision for transfers to the surface lines, which he had circulated in the interest of the Metropolitan company, was never presented to the rapid transit commission because the merger had removed the Metropolitan's desire to build subways. He said he had been opposed to the Elsborg bill, but had taken no action against it, as Paul D. Cravath, general counsel for the Interborough-Metropolitan "thought they had better let it pass."

At the hearing on Monday of this week the principal witness was John B. McDonald, vice-president of the Interborough-Metropolitan Company. Mr. McDonald presented a copy of an agreement entered into on March 16, 1905, between himself and Thomas F. Ryan, E. J. Berwind, A. N. Brady, P. A. B. Widener and N. B. Ream, by which he was to attempt to secure the consent of the rapid transit commission for the building of certain subways, while the syndicate was to furnish the funds to the amount of \$55,000,000. Mr. Ivins then read a letter from H. H. Vreeland, T. P. Fowler and J. D. Crimmins to the directors of the New York City Railway stating that Mr. McDonald was to see to it that as far as possible the subway stations should be built at points where transfer to the surface lines would be of advantage. An agree-

ment was then made between Mr. McDonald and the Public Service Corporation of New Jersey, dated December 15, 1905, to the effect that each party to the agreement was to subscribe to \$5,000,000 of the bonds of the Interstate Tunnel Railway Company, which was to build two tunnels between Manhattan and New Jersey in the interests of the Metropolitan Street Railway and the Public Service Corporation. Mr. McDonald stated that on account of the opposition of A. J. Cassatt, then president of the Pennsylvania, the scheme was blocked and the agreement between Mr. McDonald and the Metropolitan was canceled by another agreement under date of January 21, 1907, by which Mr. McDonald was paid \$100,000 for his work, including expenses. In return Mr. McDonald was to give up all claims under the agreement. Another agreement between Mr. McDonald and the Metropolitan on January 21, 1906, canceled the former agreement and Mr. McDonald was given \$150,000 for his services and to meet expenses. The \$250,000 thus paid Mr. McDonald is carried on the books of the Metropolitan Securities Company as an asset in the account of property and franchises. Mr. McDonald said that the merger probably put an end to subway competition. He had not known of the merger until it had been consummated. He was later made a vice-president of the Interborough-Metropolitan Company, with a 5-year contract, at a salary of \$50,000 a year, to take charge of the construction of new subways should they be built, but he said he was not doing any work.

On October 8 Anthony N. Brady testified that in 1902 he had sold to W. C. Whitney, in behalf of the Metropolitan Securities Company, the franchises and securities of the Wall & Cortlandt Street Ferries Railroad. He understood he was to be paid \$250,000, the cost of the property to him, but had received in payment a check from the Metropolitan company for \$965,607, with instructions from the company's lawyers to keep the \$250,000 and send the remainder by personal checks to Thomas F. Ryan, W. C. Whitney, P. A. B. Widener, Thomas Dolan and William L. Elkins, directors of the Securities company. The \$965,607 was entered on the books of the company in the property and franchise account, and according to Mr. Brady's evidence the difference between that amount and the \$250,000 paid to him represented the profit to the men who had engineered the deal.

E. W. Sayre, treasurer of the Metropolitan Securities Company, and Marvyn Scudder, accountant for the commission, were next put on the stand and testified with regard to the company's accounts, showing that large checks had been drawn at various times by Thomas F. Ryan and H. H. Vreeland, without vouchers, which were still charged to the suspense account. Mr. Vreeland was said to have received \$300,000 above his salary for expenses since 1898, \$185,000 of which was unaccounted for.

On the following day Mr. Sayre testified that Mr. Ryan had guaranteed \$20,000 toward the fund raised by the National Civic Federation for the purpose of sending a commission abroad to study the workings of municipal ownership and that \$15,000 of this amount had been paid through Mr. Sayre under Mr. Vreeland's orders by the Metropolitan Securities Company and charged to miscellaneous expenses.

At its meeting on October 4 the public service commission passed a resolution which is designed to put an end to such methods of accounting as have been practiced by the Metropolitan Street Railway, as revealed by various witnesses in the investigation conducted by Mr. Ivins. The resolution provided for the appointment of Commissioner Willcox as a committee of one to consider the feasibility of having the accounts of all public service corporations thoroughly audited by accountants to be employed by the commission, in order to prevent improper methods of charging expenditures.

Des Moines Owl Car Ordinance Passed.—The Des Moines city council on October 7 passed an ordinance requiring the Des Moines City Railway to operate owl cars on an hourly schedule on all of its lines between 1 and 5 a. m., charging a 5-cent fare.

New Haven Electric Service Extended.—The New York New Haven & Hartford Railroad on October 5 extended its electric service out of New York as far as Stamford, Conn., the eastern limit of the electric zone. Six local trains will be run at first, but the service will be extended until all the passenger trains are propelled by electricity.

"Ambulance Chasers" Prosecuted in Philadelphia.—The initial step in the campaign which the Philadelphia Rapid Transit Company has undertaken against lawyers, physicians and other "ambulance chasers," who have been bringing fraudulent damage suits against the company, was taken on October 8, when John F. Carson, a lawyer's clerk, was arrested and charged with conspiracy to defraud the company and with hunting up unjust suits and claims. He was held on \$1,000 bail for a hearing Saturday of this week, when three

others, said to have been associated with him, and for whom warrants have been issued, will also be arraigned. At the hearing it was shown that Attorney Scott, by whom Carson is employed, has handled 201 cases against the company this year, and Carson is said to have been the principal agent in securing the cases. He was formerly an inspector in the employ of the company.

Brooklyn Rapid Transit Company to Increase Service.—The Brooklyn Rapid Transit Company on October 1 put into effect a new schedule which greatly increases the service on some of its lines. On the Bath Beach and West End line all trains which have in former winters stopped at Ulmer Park will now run through to Coney Island. Additional cars will also be run on the lines to Bay Ridge and Borough Park. The additional trains will stop on the Brooklyn side of the Brooklyn bridge.

San Francisco Bribery Case.—A. M. Wilson and M. W. Coffey, former members of the San Francisco board of supervisors, were indicted by the grand jury on October 1 on charges of having accepted bribes to vote in favor of the overhead trolley franchise for the United Railroads, which was passed on May 21. Tirey L. Ford, general counsel of the United Railroads, Abraham Ruef and another supervisor are mentioned as having been wholly or partly responsible for the bribe. Wilson is said to have received \$10,000 and Coffey \$4,000. The jury has not yet reached a verdict in the trial of Tirey L. Ford on the charge of paying Thomas Lonergan, a supervisor, \$4,000 for his vote on the overhead franchise.

To Increase Subway Service.—The Interborough Rapid Transit Company of New York on September 26 announced to the public service commission that it would voluntarily make large increases in the number of cars operated in the subway, so as to accommodate all of the standing passengers except in the height of the rush hours. Notice of this important change, which the officials state will be made within a month, was contained in a long tabulated report submitted to the commission showing the number of additional cars to be operated on each of the lines at various hours. The increases at certain hours amount to 16½ per cent. Two hundred new cars have been ordered and these are to be delivered in small lots shortly. Thirty have already been received. The board of estimate on September 26 voted to appropriate \$850,000 for the building of two additional tracks in the subway between Ninety-sixth and One Hundred and Third streets.

Urges Sale of Chicago Properties.—The Guaranty Trust Company of New York filed petitions in the United States circuit court at Chicago on October 10 urging the sale of the properties of the Chicago Union Traction Company and the North Chicago and the West Chicago Street Railroad companies and a hearing before a master in chancery to ascertain the assets of the companies. The Guaranty Trust Company states that the reorganization with lease to the Chicago Railways Company appears to be an impossibility and it urges that the properties be sold separately. In accordance with the promise of Marshall E. Sampsell, receiver of the Chicago Union Traction Company, to the city council when an extension of time for accepting the Chicago Railways Company ordinance was granted, the semi-annual interest due on October 1 on \$1,614,000 North Chicago Street Railway 4½ per cent refunding bonds was not paid. The amount of the interest due, \$36,315, will be applied to rehabilitation expenses. The Northern Trust Company, trustee under the deed securing these bonds, can take no action relating to the default until 90 days have elapsed.

Brooklyn Fourth Avenue Subway Authorized.—The New York public service commission, first district, on October 2 passed a resolution by a vote of 3 to 2 authorizing the construction of the Fourth avenue, Brooklyn, subway, which will be 13½ miles long and is estimated to cost about \$25,000,000. The plans and form of contract for the subway were prepared by the old rapid transit commission and the board of estimate approved the plans and appropriated the necessary money. This is the first subway route of any magnitude which the new commission has authorized. Commissioners Bassett and Maltbie opposed the resolution, the former because he did not believe a bidder could be found for the construction and operation of the road and because he thought only a short section of the route was required; the latter because he believed that subways were needed more in other and more congested sections of Manhattan and Brooklyn. The route extends from Manhattan across the Manhattan bridge and under Flatbush and Fourth avenues to Fortieth street, Brooklyn, as a 4-track road. From there it extends to Coney Island as a 2-track road, with a 2-track branch from Fortieth street to Ft. Hamilton. The line will be built in sections and bids will be advertised for at once.

Construction News

FRANCHISES.

Babylon, N. Y.—The South Shore Traction Company is seeking a franchise in Babylon for the operation of its line in that village. The Suffolk Traction Company also has filed an application for the same privilege.

Buffalo, N. Y.—The public service commission has approved the application of the Crosstown Railway Company to construct an extension from Delavan avenue to the city line to Pine Hill in Cheektowaga. The extension is principally for the accommodation of the traffic to the several cemeteries at Pine Hill. It will be double-tracked and 1,800 feet long. Work will be started next spring.

Clarksdale Covington & Collierville Interurban Railway, Clarksdale, Tenn.—After considerable opposition covering several weeks of controversy, this company has been granted a 50-year franchise for the operation of its interurban line in Shelby county, Tennessee.

Clayton, Mo.—The St. Louis Montesano & Southern Railway Company has been granted a six months' extension of time by the St. Louis county court, in which to begin work on its proposed electric line from the southern city limits to the northern boundary of Jefferson county.

Houston, Tex.—The Houston Electric Company has applied to the county commissioners for permission to extend its line from the limits of Houston to the limits of Harrisburg by way of the Harrisburg road. David Daly, general manager.

Jacksonville (Fla.) Electric Company.—This company has secured a franchise to extend its lines on Lincoln avenue to the new Seaboard Air Line railway shops.

Lafayette, Ind.—The commissioners of Tippecanoe county have granted a franchise to the Chicago & Western Indiana Traction Company to build and operate an interurban railroad through the southwestern portion of the county. The franchise is for 50 years, provides that the company must build its own bridges and prohibits the operation of the road by steam.

Long Beach, Cal.—The Pacific Electric Railway Company has asked the city trustees for the advertisement and sale of three 50-year franchises, one in Seventh street, from the eastern city limits to the Cerritos slough, one from Sixth to Fourteenth street, on Pine avenue, and one on Ocean avenue, from Golden to Third. The franchise on Ocean avenue will complete the belt line around the city.

Mansfield, Ill.—The council has granted a franchise to the Corn Belt Traction Company, which proposes to build a line from Champaign to Bloomington.

Pittsburg, Pa.—The Pittsburg Railways Company has applied to the city council for franchises covering the several extensions and loops in the outlying districts of Pittsburg which it proposes to make during the coming year. The company offers to open, grade and pave California avenue from the Washington avenue bridge to Fulton street and pay the city \$25,000 for damages to abutting property. It also asks permission to widen Allegheny avenue from Sedgwick street to Franklin street and to cross the Washington avenue bridge at Sedgwick street.

Portland, Ore.—The United Railways Company within a few days will apply for a franchise to use the county road from Portland through Linnton, Ore., to the county line, for the construction and operation of a broad-gauge electric railway, which will form part of a system to be built by this company in Portland and the neighboring country. By this proposed route it is believed that easy access to Cornelius pass, over which the line will pass to Hillsboro, will be gained. If this route is decided upon application for right of way on various streets in the northwestern part of the city will be presented. This application will cover practically all of the streets which were embodied in a similar petition made some months ago by Lafe Pence.

Pueblo, Colo.—M. Douthitt, who recently withdrew his application for a franchise in this city on account of the opposition of some of the property owners along the route, has now received permission from the city council to use the necessary city highways en route to Blende where the zinc smelter is located. The company later will complete the road to Rocky Ford and La Junta.

Richmond, Ind.—The final hearing of the injunction case against the city, restraining it from interfering with the operation of the Terre Haute Indianapolis & Eastern Traction

Company through this city has been postponed till October 21. The company is seeking to make the injunction perpetual.

Saginaw, Mich.—The city council has granted a 30-year franchise to the Saginaw Valley Traction Company for the operation of its line in Genesee avenue from Bond street to Barnard street.

RECENT INCORPORATIONS.

Evansville Petersburg & Vincennes Railway.—Incorporated in Indiana to build and operate an interurban electric railway from Evansville to Petersburg. The company also will furnish light, heat and power to the several towns along the line, which will pass through Vanderburg, Warrick, Gibson and Pike counties. Incorporators: F. W. Cook, H. E. Meyer, L. H. Herman and T. N. Honeywell.

Gary & Interurban Railway, Gary, Ind.—This company has filed amended articles of incorporation with the secretary of state, increasing its capital stock to \$1,000,000. C. B. Mauback, secretary.

Mt. Vernon & Eastern Railroad.—Incorporated in New York to construct a standard-gauge steam or electric railway from Mt. Vernon to Lewisboro, Westchester county, about 35 miles. Incorporators: Oakleigh Thorne, William H. Cheshbrough, Carleton Bunce, Howard K. Wood and Charles E. Mitchell, New York; Marsden J. Perry, Providence; George H. Hansel, Cranford, N. J.; Kennett K. McLaren, Jersey City; Allen Wardwell, Lawrence, N. Y.

Philadelphia Subway Terminal Railway.—Incorporated in Pennsylvania to construct a subway $4\frac{1}{2}$ miles long in Broad street, from Filbert street to a point near North Philadelphia station, where it will connect with the Pennsylvania Railroad's Germantown and Chestnut Hill branch. It also will intersect the city hall loop of the Market street subway of the Philadelphia Rapid Transit Company, which was formally opened to traffic last March. The plans provide for an underground station, extending from Filbert street to Broad street station, and from thence southward to Market street, where it is planned to connect with the Philadelphia Rapid Transit Company's Fifteenth street station. By reason of the necessity for passing under the Reading railway subway and under the large sewer which crosses Broad street at Dauphin street, some intricate engineering difficulties will be encountered in the construction of the new subway, which, it is stated, will bring the cost per mile up to nearly \$2,500,000. The new company is chartered with a capital of \$40,000, which later will be increased when the necessary franchises have been secured. George W. Goddard, Torresdale, Pa., manager of the Torrey Electric Vehicle Company, is president of the new company. Montgomery Harris, Germantown, and Charles Willing, Chestnut Hill, together with Mr. Goddard, are directors.

Waterloo Pella & Southwestern Railway, Pella, Ia.—Incorporated in Iowa to construct and operate a railroad, either steam or electric, from Waterloo to Chariton, Ia., a total distance of 130 miles. The line will proceed in a southwesterly direction from Waterloo through Traer, Toledo, Tama, Sheridan, Grinnell, Sully, Pella, Howell, Durham, Attica, Columbia and Olmitz to Chariton. The road, if built, will open up a considerable section of undeveloped coal fields, as well as a rich farming district in northeastern Iowa. Capital stock, \$150,000. The board of directors is as follows: E. A. Harris, P. H. Van Gorp, P. H. Bousquet, U. L. Hendrichs, A. N. Kuyper, B. J. Keables, R. Rhynburger, J. H. Van der Linden, W. C. Smith, T. D. Rice and A. T. Klein, all of Pella, Ia., and vicinity.

Western Illinois Electric Traction Company, Chicago, Ill.—Incorporated in Illinois to build an electric railway from Lyons to Aurora, Ill. Capital stock, \$100,000. Incorporators: M. M. Miller, E. J. Schmidt, Louis Crollan, Lee Michael and William Klein.

TRACK AND ROADWAY.

Arkansas Valley Traction Company, La Junta, Colo.—J. B. Pearce, secretary and auditor, writes that permanent surveys for this company's proposed interurban line have been completed and that grading will be started in January, 1908. The line will start from La Junta and go by way of Swink and New Dale to Rocky Ford, Colo., a distance of 12 miles. All of the right of way has been secured, together with franchises in La Junta, Rocky Ford and Swink, as announced in previous issues of the Electric Railway Review. Contracts for everything except equipment will be let within the next 90 days. The line will be equipped with gasoline motor cars. The officers of the company are: J. E. Gauger, president, Rocky Ford; J. B. Pearce, secretary and auditor; H. W. Potter, treasurer; F. T. Lewis, chief engineer. La Junta.

Atlantic Northern & Southern Railway, Atlantic, Ia.—Grading on this proposed interurban line has been started and it is expected that five miles of the distance will have been completed by the end of October. It is stated that right of way has now been secured between Atlantic and Kimballton, Ia., about 20 miles. The line eventually will be built between Atlantic and Villisca, Ia., and will be 72 miles long. J. W. Cuykendall, Atlantic, is president.

Bessemer, Ala.—It is stated that Atlanta, Ga., capitalists are interested in a movement toward the construction of a belt electric line around Bessemer. If built the line would serve a rapidly growing territory in the outskirts of Bessemer at present practically without street railway facilities.

Bloomington, Pontiac & Joliet Electric Railway, Pontiac, Ill.—Control of this road, which now extends from Pontiac to Dwight, Ill., has been acquired by H. A. and L. D. Fisher of Joliet, Ill., and it is announced that the line will be extended from both ends to connect Bloomington and Joliet.

Boise & Interurban Railway, Boise, Idaho.—It is announced that this company, which recently has completed an interurban line from Boise to Caldwell, Idaho, will build and operate a street railway in Caldwell. An extension also is planned to the fair grounds, about one mile distant, work on which is to be started at once in order to have the line in readiness for the crowds when the fair opens this month.

Boston, Mass.—The new subway under Washington street from Broadway to Haymarket square is almost completed in the rough and preparations for a junction at the square with the old subway are now being made. The only part of the tunnel proper still incomplete is that portion between Thompson's Spa and the Ames building, where the new tube dips under the East Boston tunnel. According to the contract this must be finished by November 15. The first piece of work necessary for the joining of the old and new subways will be the erection of a 270-foot wall from 10 to 30 feet outside of and intended to take the place of the present westerly wall of the subway as it passes under Haymarket square. The transit commissioners will receive bids for this work on Friday of this week. The stations at Summer and Winter streets will be completed by November 15.

British Columbia Electric Railway, Vancouver, B. C.—At a recent meeting of the directors of this company it was voted to appropriate \$1,000,000 for extensions, improvements, etc., during 1908. H. Sperling, general manager, Vancouver, B. C.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—Work has been started on this company's line at Westfield, N. Y., and as soon as completed will connect with the line now in operation from Westfield to Erie, when the projected viaduct at Erie has been finished. Work will be pushed eastward to join the Fredonia-Brocton line now in operation and it is believed that cars will be running into Fredonia from Buffalo early next year. Work is also in progress at Angola, Farnham and west of Silver Creek. J. C. Calisch, general manager.

Butler & Chicora Street Railway, Butler, Pa.—This company has been organized to build a line connecting Kaylor, East Brady, Carns City and Butler, Pa. An application for a charter will soon be made by E. W. Dewey, John Daly, W. G. Sterns, W. J. Horan and W. Crisweld.

Butte (Mont.) Electric Street Railway.—This company is building a $2\frac{1}{2}$ -mile extension in the Gallatin addition in Butte, and has graded about one mile. The East Centerville extension, about three-fourths of a mile long, has just been completed and plans are being made for double tracking the South Main street line.

Centralia Chehalis & Western Railway, Centralia, Wash.—This road, which has secured a franchise for the construction and operation of its line in Chehalis, has secured subscribers to \$150,000 worth of stock. The company will build eight miles of line between Centralia and Chehalis, with a 2-mile branch to a point not yet named. The road will develop the freight business in that section and it is stated that enough freight tonnage has been guaranteed to afford ample business on which to start operations. B. J. Weeks, formerly of the Pacific Traction Company, Tacoma, is promoting the new line.

Chicago City Railway.—This company is having some trouble in getting a loop constructed in Langley avenue, Thirty-eighth and Thirty-ninth streets, to be used for handling cars at the car house on Thirty-eighth street, on account of opposition from property holders on Langley avenue. President Mitten hoped to have the new pay-as-you-enter cars in operation by November 1, but says that the troubles in connection with the construction of the loop will delay the date of beginning operation. The number of men employed on

track construction reached the high-water mark on October 10, the payrolls of the company showing 1,683 men at work on Indiana, Wentworth, Cottage Grove, Vincennes and South Chicago avenues and State and Forty-third streets.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—Announcement is made of a formal agreement between this company and the St. Joseph Valley Traction Company for an exchange of track privileges in Elkhart, Ind.

Connecticut Company, New Haven, Conn.—President C. S. Mellen has announced that the construction of the electric railway from Hartford to Middletown, Conn., will begin as early next spring as the weather will permit.

Denver & South Platte Railway, Denver, Colo.—Announcement has been made that this line will be in operation some time this month. All of the overhead work has been completed and the feeder lines from the power house of the Denver City Tramway are being connected. There remains but one-half mile of track to be laid, and as soon as the company secures permission to cross the right of way of the Santa Fe Railroad at Littleton the remaining track work will be completed and the line be placed in operation between Denver and Littleton. A mortgage for \$1,000,000 has been filed in favor of the Continental Trust Company for the purpose of obtaining funds for the extension of the road to Roxborough Park, 20 miles south of Denver. The line ultimately will be extended to Colorado Springs.

Easton & South Bethlehem Transit Company, Easton, Pa.—It is announced that this company will build a 4,300-foot extension to its present line in the borough of Northampton Heights.

Enid Blackwell & Osage Interurban Traction Company, Enid, Okla.—Four miles of this proposed interurban line have been surveyed and a portion of the right of way secured. Contracts for material, etc., will be let within 30 days. The line will connect Enid, Pawhuska and Blackwell, about 130 miles, and gasoline will be used for the motive power. John R. Clover, treasurer, Enid, Okla.

Ft. Dodge Des Moines & Southern Railroad, Boone, Ia.—Announcement is made that a 12-mile branch of this road, penetrating the gypsum fields of this section, will be built into Lehigh, Ia., during the coming year. This branch will leave the main line at a point just south of Ft. Dodge. J. L. Blake, general manager.

Ft. Dodge Des Moines & Southern Railroad, Boone, Ia.—This company's line has now been completed into Ft. Dodge, Ia., and regular cars were operated on October 5. The line has been in operation from Des Moines as far as Boone all summer.

Ft. Worth, Tex.—The contract for grading the interurban line from Ft. Worth to Mineral Wells, via Weatherford, Tex., promoted by G. R. Turner of New Orleans, has been awarded to the Suderman-Dolson Company of Houston.

Georgia-Carolina Railway.—Announcement is made that the preliminary and location surveys of this proposed 75-mile interurban line between Athens, Ga., and Anderson, S. C., will be made by the Richardson-Wey Engineering Company, Atlanta, Ga., and De Camps & Cunningham, engineers, Anderson, S. C. The report of the engineers will include estimates for both steam and electricity. W. L. Hodges, Hartwell, Ga., is president.

Grand Forks, N. D.—It is stated that an electric railway from Grand Forks to Carrington, N. D., is being promoted by Robert Thompson.

Illinois Traction System, Champaign, Ill.—In reference to the report that this company proposed to build a line from Peoria to Rock Island, Ill., L. E. Fischer, general manager, Danville, Ill., writes that there is no movement on foot to build such a line now, although the matter is under contemplation.

Joplin & Monett Interurban Railway, Joplin, Mo.—It is stated that contractors have been over the proposed route of this interurban railway preparatory to starting its construction some time this fall. When completed the line will form a complete belt 130 miles long and will connect about thirty towns with Joplin. Col. William S. Brawner is interested.

Joplin & Pittsburg Railway, Joplin, Mo.—Three grading forces are now at work on the line between Pittsburg, Kan., and Joplin, Mo., 30 miles, and the ties and rails have been delivered. It is stated now that cars will be in operation over the line by January 1. Work is also in progress on the branch line from Scammon to Mineral, Kan., 16 miles. P. P. Crafts, general manager.

Madison Four Lakes & Chicago Railway.—Surveys are being made for this proposed 36-mile interurban railway from Madison to Zanesville, Wis. Arrangements are being made for the financing of the road and when these are completed contracts will be let. Daniel B. Ely, 2 Wall street, New York City, is promoting the project.

Mahoning & Shenango Railway & Light Company, New Castle, Pa.—This company has commenced the work of grading and setting poles along the old right of way of the Buffalo Rochester & Pittsburg Railroad between Big Run and Punxsutawney, Pa. About three miles of grading has been completed.

Mid-Continent Traction Company, Tulsa, I. T.—Contracts for the construction of this 21-mile interurban line from Tulsa to the Glen Pool oil field, by way of Red Fork and Sapulpa, will be let within the next 30 days. Surveys are now being made and right of way is being secured. F. L. Smart, Kansas City, Mo., is president; Graham Burnham, secretary, Tulsa; J. Robert Burnham, chief engineer.

New Orleans (La.) Railway & Light Company.—This company has just completed the work of rebuilding its tracks in Broadway from Maple to Magazine streets, placing the tracks in the center of the street, instead of alongside the gutters, as heretofore, and substituting for the old light T-rail new 107-pound rail.

North Alabama Traction Company, New Decatur, Ala.—This company has commenced work on an extension which, when built, will complete a loop from Decatur to New Decatur. The company also is relaying much of its track in Decatur with a heavier rail. It is stated that the work in hand and contemplated in both cities for this year will cost about \$10,000.

Omaha & Nebraska Central Railway, Omaha, Neb.—The H. J. Folts Company of Minneapolis, Minn., which is financing this road, has secured 80 per cent of the right of way. Considerable grading already has been done out of Hastings, through which the line will pass, and work is to be started on the remainder soon. The line will carry both passengers and freight and will touch the following cities: Hastings, Aurora, Osceola, David City, Wahoo and other smaller towns. It will be about 160 miles long.

Oregon Electric Railway, Portland, Ore.—It is reported that this company, which is just completing its line from Portland to Salem, Ore., 45 miles, is now making preparations for extending south to Eugene and Albany, Ore. As soon as the line now under construction is completed work will be started on a branch line to Forest Grove and Hillsboro. It is expected to run cars from Portland to Salem by December 1. W. S. Barstow & Co. of Portland are doing the engineering work and Guy W. Talbot is general manager.

South Shore Traction Company.—The appellate division of the supreme court of New York has decided that this company has forfeited its franchise in Suffolk county, because of its failure to construct the road within the time limit. The road is now under construction and it was proposed to operate through Patchogue, Islip, Bay Shore, Babylon, Jamaica and Long Island City.

Spokane Cheney & Southern Railway, Spokane, Wash.—The first car on this interurban line from Spokane to Cheney was operated over the entire distance on September 28. The car carried a party of members and guests of the commercial club to the interstate fair, which was opened on that date. Cars will be placed in regular service as soon as the ballasting has been completed.

Sumter, S. C.—W. H. Ingram of Sumter, W. H. Lyles and T. C. Williams of Columbia, S. C., with a number of outside capitalists, are said to be interested in a street railway project for Sumter. A franchise has been secured and the construction of the road will be started in the near future. It is stated that the company contemplates the erection of a large tourist hotel on the property which it has acquired near Sumter.

Sunbury & Selinsgrove Electric Railway, York, Pa.—The contract for the construction and equipment of this proposed electric line from Sunbury to Selinsgrove has been awarded to the York Construction Company. The line will open up fertile sections of Snyder and Northumberland counties and will probably be completed by next spring. The cost is estimated to be \$250,000. If the present proposed route is followed the line will cross the new bridge over the Susquehanna river, which has just been opened to traffic. W. H. Lyons, president, Sunbury, Pa. L. G. Brown, P. M. Harrison, G. W. Drury, York, and Boyd Musser, Scranton, Pa., are also interested.

Tampa & Sulphur Springs Traction Company, Tampa, Fla.—It is announced that this company will increase its capital stock from \$100,000 to \$300,000 in order to carry out plans for improvements decided upon for the coming year. With this increased capital a new line down Ross avenue to the Hillsborough river will be built where a bridge will be erected for the operation of the line to West Tampa. The necessary right of way has been obtained and permission from the government secured for the construction of the bridge. Another improvement will be the building of a line on Nebraska avenue, Tampa, from the Hillsborough river at Sulphur Springs to a point near the Tampa Electric Company's northern terminus on Nebraska avenue. Application for this privilege will be made in the near future.

Troy, Ala.—F. Anderson, L. M. Bashinsky and William Clancy of Troy, Ala., are said to be interested in a proposed interurban line from Troy to Orion, Ala., by way of Milo, about 13 miles.

Twin City & Lake Superior Railway, Minneapolis, Minn.—This company, recently incorporated to build a high-speed, third-rail interurban railway from St. Paul and Minneapolis to Duluth, Minn., and Superior, Wis., will begin the construction of the line at once. Preliminary surveys are now in progress. The line as proposed will be about 130 miles long and will be operated by steam until motive power for the equipment of the road with the Farnham inverted third-rail system can be installed. By the building of this line a reduction of 30 miles will be afforded in the present rail distance between the points named, and as the route chosen by the new company is the shortest possible one that physical conditions will permit, quick and efficient freight, passenger, mail and express business for the patrons of the road is assured. It is estimated that the road will cost \$21,500 per mile, or a total of \$2,775,500 when completed. The company is capitalized at \$7,000,000, divided into 10,000 shares of \$100 each. The executive offices of the company are in the Railway building, Minneapolis. E. W. Farnham, president, Chicago, Ill.; W. H. Crossland, vice-president; F. L. Kidder, treasurer, Minneapolis; S. A. Carlisle, secretary, Wyoming, Minn.

Wapakoneta, O.—It is reported that a movement is on foot to build an electric road from Wapakoneta to Delphos, O., through Buckland, Kossuth and Spencerville.

Waterbury & Milldale Tramway Company, Waterbury, Conn.—Contracts soon will be let for this company's proposed interurban line from Waterbury to Milldale, Conn., eight miles. Surveys have been completed and a portion of the right of way secured. The company is capitalized at \$100,000. Charles H. Clark, president, Milldale; John H. Cassidy, secretary, Waterbury; Edwin S. Todd, treasurer, Milldale; Otis S. Northrop, Waterbury; C. H. Clark, Southington; George F. Hughes, Waterbury; E. S. Todd, Milldale; and John H. Cassidy, Waterbury, are the directors.

Winona Interurban Railway, Winona Lake, Ind.—Grading on the Warsaw-Peru extension of this company's line may be completed this fall and cars be placed in operation early in the year. A large force is working just north of Mentone, Ind., and will proceed in this direction as rapidly as possible. Considerable delay has been occasioned by the sinking of the concrete arch at Gilead a few weeks ago.

POWER HOUSES AND SUBSTATIONS.

British Columbia Electric Railway, New Westminster, B. C.—This company is making preparations to supply power for the Chilliwack-New Westminster lines, which are under construction. The new plant will be capable of developing more than double the power of the present plant at Lake Buntzen. The company has title to take hydraulic power to the extent of 45,000 horsepower from Lake Buntzen. D. J. McQuarrie, manager.

Johnstown Passenger Railway, Johnstown, Pa.—It is reported that this company has decided to erect a large power house on property owned by the company in Ferndale. The work proposed will represent an expenditure of not less than \$150,000. The new power house will be located very near the load center of the system. It is probable that the present equipment of three compound engines, three electric generators and a battery of eight boilers will be removed wholly or in part from the old power station to the new one.

Youngstown & Ohio River Railroad, Youngstown, O.—This company has awarded the contract for concrete work in connection with its new power plant at West Point, O., to E. R. Blakely of Cleveland, O. The work includes a concrete stack 175 feet high, 24 feet square at the base, with an inside diameter of eight feet at the top.

Personal Mention

Mr. J. C. Kirkpatrick has been appointed chief claim agent of the Illinois Traction System, effective at once, with headquarters at Springfield, Ill.

Mr. A. C. Harrington has resigned as resident engineer of the Buffalo Lockport & Rochester Railway to become chief engineer of the American Engineering Company, Indianapolis, Ind.

Mr. G. A. Kohler of Wapakoneta, O., has been appointed auditor of the Springfield Troy & Piqua Railway of Springfield, O. Mr. Kohler has been for several years bookkeeper and paymaster for the Western Ohio Railway.

Mr. J. F. Reardon, superintendent of railways and master mechanic of the Everett (Wash.) Railway Light & Water Company, has resigned to accept a similar position with the Lehigh Valley Transit Company, Allentown, Pa.

Mr. R. R. Ray, superintendent of transportation of the Southern Michigan Railway, South Bend, Ind., has been appointed claim agent of the South Chicago City Railway, with headquarters at 9338 Ewing avenue, South Chicago, Ill.

Mr. Albert Carr has resigned as chief engineer of the United Railroads of San Francisco, to take a position as superintendent of construction in the water power development of the Central Colorado Power Company, with headquarters at Colorado Springs.

Mr. Frank C. Burton has been appointed superintendent of transportation of the Montgomery, Ala., Traction Company, reporting to Mr. F. B. Royster, general superintendent. Mr. Burton formerly was connected with the Yonkers lines of the Union Railway of New York.

Mr. C. P. Orth has been appointed master mechanic of the Galesburg & Kewanee Electric Railway, Galesburg, Ill. Mr. Orth formerly was connected with the Cleveland Electric Railway and more recently with the Lorain Street Railway and the New York & Long Island Traction Company.

Mr. William E. Slaughter, who for several years past has been superintendent of the Baltimore & Annapolis Short Line, now being equipped for electrical operation, is reported to have accepted the position of general passenger agent of the Washington Baltimore & Annapolis Electric Railway; effective November 1.

Mr. J. A. Emery, whose resignation as vice-president and general manager of the Birmingham Railway Light & Power Company was announced in the Electric Railway Review of September 14, has become associated with the Emery Steel Company of Birmingham, Ala., recently incorporated to do a general business in castings and machinery. Mr. R. C. Foster and Mr. J. H. Pritchard are associated with Mr. Emery in the new company. Mr. Emery will continue to act as one of the directors in the street railway company.

Mr. C. L. Cadle has been appointed electrical engineer of the Rochester Railway Company, Rochester, N. Y. Mr. Cadle graduated from the Case School of Applied Science, Cleveland, O., in 1904, and soon afterward became associated with the engineering department of the Cleveland Electric Railway. During the past few months he has been acting as assistant to the general manager of the Electric Railway Improvement Company of Cleveland. Mr. Cadle assumed his new duties with the Rochester Railway on October 1.

Mr. Benjamin J. Weeks has resigned as general manager of the Pacific Traction Company of Tacoma, Wash., to devote his time to the promotion of a new electric railway enterprise, the details of which are not announced. Mr. Weeks has been connected with electric railways in Washington for the past six years, during the first 2½ years of that period as general superintendent of the Tacoma Railway & Power Company and later as general manager of the Spokane Traction Company. He resigned the last-named position in the spring of 1906, to go with the Pacific Traction Company.

Mr. H. H. Vreeland, president of the New York City Railway, which is now in receivers' hands, on October 4 resigned as manager for the receivers, a position to which he was appointed on September 24. In an address before the Metropolitan Street Railway Association, an organization of employees, of which he is president, Mr. Vreeland said: "The legal entanglements which have arisen in connection with the company's affairs have made it necessary for me to give attention to matters which seem to be of more pressing importance for permanent good than operating work." Mr.

Vreeland has worked his way up to the presidency of the company from the position of conductor and besides his great ability as an operating railroad man has had a large part in the financial reorganizations of the company. He will be succeeded as manager under the receivership by Oren Root, Jr., heretofore vice-president and general manager.

Mr. G. W. McClure, heretofore superintendent of motive power of the Norwich & Westerly Railway at Norwich, Conn., has resigned to accept a position as inspector of car construction and equipment with the Illinois Traction System, with headquarters at Danville, Ill. His new duties will include the inspection of all new cars, locomotives, etc., built at the various car works. Mr. McClure is 38 years of age and has been engaged in street and interurban railway work for the past 12 years. His first experience in this line of work was as armature winder for the Lindell Railway Company of St. Louis, Mo. He later became connected with the Calumet Electric Street Railway of Chicago, where he remained for six years as electrician in charge of electrical equipment of cars and electrical machinery in the power station of this company. He subsequently held this position for a short time with the Illinois Traction System, but resigned to become master mechanic of the Michigan United Railways at Lansing, Mich. In August, 1906, Mr. McClure resigned to become superintendent of motive power of the Norwich & Westerly Railway, where he has remained until his present appointment.

Mr. Oren Root, Jr., who has been appointed general manager for the receivers of the New York City Railway Company, was born at Columbia, Mo., in 1873, and is accordingly 34 years of age. He was graduated in 1894 with honors from Hamilton College, the institution from which his father, grandfather and uncle, Elihu Root, have also been graduated, and in 1895 entered the service of the New York City Railway Company as receiver of fares at one of its terminals. After a few months he was given a position as clerk in one of the division offices and subsequently held various positions in several departments until 1899, when he was appointed assistant to the president of the Metropolitan Street Railway Company. The following year he was appointed assistant general manager and in 1903 general manager. In 1906 Vice-President Frank S. Gannon resigned and at that time he was given the title of vice-president and general manager, which position he held up to the time of his appointment as general manager for the receivers of the New York City Railway Company. From 1902 to 1905 Mr. Root was also president of the Central Crosstown Railway, an independent street railway line in the city of New York.



Oren Root, Jr.

Obituary.

Nicholas Goelz, formerly superintendent of the North Hudson County Railway, now a part of the system of the Public Service Corporation of New Jersey, died at his home in New York on October 4, aged 83 years. Mr. Goelz was an old street railway man and in 1860 established the Weehawken & Hoboken Horse Car Railroad.

Elmer H. Littlefield, division superintendent of the Boston Elevated Railway, died recently at the age of 59 years. He began his street railway career in 1870 as conductor on the Union Street Railway lines of Boston. He later entered the service of the Union & Cambridge Street Railway in the same capacity, rising through successive promotions to the position of assistant superintendent. In 1888 Mr. Littlefield resigned to become superintendent of the street railway lines of Topeka, Kan., later going to Oklahoma, where he resided for several years. In 1898 he entered the service of the West End Street Railway, now leased by the Boston Elevated Railway, and in 1899 was appointed superintendent of the ninth division of the latter, where he remained until his death.

Financial News

United Traction Company, Albany, N. Y.—The annual report for the fiscal year ended June 30, 1907, as presented to the New York public service commission, second district, shows:

Year ended June 30—	1907.	1906.
Gross	\$1,956,441	\$1,765,223
Expenses	1,187,735	1,116,037
Net	\$ 768,706	\$ 649,186
Other income	91,982	19,889
Total income	\$ 860,688	\$ 669,075
Charges	349,925	347,071
Surplus	\$ 510,763	\$ 322,004
Dividends	187,485	240,980
Surplus	\$ 323,278	\$ 72,024

The company issued \$7,500,000 additional stock for the purpose of acquiring the Hudson Valley Railway, making the total stock outstanding \$12,500,000. The total number of passengers carried was 40,931,962, an increase of over 4,000,000 over the previous year. The number of transfers issued was 6,016,212, as against 4,941,686 in the preceding year. Other figures in the report for last year include the following: Average number of officials and employees, 1,400; aggregate salaries and wages paid, \$881,894.39.

ELECTRIC RAILWAY EARNINGS.

American Railways Company, Philadelphia (Subsidiary Companies).		
Gross earnings—	1907.	1906.
September	\$270,057.87	\$258,096.78
July 1 to September 30.....	866,216.78	808,538.22

Detroit United Railway.		
August—	1907.	1906.
Gross earnings	\$ 686,224	\$ 615,004
Expenses	396,885	349,617
Net earnings	289,339	265,387
Other income	3,989	3,382
Total income	293,328	268,769
Charges	116,537	106,850
Surplus	176,791	161,919
January 1 to August 31—		
Gross earnings	4,445,502	3,969,734
Expenses	2,726,651	2,365,263
Net earnings	1,718,851	1,604,471
Other income	35,964	29,713
Total income	1,754,815	1,634,184
Charges	912,549	817,056
Surplus	842,266	817,128

Figures include Rapid Railway System, Sandwich Windsor & Amherstburg Railway and Detroit Monroe & Toledo Short Line.

Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.		
August—	1907.	1906.
Gross earnings	\$125,117.82	\$105,690.54
Operating expenses	70,047.00	63,119.07
Net earnings	55,070.82	42,571.47
January 1 to August 31—		
Gross earnings	811,889.67	698,650.23
Operating expenses	487,027.51	431,495.76
Net earnings	324,862.16	267,154.47

Toledo (O.) Railways & Light Company.		
August—	1907.	1906.
Earnings	\$221,261.00	\$202,872.31
Operating expenses	118,524.73	101,779.81
Net earnings	102,736.27	101,092.50
Miscellaneous income	861.75	1,224.16
Gross income	103,598.02	102,316.66
Deductions	68,668.57	59,509.68
Net income	34,929.45	42,806.98
January 1 to August 31—		
Earnings	\$1,679,636.87	\$1,580,502.79
Operating expenses	972,698.30	787,260.43
Net earnings	706,938.57	793,242.36
Miscellaneous income	7,553.62	7,830.78
Gross income	714,492.19	801,073.14
Deductions	516,243.26	471,700.77
Net income	198,248.93	329,372.37

Manufactures and Supplies

ROLLING STOCK.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has purchased one car.

Tri-City Railway, Davenport, Ia., is said to have placed an order for six new cars.

Illinois Central Electric Railway, Canton, Ill., it is reported, is in the market for three closed cars.

St. Clair Tunnel Company, Detroit, Mich., has purchased four electric locomotives. It is reported that the Baldwin Locomotive Works was awarded the contract.

Seattle Electric Company, Seattle, Wash., is reported to have made arrangements for the purchase of from 50 to 75 cars for city service. The order has not yet been placed.

Waterloo Cedar Falls & Northern Railway, Waterloo, Ia., has placed an order for several cars for interurban and city service to replace the three interurban and seven city cars lost in the recent destruction of its car house by fire.

New York City Railway, New York City, lost by fire on October 9, about one hundred and twenty-five electric motor cars, which were burned in the car houses at 523 East Fourteenth street.

SHOPS AND BUILDINGS.

Conestoga Traction Company, Lancaster, Pa.—This company has purchased a site for a car barn.

Indiana Union Traction Company, Anderson, Ind.—An architect has been employed by this company to prepare plans for a new passenger station at Elwood, Ind.

New York City Railway, New York, N. Y.—The car houses of the New York City Railway, occupying nearly a block of ground between Fourteenth and Fifteenth streets and Avenues A and B, New York City, were seriously damaged by fire on October 9. The cause of the fire was thought to be defective insulation. About one hundred and ninety-two cars were stored in the barns at the time the fire was first discovered, and of this number about one hundred and twenty-five were consumed, most of which were motor cars. The effect of this caused a shortage on the Fourteenth street line, Christopher and Twenty-third street car lines, Belt line in Avenue B and the Seventeenth and Eighteenth street crosstown lines. The officials drew on all other lines for what cars could be spared and late in the day had the line running at about three-fourths its normal capacity. The loss entailed is estimated at \$250,000.

TRADE NOTES.

American Locomotive Company will hold its annual meeting at 111 Broadway, New York City, on October 15.

Crocker-Wheeler Company, Ampere, N. J., has removed its Birmingham, Ala., office from 2119 Third avenue to the Woodward building.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has declared a quarterly dividend of 2½ per cent on the preferred, assenting and non-assenting stock, payable on October 10.

Nathan Shute has been appointed sales agent of the car equipment division of the Ohio Brass Company, succeeding the late J. S. Hamlin. Mr. Shute has been connected with the company's New York office, but will now make his headquarters in Mansfield, O.

W. P. Cosper has resigned as general sales agent of the Garton-Daniels department of the Electric Service Supplies Company, effective October 1, and will engage in the manufacture of hot water heaters for electric cars under patents issued to him on October 1.

Western Electric Company, Chicago, Ill., will have its electric railway supplies exhibits in booths Nos. 480 to 486 at the Atlantic City conventions. The representatives of the company will make their headquarters at the Hotel Islesworth, Boardwalk and Virginia avenue.

J. E. Fries, a Swedish engineer of wide experience and technical training, has severed his connection with the Allis-Chalmers Company to become associated with the Power Improvement Company of Milwaukee. This company, which is

comparatively young, acts as consulting engineer and intends to take up electric railway work actively, a branch to which Mr. Fries devoted much of his time while with the Allis-Chalmers Company.

Columbia Brake Shoe & Foundry Company, Cincinnati, O., has removed its offices from the Perin building to Suite 1310 Traction building. The rapid growth of the company's business during the four years it has been in existence made larger office facilities necessary.

Harvey M. Littell, who in 1896 was president and for many years was prominent in the work of the American Street Railway Association, announces his association with Harry S. Hought & Co., Broadway and Sixty-third street, New York City, agents for the Thomas automobiles.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., which purchased the Wirt Electric Company of Philadelphia some months ago, has announced that the Wirt business has been consolidated with that of its New York plant at Park avenue and One Hundred and Thirtieth street, where the manufacture of Wirt apparatus will be continued.

Walter B. Snow, 170 Summer street, Boston, Mass., announces that he is prepared to undertake work of any kind in the broad field of publicity for manufacturers of machinery and allied products. His regular service will cover the conduct, on a salary basis, of the publicity departments of a limited number of non-competitive clients. Special service will be rendered to others in the form of general advertising, catalogue making, technical writing and investigation. The intimate acquaintance with engineering in general, and publicity in particular, acquired during nearly 25 years' connection with the B. F. Sturtevant Company, encourages him in the belief that this service can be made of exceptional value.

G. C. Reiter, Canton, O., who was formerly president of the Cheswick Manufacturing Company, has opened an office and is now equipping a shop on the ground formerly occupied by the Aultman Manufacturing Company, on South Market street, Canton, and will hereafter give his attention exclusively to the manufacture and sale of gongs and bells for street railway purposes. Mr. Reiter is a pioneer in the making of street car gongs, having first engaged in the business a number of years ago. When he became affiliated with the Cheswick company he turned over the gong business he had successfully worked up. Now that this company has ceased operations Mr. Reiter will personally superintend the manufacturing of the high-class foot and overhead gongs and bells which have heretofore given such good service on hundreds of cars operating on electric railways throughout the United States.

ADVERTISING LITERATURE.

Ohio Brass Company, Mansfield, O.—The "Monthly Bulletin" for October contains an illustrated article on Atlantic City and the street railway conventions.

Western Electric Company, Chicago.—A folder in the form of a legal document is entitled "The Evidence in the Case of Western Electric Arc Lamps Versus Others."

H. W. Johns-Manville Company, New York.—A new leaflet is devoted to the J. M. adjustable metallic crossover, the J. M. insulated crossover and the Philadelphia section insulators.

Electric Service Supplies Company, Philadelphia.—The October issue of The Keystone Traveler is a special convention number with an appropriate cover. It contains considerable convention information and a number of pertinent illustrations.

Blake Signal & Manufacturing Company, 246 Summer Street, Boston, Mass.—A well-printed booklet entitled "Requirements for Efficient Telephone Train Dispatching," exhaustively treats this important problem. Letters from various companies using the Blake system are reprinted.

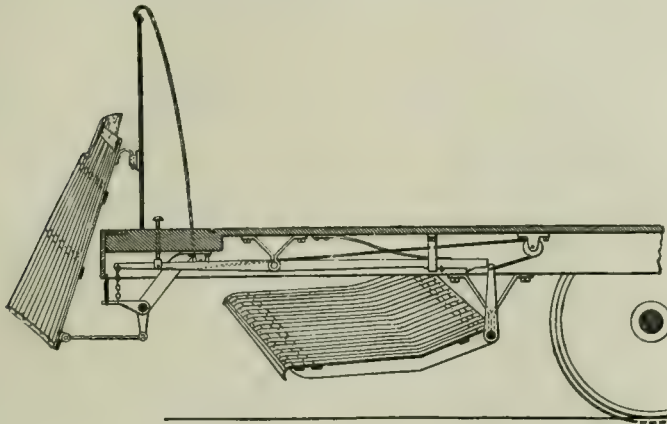
C. A. Manufacturing Company, Austin, Tex.—A booklet reciting the merits of C. A. wood preserver comes from this company. This product is manufactured in the company's chemical works at Mannheim, Germany, and is carried in stock in branch houses at Austin, New York, New Orleans, San Francisco, Salt Lake City and Galveston.

General Electric Company.—The General Electric Review for September, 1907, which is Volume IX, No. 4, of this publication, contains a number of interesting articles, notably "Fundamental Principles of Centrifugal Fans," Part I, by Maxwell W. Day; "Gyroscopic Forces," Part II, by W. E. Miller; "Railway Signals," Part III, by F. B. Corey; and "Potential Control of Alternating-Current Systems by Synchronous Motors with Tirrill Regulators," by Ernst J. Berg.

THE MEYERS CAR FENDER.

The car fender shown in the accompanying illustration is designed to serve economically as a life saver under the most severe conditions. The fender is entirely automatic, but may be thrown into the emergency position by the motor-man without his leaving his position at the controller.

The fender is manufactured by the Fred J. Meyers Manufacturing Company, Hamilton, O., and is of a substantial design.



Details of the Meyers Fender.

The parts are so well made and fitted that they do not easily get out of order and as a result the maintenance expense of this fender is found to be very small.

In the illustration presented the component parts and their substantial design are shown. It will be noted that the fender has its buffer and scoop separately hung. The buffer is suspended from the dash of the car and extends

the scoop, and the fender, having no support, is dropped to the rail. While the fender is in this position, and after the pressure has been removed from the trip arm, a notch near the rear end of the main lever engages with the back side of the fender arm and locks the scoop in the down position. This makes it impossible for any object to get between the lower end of the fender and the rails. The release is made only by a trip in the motorman's cab.

The buffer manufactured by this company is made of spring steel and it is claimed that it will not bend or buckle, even under severe tests. The scoop is made of steel slats supported on 1¼-inch round steel.

In addition to the fender the Meyers company makes at its Hamilton shops substantial wire guards to place over the windows of cars to prevent passengers from extending head or arms out beyond the side lines of the car. Seventy-five different styles of punches are also made for the use of conductors in canceling tickets.

CHRISTENSEN AIR BRAKES.

Christensen Air Brakes, which for the past 18 months have been manufactured solely by the Allis-Chalmers Company, Milwaukee, are built in a specially equipped shop, comprising some 69,120 square feet of floor space at the West Allis works. The illustration reproduced herewith shows a portion of the test floor in the air brake department, the assembling and machining of parts being done on the same floor, which is 576 feet in length. Another floor of equal length is provided for the coil winding and armature assembling department.

Of the Christensen type of air brakes, now manufactured solely by the Allis-Chalmers Company, there are over 17,000 in daily service. The orders for these equipments recently taken indicate no decline in the favor extended to this apparatus. The Consolidated Railway Company of New Haven, Conn., whose properties are in operation in some 30 cities and towns of southern New England, not long ago placed what was said to be the largest contract for air brakes ever let. It comprised over 280 complete equipments. As a matter of



Allis-Chalmers Company—View of Portion of Air Brake Testing Floor.

down to within a few inches of the rails. Attached to the lower side of the buffer is a lever bar, which leads to a projecting arm fastened to a tripping shaft. This shaft is held in position by a coil spring which retrieves the arm, after it has been tripped, and holds the buffer in normal position. A chain is attached to the short end of the shaft and to a lever which leads back under the sills of the car to the hangers which hold the scoop in position. This lever is supported near its center on a pin. The rear end of the lever, when in normal position, engages with an arm connected by a rock shaft, to the fender scoop and holds the lower end of the scoop up from the running rail. Whenever the lever is tripped it is raised above the arm attached to

railway history, the first Christensen air brake equipment placed in service in New England was installed in 1898, on a car of the Hartford Street Railway Company, now a part of this system. After nine years of continuous service this equipment is still in daily use.

The Interborough Rapid Transit Company of New York City recently placed an order with the Allis-Chalmers Company for ninety-one 24-foot air compressors and pneumatic governors. The vital parts of air brake equipments and other important contracts of a similar character have been let by traction companies in all parts of the country.

The Christensen air brakes in regular service are carried on about 350 different electric systems throughout the world.

ECONOMY TEST OF 7,500-KILOWATT WESTINGHOUSE-PARSONS STEAM TURBINE.

The following data comprise the principal results obtained on September 1, 1907, during an 8-hour economy test upon a turbine, installed earlier in the year, at the Waterside station No. 2 of the New York Edison Company. This test was conducted entirely by the New York Edison Company, under the direction of J. P. Sparrow, chief engineer. The various arrangements were carried out in accordance with a mutual agreement between builder and operator, entered into previous to the test, and the results given were obtained by independent computation.

The turbine unit tested is of standard Westinghouse construction. It has a maximum rated capacity of 11,250 kilowatts and was built to operate on 175 pounds steam pressure, 28 inches vacuum and 100 degrees superheat. Under these conditions the turbine unit was guaranteed to have a minimum steam consumption of 15.9 pounds per kilowatt-hour at the generator terminals, with a normal speed of 750 revolutions per minute. Incidentally the electrical efficiency of the generator was guaranteed to be 97.8 per cent, exclusive of friction and windage, at a load corresponding to that sustained during the test. The results of the test detailed below show an economy about 7.5 per cent better than the guarantee.

Methods of Conducting the Test.

Load.—During the test period No. 2 Waterside station sustained practically all of the 25-cycle load on the system, of which the unit under test carried practically 70 per cent, the

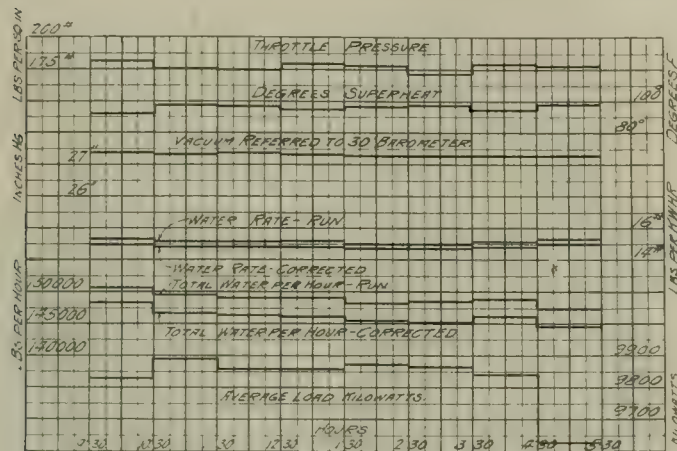


Diagram of Turbine Performance.

remainder by the other turbine units in the station. This load was maintained as constant as possible by remote control of the turbine governor by the switchboard operator. Between the first and the last hours of the test the maximum variation in load was held within 4 per cent above and below mean. During the last hour, however, the load decreased somewhat. Previous to the test this turbine unit had been running on a load of 7,000 kilowatts, which was increased to its test load 10 minutes before the start.

Calibration.—The three-phase electrical load was measured by the 2-wattmeter method, using two Weston indicating wattmeters of the standard laboratory type. These instruments were calibrated at the New York Electrical Testing Laboratories immediately before and after the test. Power factor was maintained substantially at unity, and all electrical readings were taken at 1-minute intervals.

Steam Consumption.—As a surface condenser was used in connection with this turbine unit, the water rate was determined by weighing the condensed steam delivered from the condenser hot well. This condensation was weighed in a tank mounted upon platform scales, with a reservoir above large enough to hold the condensation accumulating between each weighing. These weighings of 12,000 to 13,000 pounds each were made at intervals of five minutes.

Gland Leakage.—By the loop method of connecting the gland water supply the necessity for correcting condensation by an amount equivalent to the weight of the gland water used is avoided. It will be noted that a continuous gland water circuit is used entirely outside of the weighing apparatus, and that all overflow from the standpipe returns to the hot well delivery.

Condenser Leakage.—As the circulating water is quite salt, any condenser leakage may immediately be detected by

the salinity of the condensed steam, which should be pure distilled water. On this account condenser leakage was determined entirely by chemical analysis, employing the silver-nitrate test with a suitable color indicator. This method proved extremely sensitive, and possessed a decided advantage over the ordinary method of weighing the leakage accumulating during a definite period when the condenser is idle and under full vacuum. As samples of circulating water and condensed steam could be taken at the same time, this method made it possible to discover any change in the rate of condenser leakage taking place during the test, while the method of weighing above described provides only an average result during the period.

Hot Well Correction.—In this condensing plant the delivery of the hot well pump is automatically controlled by a float valve in the interior of the hot well. This maintains the water level therein at a practically constant point, and hence no correction had to be made for difference in level of water in the hot well before and after the test.

Steam Supply.—Steam pressures and temperatures were determined close to the turbine throttle. As usual, the degree of superheat was obtained by subtracting from the actual steam temperature the temperature of saturated steam at the corresponding pressure carried at the time. All gauges and thermometers were calibrated previous to the test at the United States Testing Bureau. It will be noted that both pressure and superheat were somewhat below the guarantee.

Vacuum.—Vacuum was measured directly at the turbine exhaust by means of a mercury column with a barometer alongside for reducing to standard barometer—30 inches. This also obviated the necessity for temperature correction between the two mercury columns. During the test the vacuum was not maintained quite up to normal.

Results of Tests.

The following data represent the result of the tests, calculated for the conditions as actually run; i. e., for instrumental errors only:

Duration of test 9:30 a. m. to 5:30 p. m.
Average steam pressure at throttle, pounds per square inch, gauge 177.5
Average superheat at throttle, degrees F. 95.74
Average vacuum (referred to 30-inch barometer) inches, height 27.31
Average load on generator, kilowatts 9,830.48
Average steam consumption, as tested, pounds per kilowatt-hour 15.15

Test Correction.—Owing to the departure, during the test, from specific operating conditions upon which guarantees were based, it was necessary to correct the observed results by the following amounts:

Pressure (2.5 pounds high) correction, 0.25 per cent;
vacuum (0.69 inch low) correction, 1.84 per cent; superheat (4.26 degrees low) correction, 0.29 per cent.

These corrections were mutually agreed upon previous to the test as representative of this type of turbine. When applied to the observed steam consumption given above the following results, representing contract conditions, are obtained:
Average corrected water rate

during 8-hour test 14.85 pounds per kilowatt-hour
Guaranteed water rate 15.9 pounds per kilowatt-hour

Log.—Referring now to the log, it is interesting as a check upon the average figures above presented, to observe the results segregated into hourly periods, as shown. Here it will be noted that the load was considerably lower during the first and last hour than during the main part of the test. Neglecting, therefore, these two hours and considering only the 6-hour period from 10:30 a. m. to 4:30 p. m., the results are as follows:

Average corrected water rate 14.8 pounds per kilowatt-hour
Equivalent water rate... 10.65 pounds boiler horsepower-hour
Equivalent water rate... 9.8 pounds indicated horsepower-hour

The two latter quantities are determined by applying conversion factors for generator efficiency and for internal losses.

In connection with these tests a noteworthy agreement exists between the results noted and those previously obtained from tests of machines of similar design installed in the Manhattan station of the Interborough Rapid Transit Company, New York, and the Long Island City station of the Pennsylvania Railroad. At the same loads and with equivalent operating conditions, the performance of the machines is almost identical. These economic results, while not exceeding in actual steam consumption the best records of European practice, yet are extremely good in view of the moderate operating conditions under which the test was conducted. In fact, they represent the best results that have yet been obtained by any turbine under the conditions named.

Electric Railway Review

DAILY EDITION

PUBLISHED BY THE WILSON COMPANY

IN HONOR OF THE ANNUAL CONVENTIONS OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AND OF ITS ALLIED ASSOCIATIONS OF ACCOUNTANTS, ENGINEERS, CLAIM AGENTS AND MANUFACTURERS, AT ATLANTIC CITY, N. J.

Subscription in advance, including regular weekly issues and daily editions published from time to time in places other than Chicago, postage free; one year, \$2.00; foreign, \$5.00; Canada, \$3.50; single numbers, 10 cents.

PUBLICATION OFFICES: 117-151 North 10th Street, PHILADELPHIA

EDITORIAL OFFICES: The Steel Pier, ATLANTIC CITY, N. J.

BUSINESS OFFICES: 160 Harrison Street, CHICAGO; 150 Nassau Street, NEW YORK; 1529 Williamson Building, CLEVELAND.

VOL. XVIII

PHILADELPHIA, PA., OCTOBER 14, 1907

No. 15a

We hope our friends will find the Daily Review during the present week even more useful and helpful than it has been at previous conventions. In the environment of Atlantic City, with the facilities at our disposal and with the assurances of appreciation which have so generally and generously reached us, we certainly should

not fail to match expectations, however high those expectations may be. The Daily is designed to be a faithful, comprehensive and prompt chronicle of the conventions; to assist in the promotion and development of the best practice in electric railway operation and administration; to aid in a more thorough acquaintance and understanding between the several departments of the service and between the representatives of the railways and the representatives of those who serve them with equipment and supplies; and to be an ever-present help in time of need to our beloved contemporaries of the technical press. To these exalted purposes we dedicate the endeavors of a strenuous and united staff for the next six days.

The
Daily
Review.

The Public Service Commission for the first district of New York is now conducting an investigation into the affairs of the companies holding and operating the New York street surface railway system, notably, the Metropolitan Street Railway Company and the Metropolitan Securities Company. The examination of the accounts

Evil
Effects of
Secrecy.

of these companies has developed a number of alleged irregularities. Two of the items which have been the cause of considerable adverse comment on the part of the daily newspapers are a payment of \$10,000 said to have been made to H. A. Robinson, treasurer, on the occasion of the meeting of the American Street Railway Association in 1901, and a contribution by the Metropolitan Securities Company of \$15,000 to the National Civic Federation to help pay the expenses of the Federation's committee on "Municipal Ownership" which made an investigation of this subject in the United States and in Europe. The only thing wrong about these two expenditures lies in the secrecy with which they are alleged to have been made. The \$10,000 for the 1901 convention was an entertainment expense which was sanctioned by long usage, according to which the street railways in the convention city provided an exhibit hall for the use of the American Street Railway Association. This expense, which was perhaps a small matter for the companies in large cities, has since 1902 been recognized as unreasonable and unnecessary. The unfortunate effect of secrecy is best shown in connection with the contribution of \$15,000 for the National Civic Federation municipal ownership work. The proper solution of the municipal ownership question is of the very greatest importance to the whole body of taxpayers as well as to investors in those corporations which would be displaced in the operation of public utilities. For this reason the expense incurred by the management of the New York street railways for the purpose of laying the facts regarding municipal ownership operation before the public was money well invested for stockholders, and we believe for the general public as well. The fact that this contribution of the railways was made in secret

gives opportunity for the allegation of bias on the part of the committee which represented the Federation and the ill odor clinging to the financial operations of these companies is made the excuse for questioning the reliability of the report. Had the facts been plainly stated at the time the payment was made, such attacks as these would fall flat.

====

Exhibits
on the
Pier.

A convention without exhibits would be dull indeed. But here in Atlantic City the association visitors are to be especially favored with an exhibit of supplies for electric railway service which, without doubt, has never been surpassed. The executive committees have chosen wisely in their selection of Atlantic City

as the meeting place for the 1907 conventions. With regard to the accommodations for the exhibits the Steel Pier offers many desirable features. This structure extends from the Boardwalk, near Virginia avenue, for more than a quarter of a mile oceanward, and with its four enclosed halls, large arcade and broad promenades affords a most desirable exhibit space. The manufacturers have realized the opportunity thus afforded and by Sunday night nearly 200 exhibit booths were ready for visitors. The early completion of exhibits is especially to be commended. While the handling of heavy supplies has in a measure been hampered by a lack of tracks into the exhibit space, yet through vigorous efforts such unwieldy parts have all been properly placed, until last night saw the booths lacking but the few finishing touches of the last minute. The display of the manufacturers so satisfactorily disposed along the promenades of the pier can not but warrant the appreciation of the association members for whose benefit and in whose honor the exhibits have been installed so satisfactorily.

====

Relations
With The
Public.

Associations of the character represented here should permit no delegates to be doubtful concerning the value of the meetings. The associations should prove their worth at each gathering, because failure to advance is fatal to men and to institutions. If the associations do not keep progress with the improvement in the industries

they represent, the failure will be apparent to old members as well as to the new delegates who come with great expectations. In the discussions at the various meetings there ought to be a frank recognition of the vital issues of the day affecting street and interurban railways. At this time these issues, more than at any other period, in the history of railways, have to do with the relations with the public. There is grave injustice in much of the recent legislation affecting corporations and the attitude of many public officials towards railways amounts to demagoguery; but the extraordinary upheaval in public sentiment may be turned to good ends by some companies if they will take advantage of the opportunity to make public their side of the transportation problem. If given publicity, the facts concerning many features of electric railway operation would help to create a new understanding on the part of the public of the trying duties of managers. This truth is appreciated by many officials; and information as to what these officials are doing to overcome prejudice and

create confidence would assist those who are wrestling with similar problems under discouraging conditions. The associations should deal with the electric railway situation as it is to-day and will be to-morrow.

NEW TWIN CITY CONCRETE STRUCTURES.

The new concrete shops of the Twin City Rapid Transit Company reflect great credit upon this constructive organization and its operating head, Calvin G. Goodrich. This group of shop buildings represents the highest type of structure which has so far been employed for purposes of this character in electric railway work. Elsewhere in this issue of the Daily Electric Railway Review appears a detailed description of the architectural features of the new shops. The article is illustrated with numerous halftones which will convey an idea of how completely the details have been evolved with a view of lowering maintenance costs.

At present the structures completed comprise six large shop buildings and a car house. The latter structure includes accommodations for the transportation department in the way of employees' quarters and the division-headquarters office. It is planned in the future to erect four other large buildings and possibly to extend the existing structures, should conditions require such improvements. The system of yard tracks has been laid out carefully to permit the handling of work in a routine manner, the rough material entering the shops from one end of the course and being passed through the different departments to final completion in the paint shop, from whence, by means of the turntable serving all the shop buildings, the finished product may be sent out of the yards over a ladder track, which diagonally intersects all storage and work tracks in the yards.

The methods of handling repair work are of especial interest. When cars are brought in for inspection or repairs they will first be taken to the car house; and, if the reported trouble should be found in a truck, that truck will be replaced by one in good repair and the equipment immediately returned to the transportation department, the impaired truck being sent through the shops for complete overhauling. Thus it is seen that by the use of extra trucks, a practice which we recall is also employed effectively by the Metropolitan West Side Elevated Railway of Chicago, the largest amount of rolling stock possible can be kept in actual service. To provide for this advantage of truck replacement the Rapid Transit company maintains one extra set of trucks for each 25 cars operated.

The new buildings in which the repair work and car building will be carried out represent careful study on the part of the architectural engineers as well as the mechanical department for the use of which they were built. Except for roof construction of the paint and machine shops, where a special system of cross-intersecting girders supports large skylights, the structures are similar as to material and design. The concrete and the steel required for reinforcement and for fire doors were the only constructive materials employed. Thus it is seen that a fire must depend entirely for its origin upon the materials stored within the buildings. The foundations are of monolithic concrete construction and the side walls comprise an interior row of concrete blocks veneered on the weather side with pressed concrete brick. The girders, including the crane runway and supporting columns, are of reinforced concrete and the roofs are concrete slabs reinforced with steel wire fabric.

Special care has been observed in preparing for the handling of the heavy work, erection and transporting heavy materials from one part of a building to another or from one shop department to another. The larger buildings are provided with traveling cranes and the machine shop has a system of four smaller overhead cranes with electrically operated hoists. These small cranes are so placed that

every machine tool on the ground floor of the large machine shop will be served.

All the tools of more than 3-horsepower capacity that it has been found desirable to purchase for the equipment of the new shops are operated by individual motor drive, and those driving motors which are not directly geared to the machine tools are supported from the under side of a system of steel girders directly below the ceiling. The benefits to be derived from placing the motors in an elevated position may be appreciated when the value of floor space in shops is considered and when it is remembered that one of the greatest enemies of an electric motor is dust, and especially dust that includes fine particles of metal.

While the complete new shop equipment of the Twin City lines is probably larger than is necessary under existing conditions, the expansion of this system and the satisfactory traffic increase which these lines enjoy would indicate that at no far distant time the proposed extensions, for which allowance has been made in the present plans, will be needed.

DEPRECIATION.

In discussing the subject of depreciation, as applicable to railways, the starting point is the fact that there is a deterioration of physical property which is not, and by the very nature of things cannot be, compensated for by current repairs. Prudence dictates that the fact be recognized and that provision be made for this deterioration. Assuming that depreciation is to be provided for there are three things to be considered: (1) The theory on which the provision is to be made. (2) The rate at which the depreciation accrues. (3) The method of accounting for depreciation.

Until very recently the theory upon which the managers of steam railways in this country proceeded was that if renewals be charged to operating expenses and the property thus maintained in good and serviceable condition, all that is necessary has been done. In this theory the assumption is that as the investment is permanent all that is necessary is to maintain the earning capacity.

As was very clearly stated in the course of the discussion on depreciation at the Columbus meeting of the Accountants' association, this policy results in the impairment of the capital account to the extent of about one-half of the cost of that portion of plant and equipment which is subject to deterioration. If the average life of the property (gradually purchased and gradually replaced) subject to depreciation is ten years the impairment at the end of ten years will amount to 45 per cent. in spite of renewals, and if the life is twenty years the impairment after twenty years will be 47½ per cent. To some extent this dissipation of assets through gradual depreciation of certain portions of the property is off-set by the appreciation of other portions.

In the case of steam railway companies which have a perpetual life, owning their rights of way in fee instead of holding them under limited franchises, it may well be argued that to make renewals out of earnings is sufficient provision for depreciation. Stated baldly, this means that while a considerable part of the investment is dissipated, the stockholder need not be uneasy because there never will have to be a final accounting for the capital. The arguments that support this policy are equally applicable to street and electric railways which enjoy "perpetual" franchises. Some recent events, however, suggest the thought that it is not altogether safe to rely upon the perpetuity of perpetual franchises. Thus:

The United States supreme court held void the 99-year act upon which the traction companies of Chicago relied. It is notable that although this law was the subject of controversy for thirty years, until the final litigation no lawyer who advised concerning the question, at the instance of either advocates or opponents, doubted its validity. The judgment of the United States supreme court was based upon

principles that the Illinois legislature which passed the act, the governor who vetoed it, and the city administration which opposed it, never even dreamed would be held applicable.

The Philadelphia Rapid Transit Company operating under a franchise believed to be for 999 years has within the year entered into a contract with the city of Philadelphia under which the city has the option to purchase after fifty years, and the company has agreed to pay into a sinking fund on behalf of the city, sums that if invested at 3 per cent., will equal the stipulated purchase price inside of sixty years. The company in effect has abandoned a "perpetual" franchise for a 50-year contract, and the only hope of its retaining the property is that the city, which is to have the custody of the fund after a few years, will spend the

those who acting in good faith prefer more modern plant and equipment.

Taking up next the rate at which depreciation accrues, there is presented an engineering problem, the solution of which must be based on experience, and will vary with conditions. Philip Dawson has compiled figures from which H. S. Knowlton deduced the general average of annual depreciation to be 8 to 10 per cent. of the cost, and this conclusion was quoted with approval by C. L. S. Tingley in his paper before the Accountants' association at its meeting in Philadelphia, in 1905 (Street Railway Review, November 15, 1905, page 793).

The engineers of the Chicago Union Traction Company in 1903 estimated the annual depreciation of the property

Depreciation—Gross Receipts and Charges for Maintenance and Depreciation per Mile of Single Track.

	Fiscal year of	Total gross receipts per mile of single track.	Total maintenance and depreciation per mile of single track.
1. Steam railways of the United States as reported to the interstate commerce commission.	1905	\$ 6,959	\$ 1,837
2. Steam railways reporting to New York railroad commission.	1905	10,548	2,674
3. International Railway Company, Buffalo, N. Y.	1905	14,639	1,456
4. Twin City Rapid Transit Company, Minneapolis, Minn.	1906	16,849	2,738
5. Milwaukee Electric Railway & Light Company (railway department)	1906	*25,632	4,606
6. United Railways of St. Louis, Mo.	1906	*26,613	4,016
7. West Chicago Street Railroad Company.	1904	26,857	6,445
8. North Chicago Street Railroad Company.	1904	33,667	7,394
9. Chicago City Railway (per annum at same rate as for first half year)	1907.	33,454	4,336
10. Metropolitan Elevated, Chicago	1907	52,941	6,902
11. South Side Elevated, Chicago.	1906	96,078	11,939
12. Interborough Rapid Transit Company, New York (elevated and subway)	1906	107,739	10,921

Note.—For reasons stated in the text "Maintenance" for Nos. 1 and 2 is believed to include current "Depreciation." For Nos. 3, 10, 11 and 12 the reports show no charges on account of "Depreciation." For No. 9 "Depreciation" is expressly excluded. For Nos. 4, 5, 6, 7 and 8 the reports show charges for "Depreciation" in addition to those on account of "Maintenance."

money as received and never be in a financial position to exercise its option to purchase.

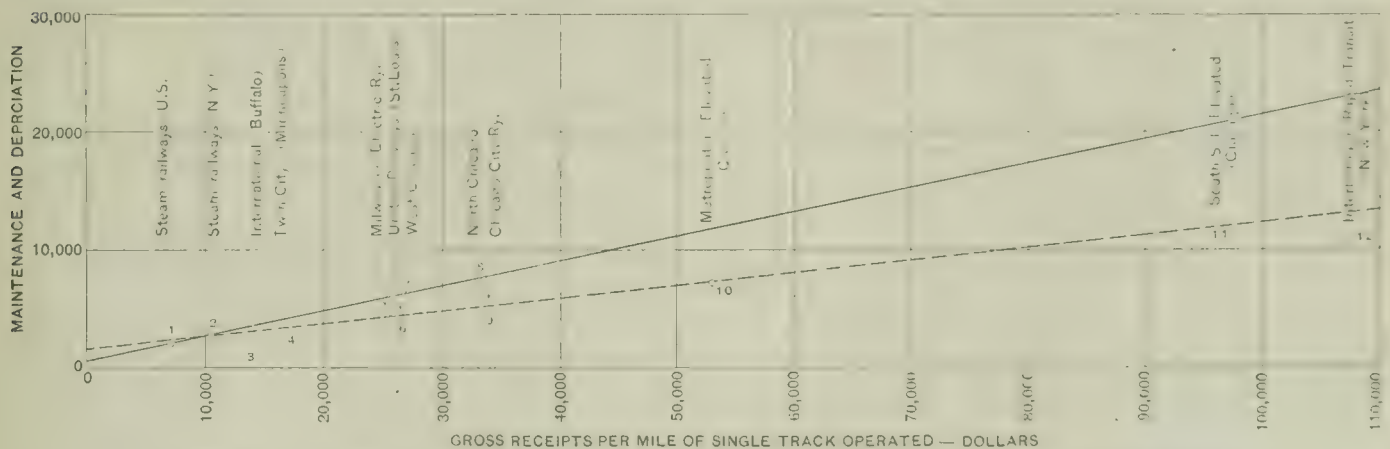
The street railways of New York City, where the boast for years has been that the problem is not to get traffic, but to carry the traffic that offers, have now reached the climax of a series of stock-watering orgies, and it is not improbable that the final adjustment will provide for the waiver of substantial franchise rights as part payment for bad management.

Even if it be safe for a company enjoying a perpetual

of the North and the West Chicago Street Railroad companies operated by it, to be 6.20 per cent. of the cost. Stone & Webster who had been retained to advise the Court in which the Chicago Union Traction Company receivership was pending reduced this figure to 5.65 per cent. per annum.

The Glasgow Tramways in 1906 appropriated for depreciation an amount equal to 5.92 per cent. of the average capital account for the year.

Figures on depreciation mean little unless the corresponding figures on repairs be given also. If the two items



Depreciation—Relation Between Gross Receipts and Charges for Maintenance and Depreciation.

franchise to dissipate a considerable portion of its capital by accepting the theory that renewals will compensate for depreciation, it does not follow that 20-year or 30-year franchise holders are in the same position. The possibility of having to replace the existing plant and equipment, not because it is worn out, but because it has become obsolete by reason of the advancement of the art, is always present. The company with a long-term franchise may plan to make the improvements when, and not until when, it is good business policy to do so; but if the franchise tenure is short the company must always face the fact that on the expiration of its grant the property may be forced to the auction block, and though its earning capacity be unimpaired the plant may have only a junk value for rival bidders—pirates in the field, or

"depreciation" and "repairs" be grouped, there are available data which should be of great assistance in determining what is a proper depreciation charge for electric railways. Analysis of the reports of the electric railway companies showing charges on account of depreciation indicates that the allowance for depreciation should be about one-third greater than the expenses for current repairs. This is also the estimate of those responsible for drafting the new franchises for Chicago in which it is provided that 6 per cent. of the gross receipts shall be expended or reserved for repairs and that 8 per cent. of the gross receipts shall be expended or reserved for renewals.

There are at hand statistics of the interstate commerce commission covering the operation of the steam railways of

the United States for the last 18 years. From these it appears that charges on account of maintenance (which includes renewals) of way and buildings and of equipment amounted to 39.69 per cent. of operating expenses in 1888, decreased gradually to 35.07 per cent. in 1894, then increased gradually to 40.81 per cent. in 1900, reached the maximum of 41.37 per cent. in 1902, and in 1905 were 40.52 per cent. of operating expenses. The average for the 18 years is 38.65 per cent. Inasmuch as the records cover a period of nearly 20 years and show but slight variations it is probably safe to assume that for 1905 the maintenance charges on the steam railways included the current depreciation (although there is an accrued depreciation not yet accounted for) and that for steam railways the proper charges for maintenance and depreciation are about 40 per cent. of total operating expenses. The average for the six years 1900 to 1905 inclusive is 40.56 per cent. of operating expenses, or 26.06 per cent. of the gross earnings and other income.

The steam railways reporting to the New York railroad commission show for 1905 maintenance charges equal to 37.76 per cent. of operating expenses, or 26.85 per cent. of the gross earnings and other income. For the five years 1901 to 1905, inclusive, the averages are 38.01 and 26.76 per cent., respectively.

Of the electric railways in the United States which may be making any provision for depreciation there are but few which make public reports as to the amount so reserved. Data as to four of these few have been published in the *Electric Railway Review* within the year, and it is believed that it may be useful to repeat some of the facts heretofore presented concerning the Chicago Union Traction Company, the United Railways of St. Louis, The Milwaukee Electric Railway & Light Company and the Twin City Rapid Transit Company.

It is certain that maintenance charges per mile of track operated should vary in some manner with the density of traffic and it may be interesting to compare the reports of various properties as to gross earnings and maintenance and depreciation charges. Such comparisons are made in the accompanying table and the same data are shown graphically in the diagram, whereon 12 points are located. Assuming that the increase in maintenance and depreciation charges should be proportional to the increase in gross receipts, a straight line on the diagram will represent the proper relations between them. For reasons already stated the ratios represented by points 1 and 2 (steam railways of the United States and of New York, respectively), are accepted as indicating maintenance charges which are large enough to include depreciation. Through the mean of points 1 and 2 two lines are drawn. The solid line is drawn through the mean of points 7 and 8 upon the hypothesis that the recommended practice of the Chicago Union Traction Company shows what is proper for railways earning from \$28,000 to \$34,000 per mile. The dotted line is drawn through the mean of points 10 and 11 upon the supposition that the provision for maintenance made by the Metropolitan and the South Side elevated roads is sufficient. The points representing the maintenance and depreciation charges of the other roads named are for the most part quite close to the dotted line and considerably below the solid line, indicating adequate or inadequate provision for maintenance and depreciation, according to the standard that is chosen.

In favor of the solid line is the fact that the charges on account of depreciation accepted as correct by the North and West Chicago companies were determined by disinterested engineers and accountants and based upon an inventory of the property and careful estimates of the cost of replacement. Against the dotted line it may be argued that points 10, 11 and 12 represent roads that are comparatively new, at least as regards electrical operation. The Metropolitan Elevated has been operating about twelve years and the charges per mile for maintenance of way have increased

145 per cent. since 1901, and the cost of maintenance of equipment per car, with a large number of new cars included, has increased over 68 per cent. in the same period. The South Side elevated has been operating about fifteen years and charges per mile for maintenance of way have increased 214 per cent. since 1897, while in the same period charges for maintenance of equipment have risen from 6.6 per cent. of gross earnings to 8.3 per cent. of gross earnings. The Interborough Rapid Transit has the subway which was opened for operation three years ago and the elevated lines which have been operated by electricity only since 1902. From these facts it is reasonable to infer that these three companies may not have been operating long enough for maintenance charges to have reached their normal maxima when they would include all of the accruing depreciation, as is now believed to be the case with the steam lines.

Other exceptionally interesting data are shown in a report of the Chicago City Railway, published on September 26, 1907. For the six months ended July 31, 1907, the Chicago City Railway Company, operating under its new ordinance, reported gross receipts of \$16,727 per mile and maintenance charges of \$2,168 per mile of single track. The new ordinance specifies that during the 3-year period of rehabilitation 70 per cent. of the gross receipts "shall be set apart and shall be used so far as required in defraying the operating expenses, including maintenance and repairs, and the residue of said 70 per cent. shall be applied to the cost of renewals and no part of the cost of any renewal paid out of such 70 per cent. shall be charged to additional capital, and all expenditures for renewals during said three years in excess of such residue of said 70 per cent. shall be charged to capital account."

That is, the ordinance expressly stipulates that for three years from February 1, 1907, no renewals (and hence no depreciation) shall be charged to operating expenses. Hence \$4,336 per mile of single track per annum (twice the charge for six months) is the figure reported by the company, and certified by the board of supervising engineers to be correct, as the necessary charge for mere maintenance of an electric railway reporting receipts at the rate of \$33,454 per mile per annum. The Chicago City Railway Company is indicated by point 9 on the diagram. This point it will be observed lies below the dotted line. Further, it will be remarked that \$4,336 is 13.05 per cent. of \$33,454; that is, maintenance charges for the first six months were more than twice as much as the 6 per cent. named in the Chicago ordinance as the minimum charge for repairs.

Therefore it appears probable that the dotted line shown is too low, and that the solid line better indicates the necessary provision to include depreciation. This grouping of a comparatively few and perhaps isolated facts is not presented with the idea that it gives a certain general formula for computing depreciation, but with the hope that it will provoke discussion which will throw more light upon the subject.

The details of the method which should be followed in accounting for depreciation offer a fairly wide field for discussion, but these should not be difficult of adjustment. The most important thing is that the scheme of accounting be such as to show the truth, and show it so that the outsider may know what it is. When property is kept in good repair depreciation is less than when repairs are neglected, and for this reason it seems desirable to show the charges for repairs and for depreciation together. There always will be times when the temptation to scientifically skin a property for personal profit, to pay dividends or to make a good showing for the management is almost overpowering, and for the general good the standards in accounting should be such as to make such tactics apparent.

Acting under authority conferred by the Hepburn law to prescribe the forms of accounts for common carriers engaged in interstate commerce, the interstate commerce

commission promulgated the third revised issue of its "Classification of Operating Expense Accounts" to become effective July 1, 1907. The new classification requires that formal depreciation accounts for equipment be established but the rate of depreciation is not specified, being left to each road to determine for itself from its own experience. The commission tentatively adopted the recommendation of the Association of American Railway Accounting Officers but soon found it desirable to modify the directions as to the depreciation accounts. Briefly, the rules to be followed by steam railways as regards equipment are:

- (1) Charge repairs to operating expenses as heretofore.
- (2) Make monthly a stated charge to operating expenses for depreciation, in lieu of charging renewals to operating expenses as has heretofore been required. The amount charged for depreciation is to be credited to a reserve account.
- (3) Charge new equipment which replaces old equipment to the depreciation reserve or to income. New equipment which is an addition or betterment may be charged to income or to capital.
- (4) When equipment is destroyed, abandoned or sold, charge profit and loss with the accrued depreciation not theretofore charged on account of this equipment.
- (5) Make adjustments between the estimated depreciation charged to operating expenses and the actual depreciation accruing after July 1, 1907, through "Renewals" accounts.

The interstate commerce commission is desirous of going further and requiring that the steam railways establish depreciation accounts for permanent way and structures as well as for equipment. The various state commissions may be expected to proceed along similar lines, and to prescribe the same requirements for electric as for steam roads. The prospect may not seem inviting but we believe that in all pertaining to accounting and publicity for accounts, electric railways will gain by working in harmony with the railway commissions.

We believe that it is only a question of a few years until a proper accounting for depreciation will be considered necessary for all electric railways, and that those who are now opposed to even discussing the subject will become advocates of the policy. As corporations serving a public need, and in the language of recent judicial decisions "charged with a public use," electric railways cannot charge rates that are unreasonably high; on the other hand they cannot hope to escape having rates that are unreasonably low forced upon them if they persist in self-deception and continue to ignore an item of expense that is equal to 10 or 15 per cent. of gross earnings.

There is today no more serious question before the electric railways than that of depreciation, and it is one in which the delegates to the American, the Engineering and the Accountants' associations are all interested. For presidents and managers the viewpoint as to the proper theory of depreciation will vary with their franchise terms and with their relations to the public served; engineers have to provide much of the data on which practice shall be based; and accountants have to devise a plan for accounting which will be logical, workable and satisfactory to the state commissions and other regulating bodies.

The public has to be considered also and two instances may be cited to illustrate its attitude on this matter: The commission appointed to investigate the gas companies in New York a year or so ago struck out as improper the charge to operation on account of depreciation of 10 cents per 1,000 cubic feet in order to get the "reasonable" selling price of gas as low as 80 cents per thousand for which there was popular clamor. A firm of public accountants retained by the city of Milwaukee to investigate the accounts of The Milwaukee Electric Railway & Light Company within a few weeks has reported that the depreciation reserves of that

company were excessive and that on January 1, last, the balance in the reserve account was so large "as to suggest that its purpose was to permit the sequestration of the profits!" The questions before the engineers and accountants are largely matters of detail; the real problem is that confronting the executive officers, because they have not only to convince themselves but also to demonstrate to the public that they are right.

IMPROVED INTERURBAN SLEEPING CAR PLANNED.

It is reported that Harris F. Holland, president of the Holland Palace Car Company, is working on plans for an interurban combination sleeping and parlor car, which will be an improvement on the car he invented five years ago, of which two are now in use on the Illinois Traction System. It is planned to build the new car in two lengths, one of 54 feet 6 inches, and the other of 61 feet. The shorter car will contain 20 berths, 10 on a side; the 62-foot type will provide room for two more on each side. Mr. Holland is quoted as follows in regard to his plans: "As in my other car, two chairs, when reversed and made up, will constitute a lower berth. It will be the same with this car, except that the chairs will be shaped so as to be more comfortable than the straight-backed chairs in my first car. The upper berths will swing down from above, as in the old car, except they will be hung lower, thus giving the occupant more room."

A double floor was provided in the old car, between the sections of which the partitions and guide rails of the compartments were made to fold into the six-inch space between the two floors. This has been eliminated in the new car and I am perfecting plans for a partition of a different character. Just what this is I cannot say until my patent has been secured. The brass grill work at the top of the compartments has been done away with also.

The elimination of these things will make the new car weigh six tons less than the first one and will make a difference of about \$5,000 in the cost in favor of the new car. My new car can be manufactured for about \$15,000. The car will take four 85-horsepower motors, while the old car required four 150-horsepower motors. The compartments will be just as strong, durable and as private as those of the first car, and in no way will the arrangement detract from the strength of the car.

The car will have no baggage compartment, but there will be two toilet rooms and a smoking compartment, the latter capable of seating five persons.

Which Would You Rather Be?

If an editor makes a mistake he has to apologize for it, but if a doctor makes a mistake he buries it. If an editor makes one there is a lawsuit, swearing and the smell of sulphur, but if a doctor makes one there is a funeral, cut flowers and a smell of varnish.

A doctor can use a word a yard long without knowing what it means, but if an editor uses it he has to spell it. Any old college can make a doctor. You can't make an editor: he has to be born.

Some time ago the company working electric street railroads in Vienna asked the government authorities for permission to provide for a certain number of "standing-places" in its cars. But the government inspectors said no. Electric cars stop and start so quickly, they said, and change speed so much and so often, that passengers might be thrown against each other and discommode the seated passengers! It is intimated that there are cities where the electric cars, without providing standing-room, sometimes carry standing passengers. It is to be feared that Vienna is behind the age.

Conventionalities

F. H. Gale, of the General Electric Company, is among those present.

A good deal depends on the weather. Yesterday's sample was entirely satisfactory.

S. Walter Mower, secretary of the Engineering association, arrived yesterday afternoon.

B. B. Davis, secretary of the Claim Agents' association, was among the early arrivals.

Elmer M. White, secretary of the Accountants' association, will make his headquarters at the Chalfonte.

C. L. S. Tingley, president of the Accountants' association, is planning to reach Atlantic City early today.

Chairman Whipple must intend to compete with the H. J. Heinz Company since he has provided just 57 varieties for the "Entertainment" committee.

It is announced that an informal reception for the members of the Engineering association will be held to-night at the Dennis hotel from 7:30 to 9:00 P. M.

H. H. Adams, president of the Engineering association, reached Atlantic City yesterday in order to attend a meeting of the committee on "Standardization," in the work of which he is very much interested.

John I. Beggs, president of the American Street and Inter-urban Railway Association, is receiving congratulations because he is the only manager who has a certificate showing that he has been spending too much money for maintenance and depreciation.

John I. Beggs, president of the American Association and president of the Milwaukee Electric Railway & Light Company and the United Railways of St. Louis, arrived yesterday accompanied by Mr. and Mrs. Richard McCulloch, of St. Louis.

President James Haitch McGraw of the Manufacturers' association, has put a new dress on his face since the Columbus convention. Since he removed those sparsely settled whiskers his face is so natural that even old time friends hardly recognize him. The trouble all arises from a bold face of the type used on scare heads.

Lawless is here. Lawless of the Danville Car Company. E. J. comes pretty near holding the record, this being the twenty-second meeting of the association he has attended. His friends missed him last year at Columbus which was owing to a very serious accident that landed him in the hospital at the time.

Among the new faces to be seen at this meeting we notice that of Col. Patrick Egan, who is looking after interests of The Traction Railway Equipment Company. Colonel Egan, it will be remembered was United States Minister, Plenipotentiary and Envoy Extraordinary to Chili under President Harrison's administration.

Secretary B. V. Swenson, of the American association, has been laboring under great disability during the last few weeks owing to a severe affection of his right eye. During the strenuous period of preparation of the reports for the convention he has been reading proof with one eye while the oculists have been carving and treating the other.

The Security Register & Manufacturing Company has a sign in its exhibit space to the effect that important business engagements make it impossible for its representatives to attend the convention. Who ever heard of Giles Allison staying away from a convention? Dollars to doughnuts the Colonel's many friends will have an opportunity of seeing him here life size.

A. W. Warnock is "turrible" proud of his exhibit in the sun parlor. The next thing to taking the trip over the "Twin

City Lines" is to see the maps and pictures which have been brought here. Mr. Warnock may have been born a passenger agent, or he may have made himself one, but he certainly understands the art of attracting attention for the business with which he is identified.

In the very attractive and convenient programme of entertainment and general information issued by the ubiquitous entertainment committee there is an announcement reading as follows: "Bathing arrangements have been made with Adams' baths." Assuming that the weatherman will be good and give us bathing temperatures, this announcement is all right for the men. But what about Eve's baths?

It is to be hoped that the golf tournament which promises to be so pleasant a feature of the week's entertainment, can be made a permanent thing, and it seems to us that it ought not to be out of place to organize a golf club—which might well be called the "Asira,"—and hold tournaments at the annual conventions, as is done by the McBarmma Golf Club, when the steam railroads hold their June conventions.

George Long, who for the past five years has been associated with the sales department of the Chicago office of the American Steel and Wire Company, has resigned to become general manager of sales for the Electric Railway Improvement Company of Cleveland. Mr. Long has been in electric construction and railway supply business for the past 20 years and has a large acquaintance among railway men.

Those who have attended previous railway conventions at Atlantic City when large exhibits were made are particularly impressed with the great improvement of the present arrangements over those hitherto in vogue, particularly with regard to the layout in the entrance to the Steel pier and in the matter of a canvas roof over the arcade. In the event that there should be any wet weather this roof will add greatly to the convenience in approaching the exhibits.

B. B. Davis laid a "bright and early" claim to a room at the St. Charles hotel. Realizing the advantage of being on the scene in the event of trouble and of settling all questions of liability before proceedings were started, Mr. Davis arrived on Saturday. Knowing that the Claim Agents' Association is entitled to all good things, Mr. Davis' arrangements comprise a ground floor meeting room. Therefore, if you are a member of the elect you will be let in on the ground floor.

S. L. Lupton prepared for the National Association of Railway Commissioners' committee on "Railway Statistics" tables showing the legal requirements in regard to reports to state commissions and the character of the data reported in each state and the use made of these data by the states. Forty-three states and territories require annual reports from (steam) railroads, and in 38 of these the reports are for purposes of regulation; 29 states and territories require annual reports from electric railways, in six of which they are for purposes of taxation and 23 for purposes of regulation.

Treasurer J. R. Ellicott, of the Manufacturers' association, was one of the early arrivals last week, and he brought his system with him. The system went into operation as early as Saturday noon and as the treasurer, who is also chairman of the finance committee, has supervision of registering the members of the Manufacturers' association and their guests, it was well that the system was not only good but that it began doing business in the very early stages. Mr. Ellicott has with him on the finance committee the following: Bertram Berry, E. H. Baker, H. M. Ransom, C. S. Hawley, J. M. High, A. H. Sisson and F. V. Green.

"Bell and Bothwell" was a phrase very much on the tongues of those who were on the pier the latter part of last week. Mr. Bell, the generalissimo of Atlantic City, at least so far as conventions are concerned, and Mr. Bothwell, manager of the Steel pier, were as usual the targets of all secondary criticism and some criticism that was primary. As

usual they rose handsomely to the emergency and by yesterday morning they had effected a transformation which was rather startling to those who left the entrance hall on Saturday evening as late as nine o'clock. Those who on Friday were inclined to think that "Bell and Bothwell" were all wrong, yesterday were enthusiastic in the assurance to everybody they met that "Bell and Bothwell" were all right.

There are always two men at the street railway conventions that have the sympathy of everybody. They are the secretary of the Manufacturers' association and the director of exhibits. Mr. Keegan, secretary, and Mr. Hequembourg, director of exhibits, have had their full share of trouble but they wear trouble proof coats and hats which have served them in good stead. Kicks and criticism roll off without making any dents. Mr. Hequembourg is a member of the executive committee of the Manufacturers' association, and in his capacity as director of exhibits he is subordinate to Mr. Keegan. They have had a good deal of difficulty at times in determining just who was the boss. When Hequembourg speaks as a member of the executive committee he is the superior officer and endeavors to give instructions to Mr. Keegan. When he is acting in his capacity as director of exhibits he is Mr. Keegan's subordinate and has to walk the plank on a chalk line. So far as we have been able to learn no desperate or strained relations have arisen out of this promising situation.

Letters Looking for Owners.

Letters, telegrams and various kinds of communications for the following are waiting at the office of Secretary Keegan at the entrance of the Steel pier.

American Oil & Disinfectant Company.
 Anderson, A. & J. M.
 American Ware Power Company.
 Adams, H. H.
 American Multigraph Sales Company.
 American Sewer Pipe Company.
 American Locomotive Company.
 Atlantic City Electric Railway Company.
 Brill, J. A.
 Blackwell, Wm. L.
 Burns, W. J.
 Cox, C. H.
 Chilton, John.
 Case, J. O.
 Condit, J. A.
 Dodge, C. H.
 Evans Almirall & Company.
 Floczyaski, A. A.
 Graves, George B.
 Gould, E. N.
 General Fire Proofing Company.
 Jamison, Joseph
 Koury, C. M.
 Knickerbocker, C. H.
 Kise, W. K.
 Karrer,
 Kaufman, Benj.
 Leene, Joseph
 Lev, Benjamin
 Mitchel, P.
 McQuiston, J. C.
 Montgomery, Robert
 Peirce, Chas. C.
 Randall, T. A.
 Reeder Gas Appliance Company.
 Spotts, C. H.
 Shoemaker, Jos. L.
 Shrimp, J. E.
 Taylor, John
 Vreeland, F. P.
 Williams, E. M.
 Williard, F. A.
 Wilson, J. H.
 Wharton, William, Jr.
 White, L. H.

Members of entertainment committee will kindly secure their membership badges (which is the committee badge numbered) from C. R. Ellicott of the committee instead of from the registration bureau.

THE CONVENTION BADGE.

The official badge this year is an admirably conceived design symbolical of the nature and territorial scope of the association and of the meeting place. That the association is an international organization covering the North American continent is indicated by the miniature flags of Mexico, Canada and the United States. The car which has been a feature of several former convention badges is retained to mark the nature of the association. The Absecon light house in the background typifies the locality. The name American Street and Interurban Railway Association in gold letters on a blue scroll and the name of the convention city and the date complete the design. The several associations, classes of membership and guests are distinguished by colored ribbons which are as follows: For delegates representing members of the American association, blue; associate members of the American association, purple; members of the Accountants' association, orange; members of the Engineering association, brown; members of the Claim Agents' association, green; members of the Manufacturers' association, red; for guests, ladies and gentlemen, white.

For the officers and executive committeemen of all five associations the badges proper are suspended from double bars inscribed with the name and office. All the badges are useful as well as ornamental, but to be effective in securing for the wearer free chair service, reduced rates on baths, etc., the badge must be worn in plain sight.

Railroad Certificates.

Those holding railroad certificates entitling them to a reduced return rate are urged to deposit the certificates as early as possible with Secretary Swenson, who may be found at the entrance to the Steel pier on the right.

Mr. ——— was cross at his wife the other evening and railed something like this: "Madame, your face would stop a car in the middle of the block."

"Sir! she replied, you—you—"

"My dear," interrupted Mr. ———. "It takes an unusually pretty face to do that." He is squared forever.

Motorman Charles Calvin, of Columbus, Ind., has been demonstrated the official "Opener" of Indiana Traction lines. His latest accomplishment was that of running the first car over the Indianapolis, Columbus & Southern Traction Company's new extension between Columbus and Seymour on September 28. Mr. Calvin has the distinction of having operated as motorman the first interurban car ever run out of the city of Indianapolis between Indianapolis and Greenwood and also the first cars on two other roads from Indianapolis.

At the close of a banquet given by the Maharajah of Gwalior to the Prince of Wales a centerpiece in the form of a temple and decorated with electric lamps and flowers was hoisted to the ceiling by pulleys and revealed a perfect model railway on the table underneath. The locomotive and train were eight feet long, and carried decanters, cigars, cigarettes and matches. The train was started by closing an electric circuit. As long as this was closed by a spring the train moved, but the lifting of a decanter or box of cigars resting on the spring allowed the spring to act, thus breaking the circuit and stopping the train.

CONVENTION PROGRAMME.

MONDAY, OCTOBER 14.

Engineering Association.

(Steel Pier.)

9:00 A. M. TO 12:30 P. M.

Registration at Steel Pier.

2:00 P. M. TO 5:00 P. M.

Convention called to order.

Address—John I. Beggs, president American Street and Inter-urban Railway Association.

Address of the president.

Annual report of the executive committee.

Annual report of the secretary and treasurer.

Appointment of convention committees.

Reports of special committees.

Report of committee on "Control Apparatus."

Report of committee on "Maintenance and Inspection of Electrical Equipment."

Claim Agents' Association.

(St. Charles Hotel.)

9:00 A. M. TO 12:30 P. M.

Registration and Badges at Steel Pier.

Secretary Davis at St. Charles Hotel.

2:00 P. M. TO 4:30 P. M.

Convention called to order.

Address—John I. Beggs, president American Street and Inter-urban Railway Association.

Address of acting president.

Annual report of the executive committee.

Annual report of secretary and treasurer.

Appointment of convention committees.

TUESDAY, OCTOBER 15.

Accountants' Association.

(Chalfonte Hotel.)

10:00 A. M. TO 1:30 P. M.

Convention called to order.

Address—John I. Beggs, President American Street and Inter-urban Railway Association.

Annual address of president.

Annual report of executive committee.

Annual report of secretary and treasurer.

Paper—"Amusement Park Accounts," by Frank J. Pryor, Jr., comptroller the American Railways Company, Philadelphia, Pa.

Question Box—Edited by Frank R. Henry, auditor United Railways Company of St. Louis, St. Louis, Mo.

Appointment of convention committees.

New business.

2:00 P. M. TO 5:00 P. M.

Lunch and social afternoon, Chevy Chase room, Marlborough-Blenheim hotel.

Engineering Association.

9:30 A. M. TO 12:30 P. M.

Report of committee on "Way Matters."

Paper—"Care of Electric Railway Tracks," by George L. Wilson, engineer Twin City Rapid Transit Company, Minneapolis, Minn.

Report of way committee on "Rail Corrugation Investigation."

Report of way committee on "Concrete Tie Investigation."

Report of subcommittee on "Rail and Rail Matters."

2:00 P. M. TO 5:00 P. M.

Report of committee on "Standardization."

Report of committee on "Open Versus Closed Terminals for Car Storage."

Report of committee on "Operating and Storage Car House Designs."

Question Box.

Claim Agents' Association.

10:00 A. M. TO 12:30 P. M.

Paper—"The Policy of the Claim Department to the Injured Employee," by R. H. Schoenen claim agent Lehigh Valley Transit Company, Allentown, Pa.

Paper—"The Claim Agent of Today and His Work," by H. K. Bennett, claim agent Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.

Paper—"How I Manage Bad Cases," by Harry P. Vories, claim agent Pueblo & Suburban Traction & Lighting Company, Pueblo, Colo.

2:00 P. M. TO 4:30 P. M.

Paper—"The Selecting and Training of Investigators and Adjusters for the Claim Department," by Ellis C. Carpenter, claim adjuster Indiana Union Traction Company, Anderson, Ind.

Question Box—(Three minutes allowed to each member to discuss a question.)

WEDNESDAY, OCTOBER 16.

American Association.

(Steel Pier.)

9:30 A. M. TO 1:00 P. M.

Convention called to order.

Address of welcome—by the Hon. F. P. Stoy, Mayor of Atlantic City.

President's address.

Report of executive committee.

Report of secretary and treasurer.

Addresses by presidents of affiliated and allied associations.

Announcements.

New business.

Reports of Committees—(a) Membership; (b) compensation for carrying mail; (c) subjects; (d) car wiring; (e) standardization of equipment.

Paper—"The Technically Trained Man and the Electric Railway Profession," by Prof. H. H. Norris, Cornell University, Ithaca, N. Y.

Paper—"The National Fire Protection Association," by Ralph Sweetland, Boston, Mass.

Paper—"The Influence of the Design of Railway Structures on Economy of Operation," by H. T. Campion and William McClellan, consulting engineers, New York, N. Y.

Engineering Association.

9:30 A. M. TO 1:00 P. M.

Joint meeting with American association and allied associations. (Steel pier.)

2:30 P. M. TO 5:30 P. M.

Paper—"A Year's Experience with Gas Engines," by Paul Winsor, chief engineer motive power and rolling stock Boston Elevated Railway Company, Boston, Mass.

Paper—"Some Practical Points in Steam Turbine Construction; with Particular Reference to the Parsons Type," by St. John Chilton, engineer Allis-Chalmers Company, Milwaukee, Wis.

Paper—"Operation of Curtis Turbines in Railway Service," by August H. Kruesi, engineer General Electric Company, Schenectady, N. Y.

Paper—"Recent Developments in Steam Turbine Power Station Work," by J. R. Bibbins, engineer Westinghouse Machine Company, East Pittsburg, Pa.

General business.

Election of officers.

Accountants' Association.

9:30 A. M. TO 1:00 P. M.

Joint meeting with American Association. (Steel Pier.)

3:00 P. M. TO 6:00 P. M.

Paper—"Mechanical Devices and Other Office Appliances," by F. E. Smith, auditor for receiver Chicago Union Traction Company, Chicago, Ill.

Report of committee on "Standard Classification of Accounts and Form of Report."

Report of committee on "International Standard Form of Report."

Claim Agents' Association.

9:30 A. M. TO 1:00 P. M.

Joint meeting with American Association. (Steel Pier.)

2:30 P. M. TO 5:30 P. M.

Paper—"The Claim Department and What Should be Done to Make it Effective," by C. B. Hardin, claim agent United Railways Company of St. Louis, St. Louis, Mo.

Paper—"Instruction of Employees in Accident Work," by F. W. Johnson, assistant claim agent Philadelphia Rapid Transit Company, Philadelphia, Pa.

General business.

Election of officers.

THURSDAY, OCTOBER 17.

American Association.

9:30 A. M. TO 1:00 P. M.

Appointment of nominating committee.

Reports of Committees:—(a) Promotion of traffic. (b) Rules for the government of motormen and conductors. (c) Heavy electric traction.

Paper—"Light Freight Handling by Electric Lines," by P. P. Crafts, general manager Iowa & Illinois Railway Company, Clinton, Ia.; general manager, Joplin & Pittsburg Railway Company, Pittsburg, Kans.

Paper—"Freight Service on Electric Railroads," by H. H. Polk, president Inter-Urban Railway Company, Des Moines, Ia.

Paper—"A Department of Publicity," by J. Harvey White, publicity manager Boston Elevated Railway Company, Boston, Mass.

Paper—"Advertising from the Standpoint of the Street Railway Company," by A. W. Warnock, general passenger agent Twin City Rapid Transit Company, Minneapolis, Minn.

Paper—"The Problems of the Small Electric Road," by H. S. Cooper, manager Galveston Electric Company, Galveston, Tex.

Paper—"The Use of The 'Tee' Rail in Cities," by C. Gordon Reel, vice-president Kingston Consolidated Railway Company, Kingston, N. Y.

Accountants' Association.

10:00 A. M. to 2:00 P. M.

Paper—"Where Maintenance Ends and Depreciation Begins," by J. H. Neal, auditor of disbursements Boston Elevated Railway Company, Boston, Mass.

Reports of convention committees.

Election of officers.

Installation of officers.

Manufacturers' Association.

(Casino Hall.)

11:00 A. M.

Annual Meeting.

FRIDAY, OCTOBER 18.

American Association.

9:30 A. M. to 1:00 P. M.

Reports of Committees:—(a) Insurance; (b) rules for the construction of modern car houses; (c) municipal ownership; (d) public relations.

Paper—"Public Policies of the Past and Future," by C. Loomis Allen, vice-president Utica & Mohawk Valley Railway Company, Utica, N. Y.

Paper—"Interurban Railway Fares," by Theodore Stebbins, J. G. White & Co., New York, N. Y.

Paper—"Municipal Ownership in Great Britain and in the United States," by William J. Clark, Manager Foreign Department, General Electric Company, New York, N. Y.

Report of nominating committee.

Election of officers.

Resolutions.

Unfinished business.

Adjournment.

GOLF TOURNAMENT.

It is hoped that every golf player in attendance at the convention will participate in the tournament which is open to members of the several associations and their guests. The tournament will be held on the links of the Country Club of Atlantic City and as the qualifying rounds may be played at any time during the first four and one-half days of the convention lack of time should be no excuse for failure to enter. H. M. Garland, who has had the details of the arrangements in hand, has secured some fine prizes which are worth playing for. The following is the statement of the general procedure which will be followed:

The tournament will consist of an 18-hole qualifying round medal-play and subsequent rounds of 18 holes at match play, United States Golf Association rules to govern, subject to local ground rules.

The qualifying round of 18 holes may be played any time before noon of Friday, October 18. On entering, it is required that the entrant shall write his name on a sheet or book prepared for the event, and which will be posted at the club house, and also put in his score card and shall declare to his partner before starting that the round he is about to play is his qualifying round of the tournament, and his card must be properly attested by his partner and placed in receptacle furnished for the purpose. Entrant must turn in this score as his qualifying score and he can turn in but one score for this event. (Competitors may play practice rounds but must select before starting which round shall be the qualifying round.)

The player making the lowest gross score in the qualifying round will receive a prize.

The eight lowest scores qualify for the right to continue on at match play for first prize.

The eight next lowest scores qualify for the right to continue on at match play for second prize.

Friday, October 18, 1.30 P. M.—The sixteen men having lowest scores in qualifying round shall be paired off in their respective classes and play 18 holes match play for first and second prizes.

Saturday, October 19, 9.30 A. M.—The winners of first match play rounds shall continue on at match play. On Saturday at 1.30 P. M., the final rounds of 18 holes for first and second prizes will be played.

Saturday after 8.30 A. M., a kickers' handicap 18 hole medal-play, open to delegates and guests, will be played.

Conditions.—Each entrant shall fix his own handicap based on the probable score to be made by H. M. Garland who shall play in the handicap. The net score of the player

which shall come nearest to the gross score of H. M. Garland shall receive a prize. In case of a tie those players who tie for lowest net score shall play extra holes, the high scorers dropping out until the low score wins. All questions relative to play and decisions in case of disagreement on any point shall be decided by the tournament committee, H. M. Garland, chairman.

The Country Club of Atlantic City has very kindly extended the privilege of the club house to all delegates and guests during their stay, and admission to the grounds may be had by official badge. The privilege of playing on the links may be had on payment of a charge of one dollar per day, and tickets may be obtained from the steward at the club.

The club is located at Northfield, and may be reached by the Shore Fast Line electric cars, leaving from the boardwalk and Virginia avenue on the hour and half hour, and returning leaving Northfield station at 20 and 50 minutes past the hour. The club may also be reached by the Atlantic City & Suburban Traction Company's cars leaving from Florida avenue and boardwalk at 15 and 45 minutes past the hour, returning leaving Northfield 10 and 40 minutes past the hour. The running time is about 20 minutes.

OUTLINE OF THE WEEK'S ENTERTAINMENT.

The arduous duties of chairman of the entertainment committee, which for a number of years have been so ably taken care of by Mr. C. C. Peirce, have this year been in the hands of Mr. A. L. Whipple. Though Mr. Whipple has had many things to occupy his attention and the task before him has not been an easy one, he has not been unaided by previous experience. Under his direction a number of events of note have been scheduled for the entertainment of the guests and members of the associations during the convention week.

Monday's Entertainment.

As most of Monday will be occupied in registration no entertainment has been provided until the evening of that day. However, a series of songs and recitations, which will be given by Miss Kitty Cheatham, in the Solarium at the Marlborough-Blenheim, at 9 o'clock, will undoubtedly be one of the events to be remembered. The programme is as follows:

Programme.

PART I.

Two 18th Century French Songs	
Mon Petit Coeur Soupire }	Weckerlein
Maman, Dites—Moi }	
An Old Romance of Two Family Portraits	D'Hardelet
(Written for Miss Cheatham)	
Three Old Negro Melodies	
Children Songs—About Dolls	
Jerushy }	Gaynor
The Sugar Dolly }	
About Animals	
The First Friend (From Kipling's Just So Stories)	German
The Cow (Robert Louis Stevenson)	Graham Peel
The Bogey Man	Troubridge
(Manuscript Written for Miss Cheatham)	
Two Nursery Rhymes	
Little Boy Blue }	Coolidge
Ding—Dong—Bell }	

PART II.

Three Modern Negro Songs	
Is You?	Bond
Why Adam Sinned	Rogers
Don' Be What You Ain't	Hein
Two Recitations	
"Butterflies"	Minnie Cochrane
(From the French of Francois Coppee)	
Slumberland (Written for Miss Cheatham)	
The Sorrows of Two Little Boys	
Waltzing }	Carpenter
Practicing }	
An Ill Wind That Blew Somebody Good	Gilbert
A Nonsense Rhyme—"A Lady of Niger"	Lang
At the Piano—Miss Flora MacDonald	
Music for informal dancing will be provided from 11 to 12.30 following Miss Cheatham's recital.	

Tuesday's Events.

It is hoped that the weather and the number of ladies in attendance will warrant a roller chair parade for Tuesday afternoon. In view of the situation the details of this event

have not yet been arranged. Further announcement will appear in the Daily Electric Railway Review on Tuesday morning.

On Tuesday evening the annual reception in honor of the presidents and other officers and their ladies will be given in the Solarium at the Marlborough-Blenheim.

On Wednesday most of those in attendance at the conventions will be engaged in the important convention meetings which are scheduled for that day. In the meantime it is hoped that the ladies will avail themselves of an opportunity to visit the Country Club of Atlantic City. Afternoon tea will be served, and for those who care for sports golf and tennis will be provided. A ladies' clock putting contest will be one of the afternoon events and a number of prizes have been provided. Sight-seeing automobiles will leave the Marlborough-Blenheim at 2 o'clock, stopping at the Chalfonte en route. Special trolley cars will also be provided if the crowd is large or there are a number of ladies preferring to go to the club by trolley. The car leaves the boardwalk at Virginia avenue at 2.30 o'clock.

Wednesday Evening.

For Wednesday evening the committee has secured the entire house at Young's pier theatre and the Savoy theatre, which should provide ample room for all who wish to attend the performances. For this event tickets should be secured from the entertainment committee. They will be distributed from the box office on the Steel Pier on Wednesday from 11 A. M. to 1 P. M. The committee wishes to call attention for this event and that of the following evening to the fact that it is necessary to present your official badge before tickets can be secured and if it is desired to obtain tickets for ladies or friends their badges should be presented also.

Following the performance there will be an informal dance in the ball room at the Marlborough-Blenheim.

Thursday's Events.

On Thursday afternoon special cars will be provided on the Shore Fast Line for a trolley trip to Ocean City. The cars will leave the boardwalk in Virginia avenue at 2.30 P. M., returning at 5.30 P. M.

In the evening the third annual Supply Men's amateur vaudeville and theatrical performance will be given at 8.30 P. M., at Young's pier theatre, and will be followed by informal dancing at the ball room at the Marlborough-Blenheim.

Friday it is expected the men's golf tournament, which has been arranged to extend throughout the week and regarding which further information is given elsewhere, will probably be at its height. Further details in this connection, with the scores of the contestants, will appear in the Electric Railway Review from day to day.

On Friday evening an entertainment will be given in the Solarium at the Marlborough-Blenheim, the details of which will be announced later.

The official badge is required for admission to all the events.

Members of the Entertainment Committee.

The members of the entertainment committee who are responsible for the success of the social events of the week are as follows:—A. L. Whipple, Chairman, Curtain Supply Co., New York, N. Y.; John H. Thomas, Standard Paint Company, New York, N. Y.; F. H. Gale, General Electric Co., Schenectady, N. Y.; S. W. Curwen, J. G. Brill Company, Philadelphia, Penna.; J. R. Ellicott, Westinghouse Traction Brake Company, New York, N. Y.; Fred Atwater, Columbia Nut & Bolt Co., Bridgeport, Conn.; C. S. Gawthrop, American Car & Foundry Co., Wilmington; George A. Barnes, Galena-Signal Oil Co., Franklin, Penna.; Henry C. Ebert, Cincinnati Car Company, Cincinnati, O.; J. H. Denton, Allis-Chalmers Company, Milwaukee, Wis.; M. R. Jackson, Schoen Steel Wheel Company, Pittsburg, Pa.; Jacob Wendell, Jr., Wendell & MacDuffie, New York, N. Y.; Wm. C. Cuntz, Pennsylvania Steel Co., Steelton, Penna.; Chas. S. Powell, New York, N. Y.; Charles C. Calkins, Hildreth Varnish Company, New York, N. Y.; W. H. Heulings, Jr., J. G. Brill Company, Philadelphia, Penna.; O. T. Smith, Westinghouse Electric & Manufacturing Company, New York, N. Y.;

J. W. Porter, Electric Service Supplies Co., Chicago, Ills.; J. N. Nind, Jr., Electric Railway Review, Chicago, Ill.; Philip J. Mitchell, Philip S. Justice & Co., Philadelphia, Penna.; H. F. Vogel, Danville Car Company, Danville, Ills.; F. A. Estep, R. D. Nuttall Company, Pittsburg, Penna.; W. K. Beard, Street Railway Journal, Philadelphia, Penna.; George D. Rosenthal, General Electric Company, St. Louis, Mo.; Henry S. Hayward, Jr., Brady Brass Company, New York, N. Y.; Harry T. Bigelow, Hale & Kilburn Mfg. Co., Chicago, Ills.; N. M. Garland, Ohio Brass Company, New York, N. Y.; J. C. McQuiston, Westinghouse Electric & Manufacturing Co., Pittsburg, Pa.; Julian Roe, Crocker-Wheel Company, Chicago, Ills.; Charles S. Clark, Pennsylvania Steel Company, Boston, Mass.; Arthur W. Field, Standard Motor Truck Co., Pittsburg, Pa.; Charles J. Mayer, Electric Service Supplies Company, Philadelphia, Pa.; Wesley Meteer, Wallace Supply Company, New York, N. Y.; W. R. Kerschner, Columbia Machine Works, Brooklyn, N. Y.; C. J. Olmstead, Westinghouse Traction Brake Co., Chicago, Ills.; Frank McCoy, St. Louis Car Company, Pittsburg, Penna.; W. J. Walsh, Galena-Signal Oil Company, Chicago, Ills.; F. W. Lane, New York, N. Y.

The "Entertainment" committee organized yesterday at a formal meeting. Special committees were appointed as follows:

Roller Chair Committee.

J. H. Thomas, chairman.
W. H. Wilkinson,
J. H. Denton,
C. C. Castle,
W. J. Walsh,
W. W. Power,
S. B. Keys,
Fred Atwater,
D. B. Dean,
P. J. Mitchell,
A. W. Field,
Thomas Cooper,
C. J. Olmstead.

Reception Committee.

W. H. Heulings, Jr., chairman.
C. S. Gawthrop,
H. C. Ebert,
H. F. Vogel,
Frank McCoy,
D. B. Dean,
E. Besuden,
S. W. Curwen,
W. H. Wilkinson.

Ladies Afternoon At Country Club

J. R. Ellicott, chairman.
J. W. Porter,
W. H. Heulings,
F. H. Gale,
Ross F. Hayes.

Afternoon Trolley Trip for Ladies

W. R. Kerschner, chairman.
C. J. Mayer,
W. K. Beard,
G. A. Barnes,
H. J. Kenfield.

In stating that the entire system of street railways in La Rochelle is but four miles long and is operated by the compressed-air system known as "Makarski," United States Consul G. H. Jackson tells of the competition this French line now faces:

The service given to the public leaves much to be desired. The cars are of a very primitive type, noisy, and uncomfortable, while the delay at the compressing station to take air in the reservoirs is both annoying and inconvenient. The cars on the main line are run on an average every 20 minutes from 6 a. m. to 8 p. m. None of the various indicators for registering the number of passengers or fares are used, and the control is made by inspectors at several points along the line. In 1905 the receipts were \$30,095, the working expenses were \$22,446, and the net profit was \$7,649. The receipts were 61 francs per kilometer, which equals \$19.85 the mile, per day. In 1906, the receipts were 164,818 francs, the expenses were 110,117 francs, the net profit being equal to 54,701 francs, or 64 francs per day per kilometer, which equals \$20.43 per mile per day.

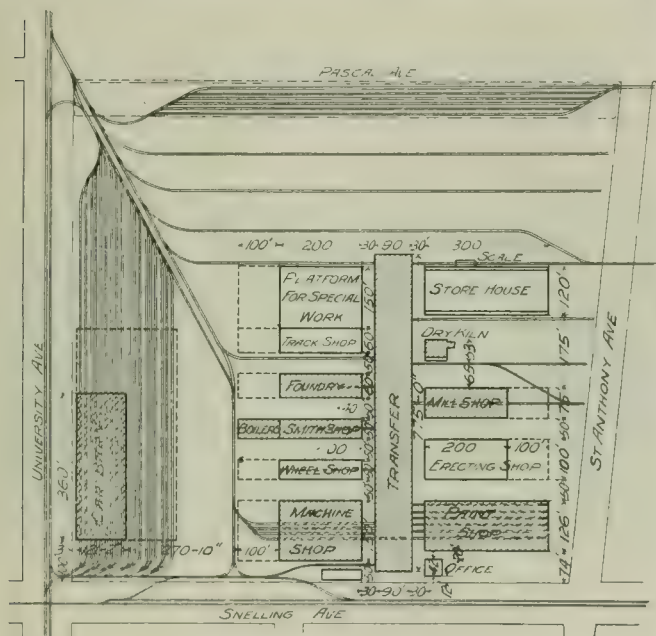
The appearance of the autobus company on the field can not but seriously affect the receipts of the street railway company, unless better accommodation and more rapid service are given for the traveling public.

NEW CONCRETE SHOPS OF THE TWIN CITY RAPID TRANSIT COMPANY.

About half way between Minneapolis and St. Paul are the new shop buildings of the Twin City Rapid Transit Company. This location is central for the present lines and future extensions as now planned. One corner of the 40-acre plot of ground on which the shops are built is at the intersection of the University avenue line, between the Twin Cities and the Snelling avenue north and south line, which latter line intersects all the east and west lines connecting Minneapolis and St. Paul. As shown on an accompanying plan, in which the structures now completed are indicated by shading, the group of new shop buildings includes the following departments: Machine shop, wheel shop, boiler house, blacksmith shop, foundry, track shop, paint shop, erecting shop, mill shop, dry kiln, storehouse and office. In addition to these shop buildings is an operating barn containing accommodations for employes and facilities for light repairs.

Method of Handling Repair Work.

Before describing the buildings in detail it may be of interest to outline the method to be used in handling car re-



Twin City Shops—Location of Buildings and Tracks.

pairs when the new shop equipment is complete. A cross section through the car house will show the track facilities afforded for making the first inspection of cars as they are brought in from the runs. Each bay of the inspection section will be provided with a power crane for lifting car bodies.

When cars are brought in for inspection or repairs they will be taken through the car house first, and if the trouble is found in a truck, that defective truck will be run out from under the car body and a truck in good repair immediately put in its place, so that the rest of the equipment may be idle for the shortest possible time. To provide for this method of truck replacement the Rapid Transit company maintains one extra set of trucks for each 25 cars. It is expected that in this manner from 25 to 30 cars in damaged condition can be returned to the line for operation each day. If for any cause the capacity of the truck-replacing facilities at the new shops is overcrowded, extra trucks in operating condition can be sent to the other modern car station which the company maintains and which is equipped with a body crane.

One half of the cars to be maintained at this barn will be trippers, which, after doing service during the day, will be set on the sidetracks in the yard, so that they can be in-

spected in the barn during the next night. The cars that are used as trippers during one week are placed on regular runs for the following week and the two halves of the equipment thus alternated in service, so that there may be no average difference in the character of the inspection which is given them. Inspection crews of the same size are maintained at night and during the day and therefore the number of car bodies required for a given service is maintained as low as possible. The yards surrounding the barn are laid out for 17 storage tracks to accommodate 16 cars each.

Concrete Structures.

Accompanying halftone views illustrate the especially attractive appearance of the new shop buildings, all of which are concrete structures. Work on these buildings began more



Twin City Shops—Interior of One Bay in the Car House.

than a year ago, but preliminary to the erection period proper it was necessary to make 85,000 yards of excavation. A scarcity of labor delayed the expected earlier completion of the structures. The foundations, which are of monolithic concrete construction, vary in thickness from 18 to 22 inches, according to the size of the buildings. The interior walls of the buildings are built of hollow concrete blocks 2 feet long, 9 inches thick and 7¾ inches high. The outer side of these walls is veneered with concrete brick of standard size, giving the building walls a total thickness of 13 inches. The concrete mixture used in the large blocks comprised 1 part Owl cement to 4½ parts sand. Each block was made under a pressure of 100 tons on a Perfection block machine, manufactured by the Dow Perfection Cement Block Company, Sioux Falls, S. D. The output of the machines is stated as 60 blocks per hour each, but during the construction of these shops as many as



Twin City Shops—View Showing Car House at the Left, Blacksmith Shop in the Center and Machine Shop at the Right.



Twin City Shops—Exterior of Paint Shop Building.



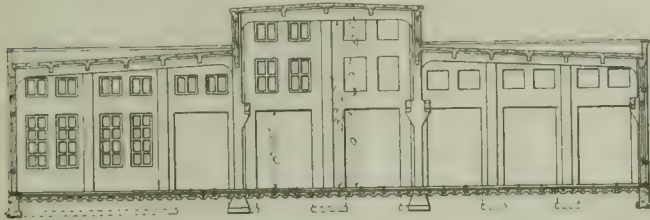
Twin City Shops—View Showing Buildings Facing Transfer Table.

800 blocks per day were cast on one machine. The blocks are said not to crush until a load of 167,200 pounds is applied.

The cement bricks were molded from a mixture of 1 part cement to $3\frac{1}{2}$ parts sand and were manufactured at the rate of 15,000 per day by five machines made by the Peerless Brick Machine Company of Minneapolis. It required two barrels of cement and $1\frac{1}{4}$ yards of sand to make 1,000 bricks.

Other than the floors, roofs and walls, all of concrete, the girders used are of especial interest. These girders support

Reference to the plan showing the layout of the buildings will indicate the position of the transfer table, on either side of which are the shop buildings proper. The pit for the trans-



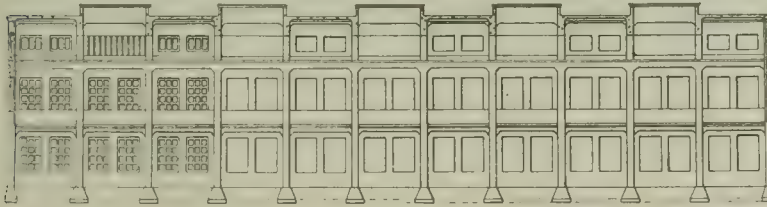
Twin City Shops—Cross Section of Paint Shop.



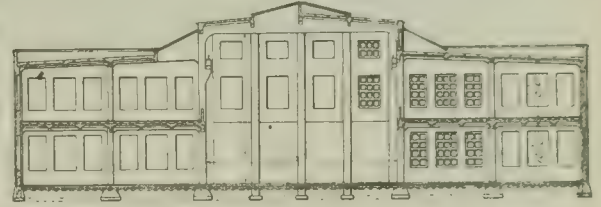
Twin City Shops—Cross Section of Blacksmith Shop.

the roof and floors and span the trackways running into the building wherever unobstructed space is required. One type of girder is 58 feet long, reinforced with seven plain steel rods $1\frac{1}{2}$

fer table is 775 feet long by 90 feet wide, with the concrete retaining walls on either side supporting the running rails. With the transfer table, 90 feet long, there is a length of track



Twin City Shops—Sections of Machine Shop, Showing Balcony.



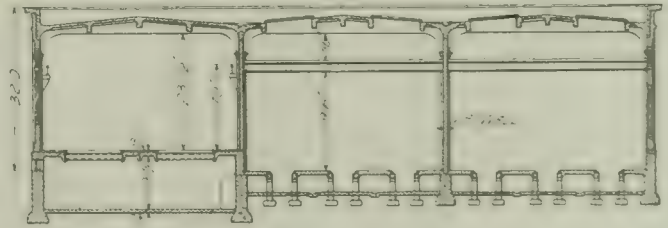
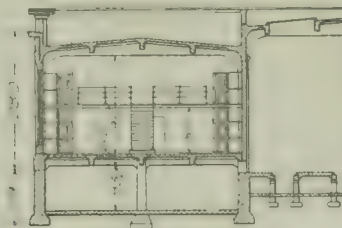
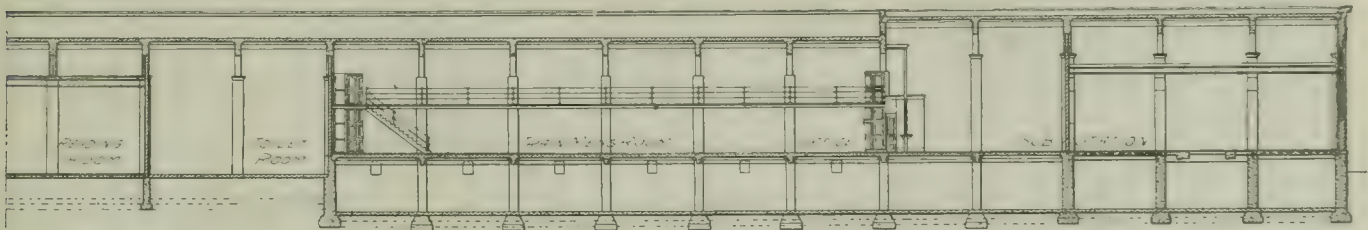
inches in diameter. Other types of girders vary in length from 50 feet down. Some of the girders are carried on monolithic plasters, reinforced with plain rods, and others on pilasters built up of concrete brick.

In these new shop buildings concrete was used wherever possible. Rolling steel doors form fireproof barriers between

available for handling at one time two standard city cars or one 70-foot interurban car with a pusher.

Machine Shop.

The machine shop has floor dimensions of 150 by 200 feet. It comprises a main center bay, with four tracks ex-



Twin City Shops—Longitudinal and Cross Sections of Car House and Operating Quarters.

the departments and also at the outside entrances. These were manufactured by the Kinnear Manufacturing Company, Columbus, O.

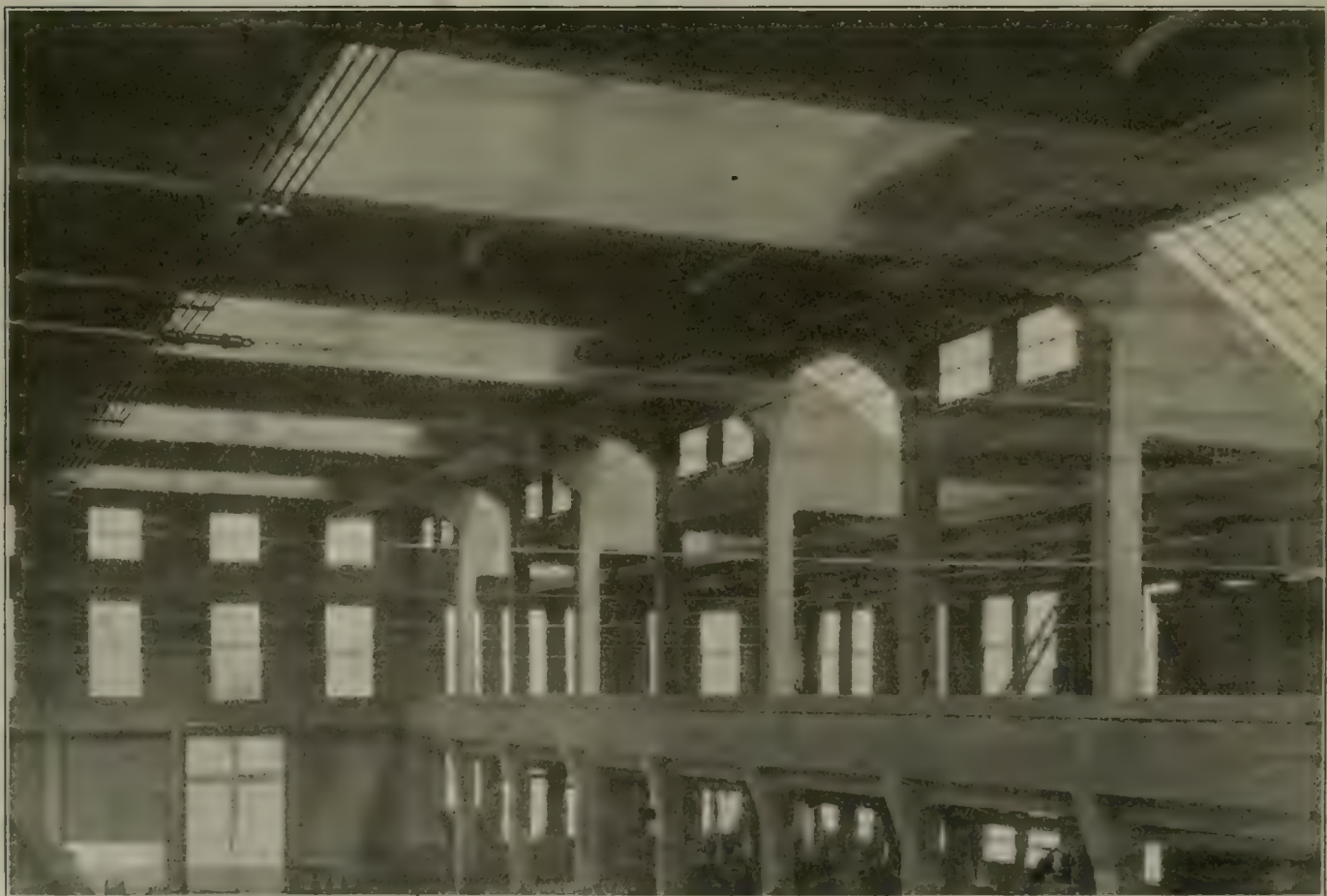
All floors are of concrete. The roofs are 4-inch slabs of concrete reinforced with 7-11 steel wire fabric and mild steel bars. This fabric was supplied by the American Wire Fence Company, Chicago. The roofs are given a waterproof covering of pitch and gravel.

tending through it and a craneway above, with two additional 2-story bays on either side, as indicated in the illustration. The type of roof construction, with large skylights and the large number of side and end windows, affords what is probably as plentiful illumination as can be found in any railway shop.

The ground floor of the entire shop building will be utilized for a machine shop in which trucks can be taken in at



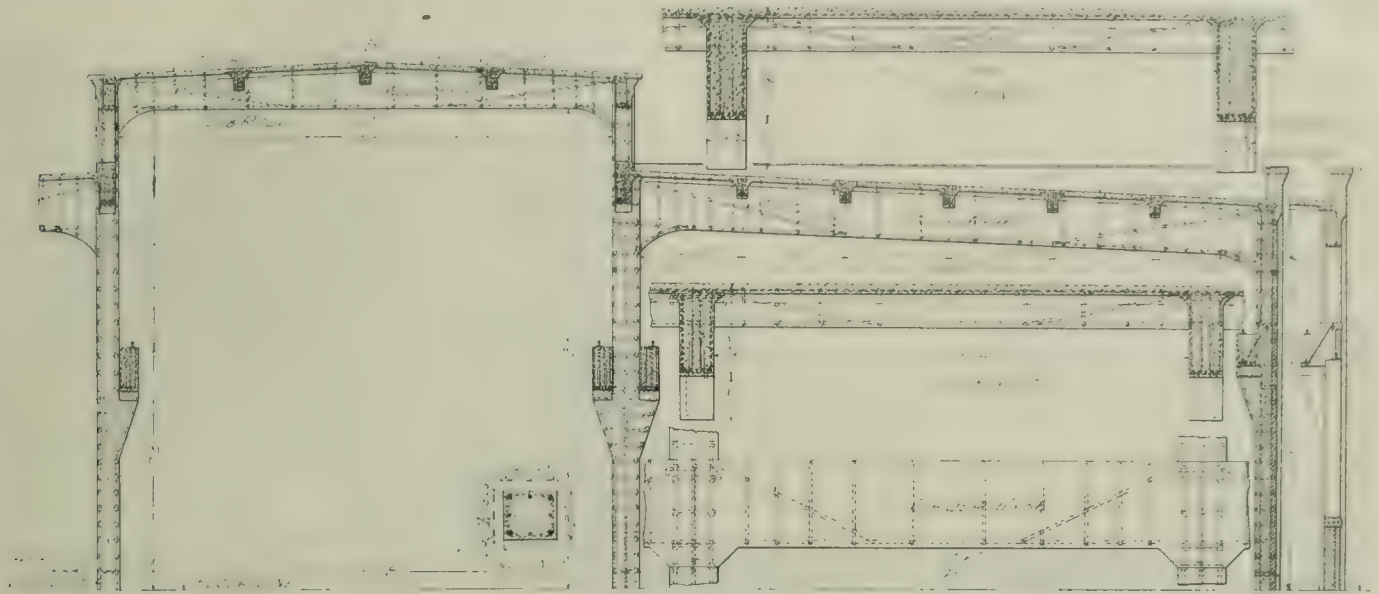
Twin City Shops—Interior of Paint Shop Building, Showing Balconies and Posts for Supporting Painters' Scaffolding.



Twin City Shops—Interior of Machine Shop During Erection of Machinery, Showing Balcony Floor and Abundant Lighting Facilities.

one end, overhauled and repaired, and taken out at the other end for operation under car bodies repaired or built in other of the shop buildings. The four tracks pass through the center bay and connect with the transfer table at one end and

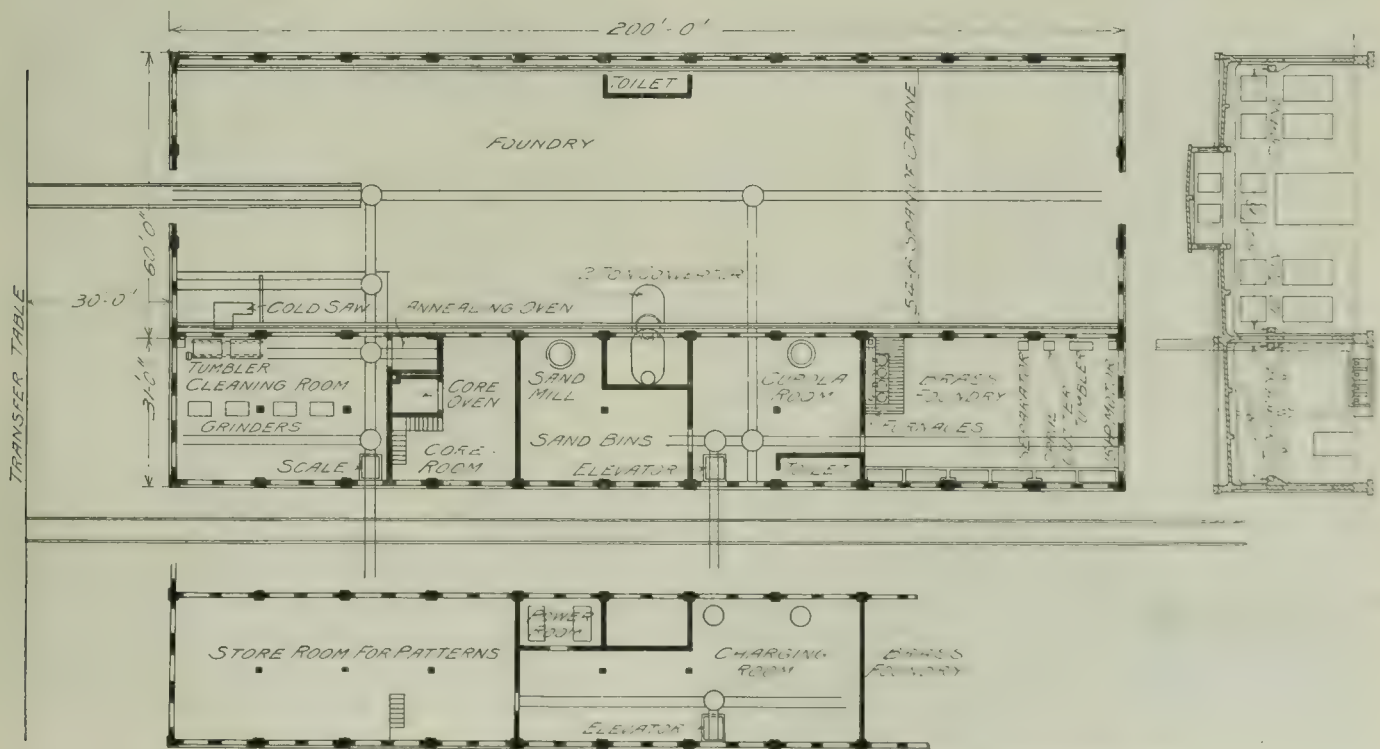
Company, Waukesha, Wis., will be electrically operated. It is noted that they will serve only the central bay, which has the four tracks leading through it. Under each of the four side bays, and supported from the ceiling of the first floor by



Twin City Shops—Partial Section Through Paint Shop, Showing Details of Concrete Reinforcement.

the yard tracks at the other. There are no pits in this shop. Seventy-five per cent of the Twin City company's railway motors are built for top inspection and those built for pit inspection when damaged will be removed from the trucks for repairing and new ones sent out in their place while thor-

10-inch I-beams, are two 4,000 pounds capacity electric traveling cranes, with hoists built by the General Pneumatic Tool Company, Montour Falls, N. Y. These travelers have a span of about twenty-five feet each and a run of 200 feet, the length of the shop. This crane equipment will serve all the



Twin City Shops—Plans of Ground Floor and Balcony and Cross Section of Foundry Building.

ough repairs are being made to the damaged parts. All the trucks for the entire system will be repaired in this shop and when needed delivered to other stations in trains.

The center bay of the machine shop will have three traveling bridges, each with four lifts of 12,000 pounds capacity each. These cranes, built by the Modern Steel Structural

machine tools in the entire first floor of the shop and should the present number of cranes and hoists prove inadequate, preparation has been made so that others can be installed.

The second floor of the side bays will be utilized for armature winding, air compressor repairs and electrical work. Elevator equipment will be provided, so that when an arma-

ture is taken out of a truck being repaired on the floor of the center bay, it need be transported but 100 feet to the place where it will be repaired.

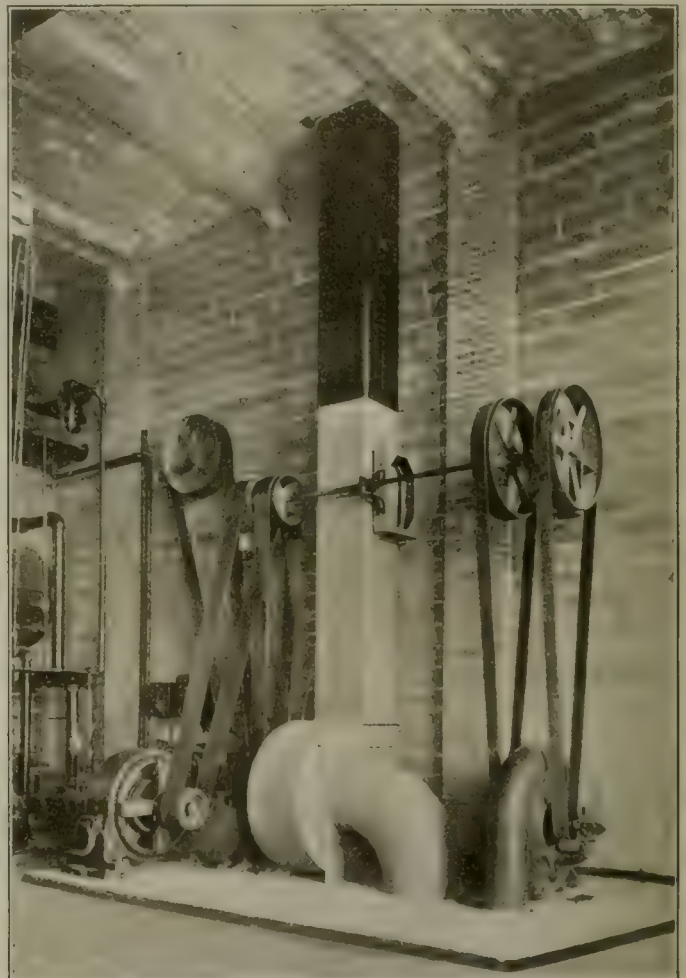
Blacksmith and Wheel Shops.

In the proposed wheel shop, which will stand between the machine and blacksmith shops, as shown on the ground plan of the shop layout, it is planned to do all the axle, gear and wheel work. Facilities will be afforded for handling the heavy pieces, so that when a carload of wheels is received it can be unloaded quickly and the car can be reloaded and sent away with a cargo of old wheels.

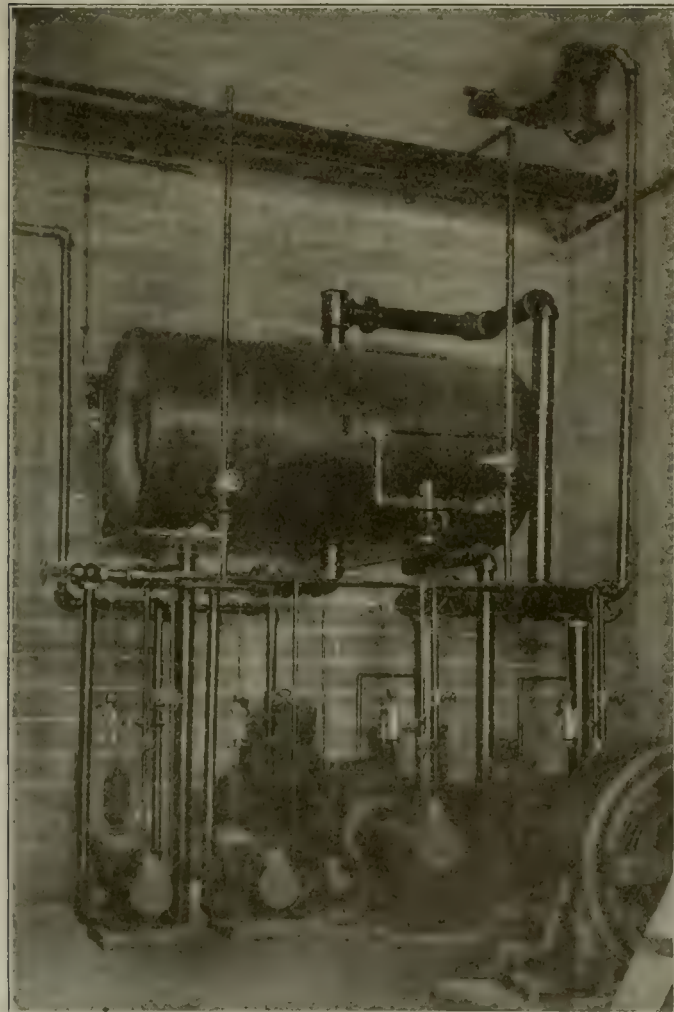
The forge shop and the boiler plant are housed in one building, with a concrete fire wall separating it into two rooms. An accompanying illustration is a cross section of the blacksmith shop, which is similar in construction to the wheel shop earlier mentioned. A very complete equipment of Buffalo down-draft forges is being installed in connection with a blowing plant in the adjacent boiler room. The blower outfit comprises a 60-inch Buffalo Forge Company exhaust fan and a No. 10 blower, belt-driven by a 35-horsepower General Electric motor. An illustration of this group of machines is presented.

Steam for use throughout the entire shop group, both for power and heating, will be generated in four 290-horsepower

where additional coils are placed along the walls near the floor. In the car house a large coil in the basement heats air, which is blown into the pits under the cars. The condensation from the radiation pipes is returned to the boilers by vacuum pumps and collected in a steel tank in the boiler room. This tank is mounted over the vacuum and feed



Twin City Shops—Blower and Exhauster Fans for Blacksmith Shops.



Twin City Shops—Vacuum Return Heating System Equipment.

Babcock & Wilcox boilers, which formerly did service in one of the Twin City power plants.

Heating System.

The radiation pipes for heating all the buildings by steam are suspended from the ceilings, except in the paint shop,

pumps, as shown in one of the illustrations. The Consolidated Engineering Company, Chicago, installed this heating system, which is known as the "Van Auker" vacuum system.

Foundry.

An illustration is presented showing the first and second floor plans and a sectional elevation of the foundry, to which will be added next year a 30-foot addition, making the building 230 feet long and 91 feet wide. There is a balcony along one side. Furnaces will be installed for melting steel, gray iron and brass, so that with the complete equipment the railway company will be able to make all the castings that it uses except car wheels and those of malleable iron.

As indicated on the shop group plan it is proposed at a later date to erect a special track work shop, 60 by 200 feet, with a platform for laying out special work, 150 by 200 feet in size.

Paint Shop.

On the opposite side of the transfer table from the machine shop is the paint shop, 126 by 300 feet in ground floor area. This building has two balconies, as shown on the sectional view, and entrances are provided at both end walls, so that cars may be run through the building on any of its six tracks. It is planned to equip this shop with two overhead cranes, so that car bodies can be lifted and trucks re-

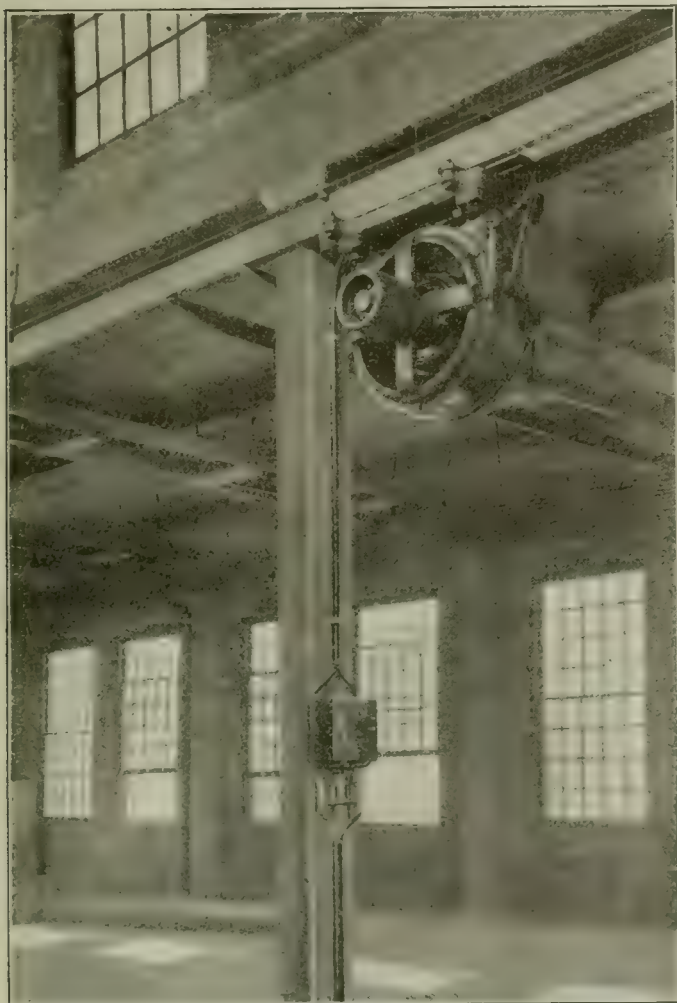
newed in the shortest possible time. The tracks are laid on 16-foot centers.

In the halftone illustration showing the interior of this building there will be noted rows of steel tubes on either side of the tracks. These tubes are four inches in diameter and will support malleable iron brackets carrying scaffolding for the use of the painters. The weight of the brackets and the 2 by 12 inch planks which will form the scaffolds will be counterbalanced by cast-iron weights movable inside of the tubes. Set screws will serve to fasten the brackets at any desired height alongside the car body on which the painters may be at work. These posts, which are between the two tracks in each bay, are removable from floor sockets so that if desired enough of them can be taken away to permit of lifting a car body from one track to another and thus not blocking any available track space.

The balconies of the paint shop will be used for varnishing and similar small work.

Erecting Shop.

In the erecting shop, which later will be built, there will be assembled all the finished work received from the steel and mill shop. It is not thought necessary to have the erecting or paint shops very large if the other shops, which are feed-



Twin City Shops—Method of Supporting Motors for Driving Groups of Tools.

ers to them, are of sufficient capacity to furnish in detail all the parts to be assembled.

Mill Shop and Storehouse.

The mill shop will include tools and facilities for the ordinary mill work required in car construction and for bench and pattern work. The machine tools will be arranged in

four groups, each group being driven by an electric motor. It is interesting to note that all new machines now working in these shops (except those of less than 3-horsepower capacity which are grouped) are operated by individual motor drive.

The refuse from the woodworking tools will be exhausted through tile pipes leading underground to the boiler room. The pipes are 24 inches in diameter and discharge into a metal hopper in front of the boilers.

The storehouse, which later will be erected, will be of sufficient capacity to serve the entire system of the Twin City Rapid Transit Company. Back of the storehouse outdoor tracks with storage bins having roofs will afford facilities for handling heavy supplies and for the care of second-hand and scrap materials.

EXHIBIT OF THE TWIN CITY RAPID TRANSIT COMPANY.

The advertising exhibit of the Twin City Rapid Transit Company, of Minneapolis and St. Paul, Minn., is unique. This exhibit is 36 feet long and 13 feet high, and is the entire decoration on the north wall of the sun parlor on the Steel Pier. The exhibit has been prepared at considerable expense by the "Twin City Lines," under the direction of A. W. Warnock, general passenger agent. It took Mr. Warnock, with two assistants and three stage carpenters of the Savoy theatre, two days to install the display; and it is a very interesting one.

The keynote of the exhibit is an immense water color picture, 13 feet long and 9 feet high, giving a bird's eye view of the Twin Cities of Minnesota and the park-lake region surrounding them. The view point of this perspective is about 80 miles south of Minneapolis and 60 miles high. It shows the detail of this territory, 1500 square miles of which is traversed by the electric Twin City Lines. To the northern horizon are the Rainy River district and the Canadian border, while in the upper right hand corner is seen the southwestern extremity of Lake Superior, where Duluth is located. The St. Croix river is at the extreme right, with the cities of Stillwater, Minn., and Hudson, Wis. The larger bodies of water lying to the north are Mille Lac, Leech and Winnibogoshish lakes. In the foreground can be traced the gorge of the Mississippi river. On this river are located the Twin Cities, from which the "Twin City Lines" reach out in many directions. The lowlands along the Minnesota river are shown at the extreme lower edge of the picture, while at the confluence of the Minnesota with the Mississippi is Fort Snelling, the village of Mendota, and below it Pike Island, on which was signed a treaty with the Sioux Indians, conveying to the United States the sovereignty of much of the territory shown in this map.

It took two engineers four months to lay out the picture. After this part of the work had been finished, a month was spent by one man in painting the coloring effects. The picture is draped in maroon. On both sides of the picture are shown in ivory frames, with mahogany trimmings, 64 large platinum tint photographs of interesting features of the Twin City Lines—cars, tracks, bridges, permanent structures, steamboats, and docks. There are also shown, framed, a large assortment of colored posters, which are used by the company in all its publicity work. The story of "Hi Jinks, the picnic person," is presented. The entire exhibit is lighted with 85 frosted incandescent globes. The company has gone to the expense of making this exhibit in order to show the character of its equipment and permanent way and what it is doing to develop business. The exhibit is in charge of a man who wears a Twin City conductor's uniform and whose duties will be to explain the pictures and to distribute the official badges of the company and pamphlets about the Twin Cities. The value of the exhibit is over \$4,000.

Conductor to Passenger—"What street do you want?"
City Passenger—"What ones have you got?"

THE CONVENTION HALLS.

The opening session of the American association convention, which is also a joint meeting with the affiliated associations, will be held in Casino hall, a large audience room seating 800 people and located at the Boardwalk end of the Steel pier. The Thursday and Friday sessions of the American association will be held in the sun parlor which accommodates about 270 people and is located near the outer end of the Steel pier. The meetings of the Accountants' association will probably be held in a large audience room in the Chalfonte hotel, the headquarters hotel of the Accountants' association. All meetings of the Engineering association will be held in the sun parlor near the outer end of the Steel pier. The meetings of the Claim Agents' association will be held in a suitable audience room in the St. Charles hotel, the headquarters of that association.

MAP OF ATLANTIC CITY.

The accompanying map shows the location of the piers, the principal hotels and the other points which is desirable to know at Atlantic City. It will be noted that the distances are

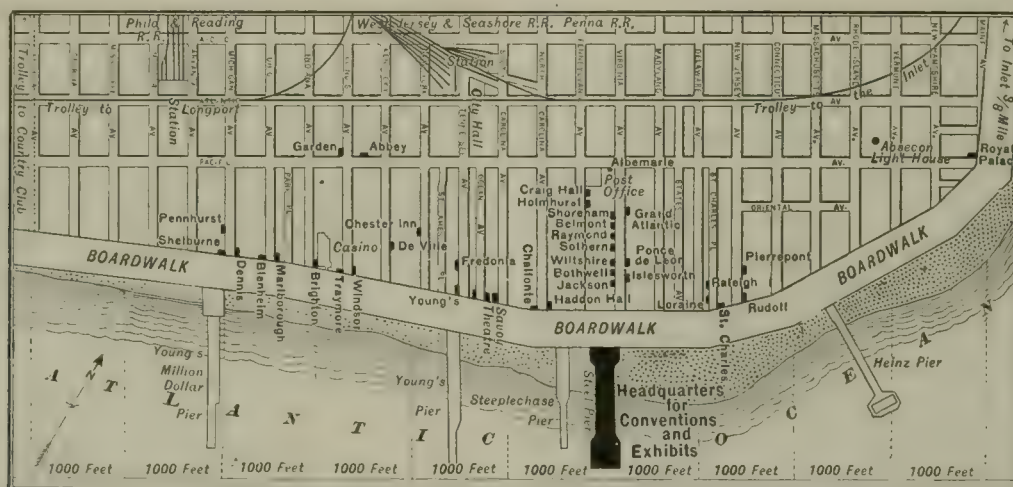
Among the Exhibits

THE EXHIBITS.

Atlantic City has offered the associations unusual facilities for a manufacturers' exhibit. The steel pier on which the exhibits are installed is a desirable place for exhibit purposes. It is 1,650 feet long, and includes four large covered areas and two promenades its entire length, with covered booths between facing the ocean and well protected from a possibility of rain.

The pier floor has been divided into more than 200 exhibit spaces now occupied and all covered by permanent roofs. Earlier than this year such an admirable arrangement would not have been possible. Only recently has the pier structure been widened so that now plentiful room is afforded for promenade space between the booths and the outside pier railing.

The exhibit space inside the covered halls is well lighted and suitably arranged for the effective display of the materials exhibited. In years past the ball room at the outer end of the pier and now utilized by 22 exhibitors has not been available



Map of Atlantic City Showing Principal Points of Interest.

measured. In pleasant weather the walks on the boardwalk are so enjoyable that the pedestrian does not realize the distance.

Roller Chairs.

The entertainment committee has succeeded in making arrangements whereby a particularly fine roller chair service will be furnished to all delegates and guests at the convention. Chairs may be had at any time during the week between the hours of 8.30 a. m. and 9.00 p. m. at the main entrance to the Steel pier or the Marlborough-Blenheim without charge to those who have official badges. However in view of the demand which there will undoubtedly be for chairs, it is requested that when stops are required they shall not be for more than eight or ten minutes. The pushers have instructions that in case the delay is fifteen minutes or more it shall be considered that the chair is no longer in service and that it may be returned to the station. This arrangement is necessary owing to the large number of convention attendants who will desire to use the chairs, of which there are a limited number. In case it is desired to have the use of a chair for longer than two hours arrangements should be made at the station before starting, as the pushers have instructions that the extreme length of service for one or more occupants shall not be longer than that period.

Chairs may be obtained from any Shill or Reed roller chair station between 9 p. m. and midnight at the rate of 25 cents per person, provided the official badge is worn and no stop is made between the station and the destination.

for exhibition purposes. This increased amount of floor space is now required by the manufacturers in their efforts this year to surpass the display at Columbus, and according to precedent the exhibits this year have increased and multiplied, passing the mark set by last year.

For the exhibition of rolling stock and track welding, a comparatively large area is available near at hand. This open air exhibit space is but three hundred feet from the entrance to the Steel Pier and is adjacent to the Ocean Shore railway tracks on Virginia avenue. A switch was installed to connect the exhibition tracks with the existing tracks in the street so that the rolling stock exhibit could be handled on its own wheels. The open-air exhibit space is sufficiently large to accommodate approximately 500 feet of track and afford room at the street side for the demonstrations of welding to be given during the week.

The booths this year have been supplied by the Atlantic City Hotel Men's Association, and therefore as regards detail appearance such as canopy, railings, etc., are very similar but due to the great variety of shapes and sizes into which the total floor area has been divided there can be little reason for adverse comment on the score of sameness.

Green is the color most largely used for decoration. The floors are covered with green crex matting which harmonizes nicely with the other decorations. The use of green burlap for backgrounds also plays an effective part in the color scheme.

The Manufacturers' association has a booth at the left of the main entrance to the pier where members of that association will register and receive badges for themselves and guests.

The postal authorities have established a branch post-office in the entrance hall of the steel pier (at the general information bureau), and all mail addressed in care of the convention will be distributed.

The Western Union and Postal Telegraph companies maintain a branch station on the Boardwalk, directly across from the entrance to the Steel Pier (up stairs). This station is open from 9 a. m. to 7 p. m. Both companies have messengers at the general information bureau and patrolling the Steel Pier. Their services also may be obtained by telephone.

THE WESTINGHOUSE AIR BRAKE COMPANY'S EL ELECTRIC LOCOMOTIVE EQUIPMENT.

The rapid progress of electrification on steam railroads has resulted in the development of high-speed, heavy and powerful electric locomotives to handle the trains previously handled by steam. For such service a locomotive brake equipment of the most modern and efficient type is required.

As nearly all electric locomotives are double end, the brake equipment must be designed accordingly. Except for this, and for the changes in detail parts, such an air compressor, governor, etc., necessitated when the available power is electrical instead of steam, the electric locomotive requires a brake apparatus similar in all respects to that of a modern first-class steam engine equipment for similar service.

The Westinghouse EL equipment is designed especially to meet these requirements. It corresponds in operative features to the EL locomotive equipment for steam engines, the changes introduced being as stated, only those necessary to provide for electric instead of steam motive power.

The two principal requirements of any device for controlling the speed of trains are (1) safety and (2) flexibility. Safety being the prime requisite, this equipment is so designed that a definite and certain response on the brakes on the locomotive is obtained for every movement of the brake valve handle—the effectiveness and amount of brake cylinder pressure obtained being independent of the number of brake cylinders on the locomotive, piston travel or leakage, and any pressure obtained is fully maintained up to the capacity of the pump until released by the operator. Furthermore the number, amount or frequency of previous applications which have been made do not destroy the ability to obtain maximum braking power on the engine should an emergency arise. In emergency applications 40 per cent. higher cylinder pressure is obtained initially than in ordinary service operation, and this is gradually reduced to about 20 per cent. higher than ordinary service pressure and held there without further reduction until the brake valve is moved from emergency position.

A safety feature of particular importance from an operating standpoint is that when handling the automatic brake valve, there is only one position (running) in which the engine brakes release. Therefore, when an engineer has made an application to slow down his train, say for a signal, and after throwing the brake valve handle to release, returns it to lap position ready for a second application, should the signal remain against him, it is impossible for him to proceed, should the signal clear, and he forget to move the brake valve handle from lap position, the engine brakes remain applied, although the train brakes are released. It is unnecessary to point out the great advantage of such a protective feature.

If an emergency application is made from the train, for instance, by a hose bursting, train parting, or opening of a conductor's valve, the engine brakes will apply to full pressure and remain thus, even though the engineer fails to follow instructions to lap his brake valve and leaves it in running position.

In point of flexibility this equipment possesses all the advantages of the former combined straight and automatic brake systems, without their disadvantages, and with many additional operative features hitherto unattainable with any equipment.

The fundamental principles of the standard brake have in no particular been departed from, and particular care has been taken to so arrange the brake valves and connections that a man totally unacquainted with the new apparatus may operate it exactly as he has been accustomed to the standard brake, and obtain just as satisfactory results as with that brake, with many of the new features besides, although he may not know it.

When handling a lone engine the straight air brake (independent brake valve) may be used, permitting either a slow or a rapid application of the brakes as desired without

making use of the automatic brake thus affording a much more sensitive control of the engine brakes when running alone than would be possible with the automatic brake.

The independent and automatic brake valves are so combined with the rest of the apparatus, that when handling a train independent or simultaneous operation of train and engine brakes, both as regards applying or releasing, may be obtained at the will of the engineer. That is, he may apply the train brakes, keeping the engine brakes released; apply the engine brakes, keeping the train brakes released; or apply both train and engine brakes together; or having the brakes applied, he may release the train brakes without releasing the engine brakes; or release the engine brakes without releasing the train brakes; or release the engine brakes and the train brakes together. When the brakes are applied the engine brakes may be released and applied again as many times as desired; after which the engineer may either release the entire train and engine together or hold the engine brakes applied after the train brakes have been released.

In making a stop, especially with a long and heavy train, the latter is of particular advantage, as the engineer when on the point of stopping, can release the brakes on the train, but still hold the engine brakes applied, thus allowing the car trucks to right themselves and insuring a smooth stop. The last few feet of the stop is thus made by the engine alone, the engineer being able to graduate the brake cylinder pressure off if he desires, all the time operating only with the automatic brake valve handle.

When on the second engine of a double header the engineer may release his own brakes, should it become necessary to do so, without in any way disturbing the brakes on the rest of the train, and can reapply if he so desires; after which the leading engineer can release the brakes on the second engine and train exactly as though the second man had not manipulated his brakes at all. When the locomotive is handled dead in a train its brakes operate exactly as in the case of double heading, but in order to have any brake the main reservoir must be charged. This is provided for by a special device called a "dead engine device," which is simply a check valve, choke fitting and cut-out cock inserted between the brake pipe and main reservoir so that the latter may be charged from the former when in this position in the train.

From the above it is clear that the equipment under consideration is far more flexible in operation than any other form of engine brake, the engineer being able to secure any desired action of engine and train brakes, either in conjunction or independently, no matter what preceding operation he may have made.

In number of parts a great reduction has been made over former types of engine equipments although the features of operation have been so largely increased.

Special consideration has been given to convenience and accessibility of parts, all valves being so designed that they may be removed for inspection or repairs and new valves substituted without breaking any pipe joints. This is provided for by making all pipe connections to substantial pipe brackets to which the several valves are bolted, requiring therefore only the loosening of nuts or bolts for removal.

From the standpoint of the man who handles the train the important features are—first, the reliability and safety of the equipment and second the simplicity of the apparatus and the great variety of operations which it affords. The first assures him of a brake which can be relied upon at all times. The second gives him a tool of maximum efficiency and adaptability with which to perform the work in hand, and, other things being equal, the more efficient the tool the better the results obtained.

From the standpoint of economy, the reduction in space occupied, number and complications of operating parts, and their convenience for removal, to say nothing of the saving of air and time, which can be effected by proper manipulation, are all vital points, the importance of which is at once appreciated.

The Security Register & Manufacturing Company of New York and St. Louis had intended to make a very complete exhibit of its various types of fare register and also of The Roth high-pressure jacks in its space Number 912. Owing, however, to some important business negotiations with a view of greatly increasing its facilities for manufacturing and the prompt shipment of its products the company found it quite impossible to get its exhibit in position. Any information that may be desired regarding the company's product in the way of description, catalogues, prices, etc., will be furnished on application to its office, 42 Broadway, New York City. Col. Allison, the president of the company will probably visit the Convention during the week.

NOTES ON THE NEW BOISE-CALDWELL LINE.

The car shown in the illustration—a Brill semi-convertible built by the American Car Company, St. Louis—was one of the first cars to be operated through to Caldwell over the now completed Boise & Interurban Railway. Seven cars constitute the equipment at present, four of them being similar to the car illustrated, two with the same window system but having in addition baggage compartments, and one express and light freight car.

The completion of the line undoubtedly marks the beginning of an era of advance for the beautiful Boise valley.



Boise-Caldwell Car—Exterior.

There is in contemplation the building of an extension through the Payette valley. As the construction of this line depends only on the success of the venture just completed, it is altogether likely it will be built. Also, a line from Boise to the Barber dam is under discussion. The Payette valley extension, it is proposed, shall be built from Emmett after connecting that point with the present line at Star, to New Plymouth and to Payette and Weiser, a branch also to be built to Ontario, Ore. The prime attraction on these



Boise-Caldwell Car—Interior.

routes will be Pierce park, to cost in the neighborhood of \$100,000.

Aside from the large expenditures on interurban work, work has recently been started on the construction of eight miles of street lines in Boise to cost \$150,000. The city work will be of the same substantial construction as the valley line and the schedule for the city line will probably afford from a seven and a half to a ten minute service. There are two sub-stations on the line, equipped with the most approved electrical machinery. The stations are located at Middleton and at Pierce park, four miles down the valley, where is located the car barn. With the view to the further development of the valley, freight rates have been kept as low as possible. Especially is this true of the shipments of farm products and lumber.

The straight passenger cars for this road, as illustrated,

contain the usual advantages derived from using the semi-convertible window system and the combination cars present a somewhat unusual feature, namely, the side door of the baggage compartment is set next to the door at the passenger end instead of next to the partition which is the more usual method of construction. All the passenger cars are equipped with the Brill No. 27-E1 trucks with 6 feet 6 inch wheel base. The dimensions of the straight passenger car are given herewith: Length over end panels, 30 feet 8 inches; over crown pieces, 40 feet 8 inches; width over sills, including sheathing, 8 feet 6 inches; size of side sills, 4 by 7 $\frac{3}{4}$ inches; center sills, 3 $\frac{3}{4}$ by 4 $\frac{1}{2}$ inches; sill plates, 12 by $\frac{5}{8}$ inches. The baggage and express car is standard—four windows to a side and sliding doors at center and at ends of car. The trucks in this case are the Brill No. 27-G1 with 6 foot 6 inch wheel base.

EXHIBIT OF THE OHIO BRASS COMPANY.

One of the notable exhibits at the convention is that of The Ohio Brass Company, Mansfield, O., located in spaces 200-218 inclusive. The various sales divisions under which the extensive line of products of this company are classified are well represented, including the high-tension division, rail bond and third-rail insulator division, overhead line material division, car equipment division and the mining division. Among the important products of the company on exhibit are the Tomlinson automatic radial car coupler in operation to show the automatic feature and the application of the M. C. B. knuckle; the lintern car signal system, which is a system of car classification and rear-end signaling using electric lamps as a source of illumination and made independent of the condition of the trolley voltage by means of an auxiliary battery of dry cells, and the Nichols-Lintern pneumatic track sander, also in actual operation.

To show the latest developments in Ohio Brass Company's catenary construction a catenary line about 100 feet long is installed in the exhibit space. This feature is complete in every detail and illustrates particularly well an approved method of curve construction. Insulators, of which The Ohio Brass Company manufactures a complete line for all practicable working voltages, are shown, from small porcelain telephone insulators up to the big four-piece cemented 60,000-volt type. The well-known "All Wire" rail bond, both compressed and soldered types, is on exhibition and the method of application to the rail explained. These bonds are shown installed on the rail under all possible conditions—on the ball, under the fish plate, around the fish plate, on the flange, etc. In this section is also shown a complete line of third-rail insulators for electric and industrial railways. These insulators are constructed with a body of "Semi-Porcelain" which has thus far proved to be efficient electrically and mechanically, for third-rail insulator work. Numerous other devices and materials are exhibited, including a complete line of hangers, trolley ears and clamps, pullovers, construction tools, etc., and car equipment specialties such as the Armstrong journal oiler, Genuine bell metal motor bearings and track brushes.

The Ohio Brass Company extends to all wearers of the blue badge a cordial invitation to make its exhibit their headquarters while at the convention. An attractive and appropriate souvenir is being distributed among the delegates. The company has chartered the Champion sloop yacht, a safe and handsome craft, in which sailing parties will be taken out each day. Tickets for these trips may be had by applying at the office in the company's booth, where directions will be given as to time and place of departure. The yacht may be easily distinguished by The Ohio Brass Company's trade mark pennant, which it flies. For the further comfort and pleasure of its friends the company has rented a limited number of rolling chairs, which may be identified by a small leather banner bearing the Ohio Brass Company's trade mark. The following named gentlemen are among those representing the company: C. K. King, vice-president and general manager; A. L. Wilkinson, secretary; C. E. Young, Nathan Shute, P. A. Hinds, C. H. Tomlinson, G. A. Mead, A. L. Price, F. S. Denneen, A. W. Dee, E. F. Wickwire, F. A. Strail, C. E. Delafield, W. H. Bloss, Home office; N. M. Garland, manager; R. M. Campbell, S. H. Mattson, New York office; E. C. Brown, manager; F. E. Johnson, St. Louis office; F. H. Jameson, manager; A. L. Havens, F. V. Cook, G. W. Cooper, Chicago office; J. E. Slimp, manager, Atlanta office; S. K. Colby, of Pierson, Roeding & Co., Pacific coast agents.

The Grip Nut Company was first in the field with souvenirs—which the same were blotters handed out by B. F. Stewart.

DISTRICT HEATING WITH EXHAUST STEAM.

Under favorable conditions a steam engine will utilize only from 10 per cent to 20 per cent. of the heat units in the steam, and the remaining 80 per cent. or 90 per cent. passes to the condenser or to the atmosphere, as the case may be. When exhausting into a condenser instead of to the atmosphere, the efficiency of the engine is increased only about 7 to 9 per cent. The desirability of using exhaust steam for heating has long been recognized, yet there may be some few people who believe that after the steam has passed the engine cylinder there is but little heat left in it. High-pressure steam expanded to a low pressure has less moisture in it than steam generated at a lower pressure, and this is one of the reasons why the use of exhaust steam for district heating is particularly advantageous. The sale of exhaust steam for heating furnishes a source of income which cannot well be ignored by a company operating a steam power station. Exhaust steam heating presents to the electrical plants a source of direct income from the sale of a by-product which otherwise is about useless. In a recent report a manager who had an exhaust steam-heating system in connection with an electric light and power plant is quoted as follows: "That 'bugbear,' back pressure, on our engines is the most profitable load the engines carry."

In the construction of many central stations the refinement in design slightly increases the efficiency through the use of feedwater heaters, automatic stokers, economizers, superheaters, etc. These refinements are insufficient, however, to get the greatest benefits out of the fuel burned, and it requires the marketing of the heat in the exhaust steam to produce the best results. All that is necessary to utilize this usually wasted heat is properly designed and installed system of street mains to transmit the heat with the least possible loss to the buildings to be heated.

The American District Steam Company, Lockport, N. Y. and Chicago, Ill., has been engaged in the district steam-heating business with the greatest possible success for more than 30 years, and has experimented with every known kind of underground construction used in connection with steam-heating plants.

In designing a plant for exhaust steam heating it is necessary that the grade of the mains be carefully looked after, that proper consideration be given to expansion and contraction, and that the mains be thoroughly and properly insulated, to reduce loss of heat by radiation to a minimum. The fact that there are so many district steam heating plants in successful financial and mechanical operation is sufficient evidence that a profitable field for the sale of exhaust steam exists within close proximity to every central station.

In arriving at a proper price to be charged for exhaust steam, the cost of generating the steam should be considered, and not the fact that the steam already has been used for power purposes. By charging for steam on this basis its true value will be realized and a handsome income made on the investment in the steam-heating system. It has not been unknown for an electric company to derive as much income from the sale of exhaust steam as from the sale of electric current, and it is also not an unknown fact that there are steam heating plants from which the sale of exhaust steam for heating pays the entire fuel bill for the twelve months, entire operating expenses of the station and interest on the investment in underground mains.

It is believed to be only a question of a very short time when every town in the country will have a district steam-heating system delivering heat to consumers in the same manner as water and gas is now delivered. On the meter basis of charging the consumer pays for only what is used, and the central station manager receives a revenue for every ounce of steam delivered. The American District Steam Company has recently perfected and patented a condensation meter which accurately registers the amount of steam condensed.

The question for every electric railway manager or operator to ask himself is—Am I getting the greatest possible net revenue per dollar of investment?

The Symington journal box has been for some time in very extensive use on steam road equipment but it is only within the past two years that it has made rapid strides into favor on electric road equipment, where it is now used extensively on trucks of the two-bar equalizer type, commonly termed M. C. B. The Symington Company is showing a variety of box designs to suit different conditions of truck construction. Some of the most recent and up-to-date equipment on which Symington boxes are used is that of the Interborough Rapid Transit Company, elevated division of the Philadelphia Rapid Transit Company and the Washington, Baltimore & Annapolis.

SNOW PLOWS FOR HEAVY SERVICE.

The electric railways in the snow belt of the United States and Canada have, since 1892, adopted many of the principles of snow fighting which the steam railroads have found to be so effective. The Russell Car & Snow-Plow Company, Ridgway, Pa., has made plows for both steam and electric lines and has developed a line of snow-fighting equipment for electric railways very similar to that used on steam railroads. Four sizes are built to meet the varying conditions on the electric roads.

Size Three, with flanger for trolley feed, is of the same general design as the double-end Russell plow for steam roads for single or double track, right or left hand running, especially suitable for high-speed interurban lines having serious snow conditions. The brake and flanger are operated by air.

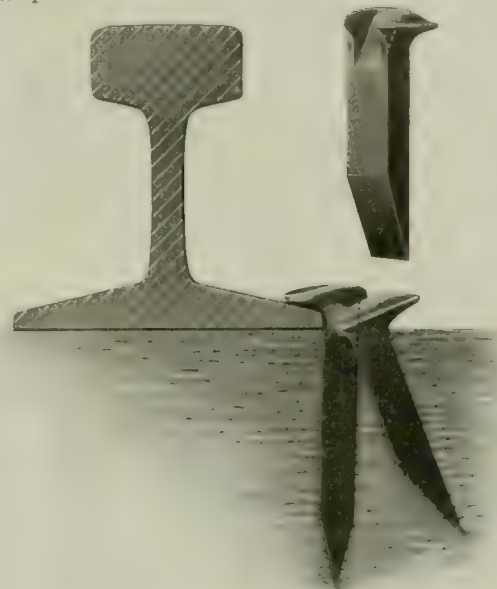
Size Four, for third-rail feed of design and for service similar to the Size Three plow except that it has a flanger in the nose of the plow. It is suitable for high-speed interurban lines having serious snow conditions. The brake and flanger are operated by air.

Size Six is a combination car and snow plow with detachable and adjustable steel noses designed for single or double track urban and interurban service. It may be equipped with ice diggers and levelers. The body is suitable for baggage, freight and express service while fighting snow. It is equipped with M. C. B. automatic couplers and when the noses are detached may also be used as an electric locomotive, thus making an all-the-year-round equipment. The brake and noses are operated by air.

Size Six, pedestal plow, is provided with adjustable steel noses operated by air, and is designed for urban and interurban service having moderate snow conditions.

SPIKE STRUT RAIL FASTENER.

The Maryland Railway Supply Company is exhibiting its patented device known as the "Spike Strut," which is designed to reinforce track spikes wherever greater resistance is required. The spike strut has a head like an ordinary standard spike, but is made larger in the shank. The point is beveled on one side with a chisel end to make it take proper angle in driving. The head is slotted on an angle of about 30 degrees to 11-16 inch in width, which is sufficient to hold any track spike.



Application of Spike Strut.

The claims made for this device are that it will hold track to gauge a longer time than any similar device now on the market. It will not loosen because there is a lateral stiffness which holds the rail so firmly on the tie that water and sand are prevented from entering, thus eliminating friction. It prevents cutting the throat of the track spike, and is particularly adaptable to curves or any point where the strain is great. The facility with which it can be installed, and the economy in cost, make such a perceptible reduction in the expense of track maintenance that it is well worth careful consideration.

INSULATING RAILWAY MOTOR COILS.

A subject of vital importance to the electric railway master mechanics is the insulation of motors. Poor insulation means poor operation, interruptions of service, and expensive repairs. The proper insulation of railway motor armature and field coils has received the attention of some of the best electrical engineers in the world, and the manufacturers of compounds for this purpose have striven for years to produce a compound which would be permanently flexible, absolutely water proof, a good heat radiator and like asbestos in its heat resisting properties. Ohmlac "17" is claimed to possess these properties, and is endorsed by the largest street railway systems which have used it for the past two years.

The advent of vacuum-drying and impregnating apparatus for the treatment of armatures and coils made a new demand on the compound manufacturers, for, when this apparatus is employed, it is desirable to use a solid compound, which can be reduced to a liquid by the application of heat.

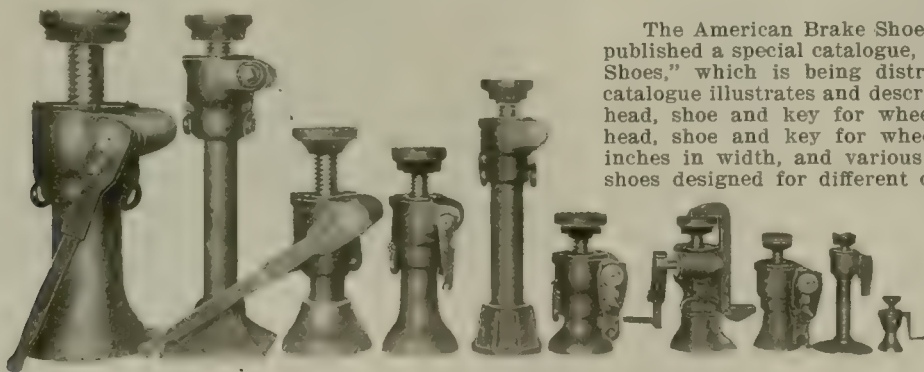
Ohmlac solid coil compound, for use in such apparatus, is the Ohmlac "17" without a solvent, and it possesses the same properties. This compound is used exclusively by the United States Navy in the repair of electric motors, and when it is considered that the motors aboard ships operate under the most severe service conditions, entailed by the salt, moisture and great extremes of temperature, there could hardly be any stronger endorsement of a compound.

A complete vacuum drying and impregnating apparatus for the treatment of coils has been installed in its laboratory by Emil Calman & Company, the manufacturers of Ohmlac "17" and the Ohmlac solid coil compound. This company will be glad to receive coils from those interested in this method of insulation, which will be impregnated and returned free of charge.

The finishing coat given to the armatures and fields is often a brushing of ordinary asphaltum and the importance of using the best varnish procurable for this purpose is usually underestimated. On account of the high temperature under which a railway motor operates asphaltum becomes very brittle and the vibration causes it to crack and fall off, leaving practically no protective coating for the armature and fields. Furthermore, asphaltum while fairly water proof, is not water repellant and the finishing varnish should possess this very important characteristic. Calman's Electric Black is designed especially for finishing railway armatures and fields and its use will prevent many motor troubles.

THE ROTH JACK.

Many users of jacks are unwilling to trust the hydraulic jack, claiming that the possible presence of leaky valves renders it unreliable for holding up a load. A mechanical jack with a high leverage and good construction is often given the preference. The Security Register & Manufacturing



Jacks of Various Capacities.

Company, St. Louis, claims in its Roth jack to have developed a mechanical jack possessing the good qualities usually claimed for the hydraulic type. It is said that this jack will lift a small fraction of an inch and remain in that position for any length of time. To insure particularly easy working, ball bearings are used throughout. A ratchet handle makes it possible to operate very rapidly, thus giving it an advantage over the usual types of mechanical jacks.

As will be seen from the accompanying illustration, these jacks are made in sizes from one ton up to sixty tons. The fourth jack from the lefthand end is designed especially

for street railway service and will be found applicable to almost all locations about the car where this device is necessary. The absence of stuffing boxes, valves and liquids which are liable to leak or freeze, gives this jack considerable advantage because when needed, no matter how long it may have been out of service, it is always in operative condition. These jacks have been in constant use for the past three years in many varieties of work and are said to have given excellent satisfaction.

The American Carbon & Battery Company, East St. Louis, Ill., is represented at the convention by P. V. D. Brokaw, general manager, and Harold J. Swape, sale manager, with headquarters at the Hotel Dennis.

The Atha Steel Casting Company, of Newark, N. J., manufacturer of the Titan steel motor gears announces that it now carries a full line of standard sizes in stock. Increased facilities have been added for the prompt filling of special orders.

The Chicago Pneumatic Tool Company is exhibiting in Spaces 129, 131 and 133 its line of Duntley electric tools, comprising drills, grinders, hoists, etc.; also pneumatic tools, consisting of the well-known Boyer and Keller hammers, and various types of drills.

The Gold Car Heating & Lighting Company is exhibiting a complete line of the most modern and up-to-date electric heating equipments in Space 403 to 417, on the south side of the pier. Messrs. E. E. Gold, E. B. Wilson, A. E. Robbins and John M. Stayman are in attendance.

The Cleveland Electric Railway has just ordered from Consolidated Car-Heating Company, New York, motormen's vestibule heaters for 760 cars. This type of heater, which is wired across line voltage is being exhibited by the Consolidated Company at its booth, which is on the stage in the ball room on the pier.

Consolidated Car-Heating Company is exhibiting at the convention its standard electric heaters, of which it sold 41,000 during the eight months ended on September 1 last. It is also exhibiting switches and complete switchboards. A very popular heater is the portable cab heater for motormen's cabs, wired independently across the line voltage.

The Dressel Railway Lamp Works, of New York, have several of their officers and representatives in attendance. They will be glad to see all of their friends at their exhibit in Booths 922 to 924 in the Ball Room, at any time. They are represented at this convention by Mr. F. W. Dressel, Mr. Robert Black, Mr. H. S. Hoskinson and Mr. F. W. Edmunds.

The American Brake Shoe and Foundry Company has just published a special catalogue, entitled "Electric Railway Brake Shoes," which is being distributed at the convention. The catalogue illustrates and describes the proposed standard brake head, shoe and key for wheels with 3-inch tread and over; head, shoe and key for wheels with treads less than three inches in width, and various styles of the company's brake-shoes designed for different classes of service.

In William Wharton, Jr., & Company's exhibit, some tongue switches, mates, frogs and a square crossing are shown, the latter cast solidly out of manganese steel for 9-inch high track. This seems to be quite an advance in special work over the hard center work and deserves the attention of street railway engineers. It is said around the Wharton exhibit that this type has been adopted as standard for the reconstruction of the roads in Chicago.

The exhibit of the Elmer P. Morris Company is of an exceptionally utilitarian nature, as it includes a pole line the entire length of the Steel pier, which is used to carry the

mains, supplying current for lighting all the exhibits. The poles are iron with bishop's crook at the top for hanging arc lamps, and are utilized by the Morris company for displaying bracket arms, malleable iron cross arms and catenary construction, the details of which last show a wide variety of types.

In Chicago, the Metropolitan West Side Elevated is renewing Mason safety treads. The Pullman Company is building 20 motor cars for this road which are to have Mason carborundum safety treads. The Chicago Junction Railway is completing the installation of its station with Mason treads. The Illinois Central is renewing Mason safety treads at Chicago stations.

The adoption of the Green Traveling Link Grate reduces to a wonderful degree the use of labor in the boiler room. With proper coal and ash-handling machinery, as usually found in the larger plants, one fireman easily can operate a dozen of these stokers, and the stokers may be as large as required for a 650-horsepower boiler. They are also made suitable for tubular boilers as small as 125-horsepower.

Guilford S. Wood, Great Northern Building, Chicago, is specializing on and carrying in stock several lines of supplies for street and electric railways, and is engaging a large run of a pneumatic tool hose of special manufacture which is particularly adapted for shop purposes. He also carries in stock corrugated matting, knob matting, cocoa matting and napier matting for street railway cars, as well as linoleum and upholsterers' leather.

The Spear & Miller Company, Chicago, Ill., manufacturer of brakeshoes, has some interesting samples on view at its booth. The company is represented by Frank R. Spear and Henry A. Dooner, who will be pleased to explain to visitors the advantages possessed by the Spear & Miller brakeshoe. Mr. Dooner, the company's general salesman, is qualified to speak authoritatively on this subject, having been in the truck business for 20 years. The company reports large contracts for its brakeshoes with both city and interurban roads.

Much interest has been shown on the part of operating officials in the exhibit of The Egly Autographic Register Company, General System Department, space No. 336-342, where a demonstration of the well-known train despatching and way-billing systems of this company is given. The very fact that the Egly company has installed its systems in more than sixty prominent roads is surely sufficient evidence that it is producing the required results. A visit will surely prove of much value, and we repeat, for the Egly company, a most cordial welcome.

At the exhibit of the Franklin Electric Manufacturing Company, of Hartford, Conn., the vibrating test given the Novi incandescent lamp demonstrates the adverse conditions under which they can be operated satisfactorily. The Novi lamp is designed and constructed to withstand an extraordinary amount of hard usage. The form of the glass anchor prevents the filament from drooping and touching the glass. The improved method of construction utilized is designed to make it impossible for the filament coils to become entangled and cause a short-circuit as so frequently happens in the case of ordinary type lamps.

The latter part of last month the Under-Feed Stoker Company of America, Chicago, manufacturer of the Jones stoker, received a cable order from the Campana Alemana Transatlantica De Electricidad, Buenos Aires, Argentine Republic, S. A., for 70 stokers. Forty-eight Jones stokers are already in operation in the plants of that company and this third order will make, when installed, a total of 118 Jones stokers purchased by the company mentioned. The Campana Alemana Transatlantica De Electricidad controls the urban and suburban traction situation in that city, as well as supplying light and power.

The Gammeter multigraph is easily operated by any office boy or girl, takes up no more room than a typewriter, and is handled with just as little muss or fuss. The success with which the machine has met since its introduction to the public two years ago speaks well for its practicability along the lines for which it is designed. The exhibit on the steel pier is in charge of Mr. J. F. Howison, manager of the Philadelphia office, located at 716 Chestnut street. He is ably assisted by his competent staff of salesmen and demonstrators. Mr. H. M. Horr, Advertising Manager from the Home Office in Cleveland, is also in attendance.

The Plomo Specialty Manufacturing Company, Cleveland, O., has on exhibition some evidence that should appeal to the users of gears and pinions. While the claims made for this company's "Whitmore's Gear Protective Composition" might be questioned if made on paper, the exhibit of pinions worn while using various kinds of lubricants offers conclusive evidence. This protective composition used in making comparative tests, is the results of a number of years of practical observation of a number of different products. To improve the characteristics of these the resulting compound was developed on entirely new lines from those which have been employed since electric traction began.

Attention is called to a series of three views the Western Tube Company are showing at Booth 918. Three photographs have evidently been taken of a "string" of cast-iron tees (62 in number), connected up with close nipples, fixed on a foundation and lined up against a building. They show up "straight as a string," proving beyond a doubt they were tapped absolutely straight. The man who is looking for a perfect cast-iron fitting will do well to make a call at this booth. The gentlemen representing the Western Tube Company are ready to give the visitor all sorts of interesting information regarding their "Quality" cast-iron fittings, or any other line which one desires to look into.

The Danville Car Company, Danville, Ill., is introducing a new type of semi-steel, semi-convertible car. Instead of using poplar for siding, as is customary on city and interurban cars, steel plates are used and on the interior of the car a heavy truss plank and a series of steel plates riveted together which act as a truss, are used for side lining. The car can be used with either longitudinal or cross seats; the posts are perfectly straight, and made for one sash to raise and one to drop or both sash to drop. The car is strongly built, has no expensive features and from an economical standpoint in first cost and in cost of maintenance, is said to be superior to anything yet put on the market.

A section of this car is on exhibition at the Danville Car Company's exhibit.

For the past 25 years the Pennsylvania Steel Company has been steadily increasing its output of switches until the annual production is 20,000 per annum, and all approved designs are manufactured. Among these is the New Century, which is simple, accurate and economical, and the Steelton positive switchstand, which has no gears, is not automatic, and when the switch is thrown in either direction the switch is on a positive dead center. The semaphore switchstand, adapted to use on suburban lines, has a disappearing semaphore blade, which is concealed by the mast, when the switch is set for the main line. Bridges and structural work of all descriptions, forgings, merchant steel, blooms and billets, angles, Z-bars and all shapes manufactured by steel mills are made by The Pennsylvania Steel Company.

A large percentage of the cars leaving the works of the Niles Car & Manufacturing Company, Niles, O., are for the single-phase alternating-current system and are covered with heavy sheet copper roofs grounded by copper cables to the car bolsters, so as to short-circuit the current in case the heavily charged trolley wires should come in contact with the roof, thus protecting the car and passengers. Among electric railways having copper roofs on their cars are the Pittsburg & Butler Street Railway; Washington Baltimore & Annapolis Railway; Ft. Wayne & Springfield Railway; Hanover & York Street Railway, and Chicago Lake Shore & South Bend Railway. This copper roof not only acts as a protection against high-voltage currents, but is practically indestructible and the best kind of protection against weather.

The Westinghouse Traction Brake Company's portable blowing plants consist of a platform truck upon which are mounted a motor-driven air compressor, two storage reservoirs, a governor and the necessary accessories, such as switches, fuses, air gage, safety valve, piping and hose connections. The truck and entire outfit is made narrow so as to pass easily through aisles and where space is restricted.

The motor compressor can be supplied for either alternating or direct current operation, and is of the same type as used with this company's well known car brake equipments.

The outfit is compact, easily moved to whatever place may be most convenient, and for service requiring air pressure at 100 pounds or less and where a permanent installation with the necessary piping and distributing system would be too expensive, or impracticable, it is especially satisfactory and economical.

LIST OF EXHIBITS.

- Acme Supply Company, Chicago, Ill.—Car shade rollers and curtains. Represented by R. E. Slagle.
- Adams & Westlake Company, The, Chicago, Ill. Street car hardware; gravity ratchet brake handles; street and interurban railway signal lamps for all purposes; arc and incandescent headlights, etc. Represented by A. S. Anderson, B. L. Compton, J. A. Foster, F. N. Grigg, E. L. Langworthy.
- Addressograph Company, Chicago, Ill.—The Addressograph, a printing machine designed for office use. Represented by E. D. Dorsey.
- Allis-Chalmers Company, Milwaukee, Wis.
- American Blower Company, Detroit, Mich.—One No. 5 type "P" blower with nozzle connected to outlet for the purpose of holding ball in suspension; one 5 x 5 type "A" vertical, self-oiling, automatic engine, mounted on sub-base, direct-connected to and driven by Westinghouse generator used as motor; one 80-inch full-housed, right-hand, bottom horizontal discharge steel plate pulley fan; one heater consisting of two No. 18 sections having a total capacity of 800 feet; one 24-inch "ABC" disc ventilating fan; one model dry kiln outfit. Represented by C. W. Old.
- American Brake Shoe & Foundry Company, Mahwah, N. J.—Brake shoes and brake heads for electric railway equipment, illustrating proposed standards of sub-committee of American Street and Interurban Railway Association for wheels with 3-inch treads and over, and interchangeability of these with M. C. B. Christie head and shoe of steam railway practice; also proposed brake head and shoe for narrow tread wheels. Represented by Otis H. Cutler, W. S. McGowan, Frank L. Gordon, F. W. Sargent, James S. Thompson, E. L. Janes, E. B. Smith, E. J. Searles.
- American Ferrofix Brazing Company, Philadelphia.—Process for restoration of broken and cracked machinery to full working strength, also apparatus for doing the work. Represented by G. H. Taylor, F. A. Saylor.
- American Locomotive Company, New York, N. Y.—Trucks for medium and high speed electric service. Represented by W. E. Woodard, Wm. Dalton, H. A. Fritz, Wm. Wampler, R. H. Baker, A. Haller.
- American Mason Safety Tread Company, Boston, Mass.—American Mason safety tread, steel base, lead-filled and carborundum-filled; delta metal (hard brass) base, lead and carborundum filled; running board of Mason safety tread carborundum filled, safety edge; car step with Mason safety tread; car platform with lead and carborundum-filled Mason safety tread; carborundum plugs for safety tread; combination Mason safety tread and cork composition; car Karbolith flooring. Represented by William S. Lamson, Henry C. King, L. H. Myrick.
- American Multigraph Sales Company, The, Cleveland, O.—Gammeter multigraph. Represented by J. F. Howison and staff; H. M. Horr.
- American Railway Supply Company, New York City.—Metal cap and coat badges for electric railway employees. Represented by Charles Lounsbury, Walter Chur.
- American Sewer Pipe Company, Pittsburgh, Pa.—Vitrified clay conduits in single and all multiple ducts, for electrical underground wiring. Represented by F. N. Kondolf, Al. S. McCome, W. R. Adams.
- American Steel & Wire Co., Chicago, Ill.—Rail bonds and bonding tools, American railway fencing, electrical wires and cables, trolley wire, galvanized strands, trolley springs and concrete reinforcement. Represented by F. A. Keys, L. A. Dietrich, J. M. Holloway, C. R. Sturdevant, J. D. Sutherland, C. S. Marshall, G. A. Cragin, W. A. Greenberg.
- Anderson, Albert & J. M., Manufacturing Company, Boston, Mass.—Line material and switches. Represented by John M. Anderson, Ernst Woltmann, William W. Hincer.
- Atha Steel Casting Company, Newark, N. J.—Titan steel motor gears (made of manganese steel) for interurban high speed service as well as ordinary electric railway service; cast steel body and truck bolsters for electric railway cars. Represented by George T. Paraschos, C. W. Owston, Jr., C. W. Gennett, Jr., L. A. Shepard.
- Atlas Anchor Company, Cleveland, O.
- Atlas Railway Supply Company, Chicago.—Atlas rail joints, including straight, compromise and insulated; Atlas special joint; plain braces, tie plate braces and tie plates; Atlas switch stand; Atlas primer and surfacer for cars. Represented by J. G. McMichael, G. M. Huber.
- Automatic Trolley Guard Company, Buffalo, N. Y.
- Bache, Semon & Co., New York, N. Y.—S. B. & Co.'s glass No. 532 and No. 316; a blown glass in extra heavy weight for carbuilding purposes. Represented by F. J. Goertner, M. D. Traup, J. P. Sjoberg.
- Ball & Wood Company, Elizabethport, N. J.—"Ballwood" welded flanges for steam, air, gas and hydraulic piping, and superheated steam. Represented by O. M. Jones, G. H. Jewell.
- Bayonet Trolley Harp Company, Springfield, O.—Bayonet detachable trolley harps; Bayonet trolley base with anti-friction bearings and detachable pole clamp; Butterfly sleet cutters; Bayonet self-lubricating trolley wheels. Represented by J. M. Olinger, R. A. Garlough, G. W. Olinger.
- Berry Bros. Detroit, Mich.
- Blake Signal and Manufacturing Company, Boston, Mass.—An operating exhibit of standard Blake dispatchers' signals with various types of despatching telephones all under control of and being operated by a train dispatcher; Blake insulated staples and compressed cleats for telephone, telegraph and annunciator wiring; tube flux for soldering. Represented by E. J. Burke, C. C. Blake.
- Booth, L. M., Company, New York, N. Y.—Drawings, photographs, reports and literature descriptive of Kennicott water softeners, and results being obtained therefrom. Represented by L. M. Booth, H. H. Sutro.
- Brill, The J. G. Company, Philadelphia, Pa.—Brill convertible "Narragansett" and Brill semi-convertible car sections; seats; 27-E3, 27-GE1, 21-E and 27-FE2, trucks; 21-E, 22-E, 27-GE1, 27-E3 and 27-FE2, truck side bars; "Noiseless" brake hanger; "Dedenda" gong; "Dumpit" sand box; brake handle; Brill springs; platform with end of car showing "Pay-As-You-Enter" system. Represented by Geo. M. Haskell, F. L. Markham, D. B. Dean, A. N. Hargrove, Fred Brill, J. Ellwood Brill, Byron O. Brill.
- Brown, Harold P., New York, N. Y.—Various types of rail joint bonded with standard plastic bonds, plastic plug bonds and semi-plastic plug bonds, showing them under test with a current of 3,000 amperes; special electric drill and magnetic clamp for use in rebonding rails without removing angle plates or disturbing pavement; demonstration of efficiency of his contact alloys on switches, bus-bars, trolley wheels, controllers, contactors, etc. Represented by James Hollowood, G. A. Kroener, J. Maxwell Coote, Daniel A. Kelley, William Temple, John Roche.
- Buckeye Engine Company, Salem, O.—Photographs of different types of Buckeye steam engines, horizontal and vertical, simple and compound; small steam engine model; wash drawings of Buckeye four cycle tandem gas engines. Represented by C. H. Weeks, Paul Bigelow, C. E. Machold, A. H. Ridell.
- Buhne Metal Packing Company, New York, N. Y.—Steam packing (fibrous babbitt). Represented by T. M. Remington.
- Burdett-Rowntree Manufacturing Company, Chicago, Ill.—Air operated car door device. Represented by J. B. Burdett, Bernard Rowntree.
- Burroughs Adding Machine Company, Detroit, Mich.—Burroughs adding and listing machines and Burroughs book-keeping machines. Represented by F. A. Willard, Ward Gavette, Frank Spiekerman, I. L. Berk.
- Calman, Emil, & Co., New York, N. Y.—Ohmlac solid coil compound field coils and sections of field coils impregnated in vacuum apparatus with this compound; armature coils insulated with Ohmlac 17. Represented by H. Lee Bragg, Walter A. Conway.
- Canadian Westinghouse Company, Ltd., Montreal, Can.—See Westinghouse companies.
- Carnegie Steel Company, Pittsburg, Pa.—Steel and concrete track, steel cross ties, Duquesne rail joints, Friestedt interlocking channel bar piling, United States steel sheet piling, steel mine timbers and ties. Represented by W. P. Siebert, John W. Dix, N. M. Hench, R. B. Woodworth, W. G. Clyde, James B. Bonner, George Summers, Frank W. Jones, A. M. Conneen, L. P. Lincoln, F. T. Llewellyn.
- Car Ventilating and Heating Company, Boston, Mass.—Apparatus for heating and ventilating cars by electricity. Represented by J. E. Dozier, E. F. Porter.

- Carey, Philip, The, Manufacturing Company, Cincinnati, O.—85 per cent. magnesia pipe and boiler coverings, magnesia flexible cement roofing, roofing paints and cements, water and weather proof pipe coverings, air cell pipe covering and boards, cork coverings for brine and ammonia pipes, asbestos tape, ribbon, cloth, paper, board, tubes, gaskets, fibre, asbestos wick, rope and cloth packings, asbestos metallic sheet packing, gaskets, etc.; electrical compound, mineral wool, hair felt, asbestos cold water paints. Represented by N. S. Kenney, H. C. Hutchison, F. H. Shipe, W. I. Kelley, J. H. Howley and F. C. Collins.
- Chicago Pneumatic Tool Company, Chicago, Ill.—Duntley electric drills and grinders for direct and alternating current, including 550 volts, direct current; Duntley electric hoist for direct current; pneumatic chipping and riveting hammers; pneumatic drills; portable pneumatic cleaning outfit. Represented by J. W. Duntley, W. O. Duntley, Thos. Aldcorn, Geo. Barden, C. B. Coates, Howard Small, B. H. Tripp and Paul Severin.
- Chicago Varnish Company, Chicago, Ill.
- Climax Stock Guard Company, Chicago, Ill.—Climax clay cattle guards, Climax expanded metal cattle guards, Climax farm crossing gates, Eureka farm crossing gates, Manufacturer's cattle guards and farm crossing gates for all conditions. Represented by F. W. Stewart and F. V. Stewart.
- Coin Counting Machine Company, Chicago.—Coin counting machines. Represented by C. H. Birdsall and W. P. Butler.
- Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y.—Banding machines, axle straightener, coil winding machine, car pit jack, babbitt moulds, coil winding and taping machines, armature buggy and stand, pinion puller, gear cases, fuse box, brake and controller handles, target switch, commutators and coils, Columbia anchor, broom filling machine and broom, rattan, armature and axle bearings complete, controller and brush holder parts, trolley wheels and parts, contact shoes. Represented by J. G. Buehler, James Grady, W. R. Kerschner.
- Columbia Nut and Bolt Company, Inc., Bridgeport, Conn.—Columbia lock nuts. Represented by Fred Atwater.
- Compound Magnet Brake Company, New York, N. Y.—Compound magnet brake. Represented by T. J. Nicholl, Thomas Sturgis, Anton Duppler.
- Consolidated Car Fender Company, Providence, R. I.—Electric car fenders and wheel guards. Represented by Albert J. Thornley, Elwood C. Hall and George H. Hollingsworth.
- Consolidated Car-Heating Company, New York, N. Y.—Electric car heaters, both cross-seat and panel types; portable vestibule heater; car heater and headlight switches; automatic cab heater switch; signal system to enable passengers to signal motorman or conductor, and an air motor system for operating doors of electric cars. Represented by Cornell S. Hawley, W. S. Hammond, Jr., S. Butler Keys and T. M. May.
- Cook's Standard Tool Company, Kalamazoo, Michigan.—Standard track tool grinder, Climax track drill, Standard track drill, Standard track jack, Standard car jack, Cook combination flat and twist drill chuck. Represented by Eugene Cook and Chas. D. Richardson.
- Cooper Heater Company, The, Dayton, Ohio.—Cooper hot water street and interurban car heaters. Represented by J. D. Hunter, W. L. Blackwell and J. B. Cooper.
- Cosper, W. P., Chicago, Ill.—Exhibit with Lord Electric Company: Hot water heater in operation and controller regulator. Represented by W. P. Cosper.
- Crocker-Wheeler Company, Ampere, N. J.—Large photographs of generating installations, photographs of the California Gas & Electric Corporation, 4,000-kw. generators. Represented by Julian Roe, S. Russell, Jr., R. N. C. Barnes, L. S. Horner, R. J. Randolph, Jr., Rodman Gilder.
- Crouse-Hinds Company, Syracuse, N. Y.—Imperial arc headlights, Syracuse changeable and stationary incandescent headlights, conduits (the modern line of conduit outlet boxes and fittings), and harpoon guy anchors. Represented by H. B. Crouse, A. F. Hills, F. M. Hawkins, Frank Buchanan, D. C. Gidley.
- Curtain Supply Company, The, Chicago.—Forsyth N. 86 roller tip fixture, No. 88 ring fixture, Keeler eccentric fixture, Acme and Climax open car cable fixtures, Forsyth open car cable fixture, and open car ring fixture, complete curtains and curtain materials of all kinds. Represented by W. H. Forsyth, A. L. Whipple and Ross F. Hayes.
- D & W Fuse Company, Providence, R. I.—Large sample board of D & W fuses and cut-outs for lighting and power circuits, also railway cut-out boxes, service switches and transformer cut-outs and deltaboston magnet wire. Represented by Willard S. Sisson.
- Danville Car Company, Danville, Ill.—Section of semi-convertible car; a model truck. Represented by E. J. Lawless, Henry Vogel, Elmer P. Morris.
- Darby, E. A., Company.
- Dearborn Drug & Chemical Company, Chicago, Ill.
- Device Improvement Company, Hanover, Pa.—Field winding and armature winding machines; armature truck; armature stand; reel stand and brake; tension machine; fuse box. Represented by R. E. Manley, W. F. Semmill, O. E. Trone, Mr. Wolfe.
- Dixon, Joseph, Crucible Company, Jersey City, N. J.—Dixon's silica-graphite paint, American graphite pencils, plumbago crucibles and retorts, Ticonderoga flake graphite lubricants, graphite gear grease, pipe joint compound, graphite motor brushes and other graphite products for street railways and manufacturers. Represented by J. A. Condit, L. H. Snyder, C. H. Spotts and J. J. Tucker.
- Doldt Coin Handling Machine Company, Portland, Me.—Two Doldt coin handling machines, one for sorting, counting and wrapping nickels, dimes, quarters, and half-dollars; and the other for counting and wrapping pennies. Represented by H. J. Holdt and J. E. Doldt.
- Dossert & Co., Inc., New York, N. Y.—Dossert joints of various designs; types A and B including 2-ways, 3-ways, cable taps, terminal lugs, rail bonds, emergency third rail clamp connectors, special railway signal service clamp connectors, motor leads for car wiring, etc. Represented by H. B. Logan, J. J. Dossert and E. A. Dossert.
- Dressel Railway Lamp Works, The, New York, N. Y.—Electric headlights for street and interurban cars, oil burning headlights for same; signal lamps for railways; electric route signal lamps; tail marker lamps. Represented by F. W. Dressel, Robert Black, H. S. Hoskinson and F. W. Edmunds.
- Duff Manufacturing Company, The, Allegheny, Pa.—Barrett automatic lowering jacks, Barrett trip jacks, Duff ball bearing and cone bearing jacks, Barrett motor armature lifts. Represented by George A. Edgin.
- Durkin Controller Handle Company, Philadelphia, Pa.—Controller regulators. Represented by Edgar W. Baird, W. S. Taylor, John P. Durkin and Patrick Loughery.
- Earl, Charles I., New York, N. Y.—Trolley retrievers and catchers. Represented by Charles I. Earl, C. A. Coutan, Ernest Miller.
- Eclipse Railway Supply Company, Cleveland, O.
- Edwards, The O. M., Company, Syracuse, N. Y.—Models showing 20 designs window fixtures and 4 designs extension platform trap door fixtures; samples of car hardware; tin barrel spring rollers of both the pawl and ratchet designs with plain roller brackets and worm gear roller brackets. Represented by Edward F. Chaffee, Franklyn M. Nicholl, O. M. Edwards, Edward Laterman, George G. Norris.
- Egry Register Company, The, General Systems Dept., Dayton, O.—Egry system of train despatching, railway way billing, retail sales, purchasing and car reports. Represented by Milton C. Stern.
- Electric Railway Improvement Company, The, Cleveland, O.—Rail bonds, electric braze bonds, copper weld bonds, bonding apparatus; electric car for installing rail bonds by the electric braze and copper welding processes. Represented by W. B. Cleveland, J. M. Gallagher, Geo. Long, W. E. Huber, J. L. Cadle.
- Electric Service Supplies Company, Philadelphia, Pa.—Protected rail bonds, Keystone overhead insulation, Lyon sheet steel gear cases automotoneers, Garton-Daniels lightning arresters, International cash registers, Locke high tension insulators, Keystone vestibule shades, Nuttall trolley bases, Keystone telephones, Philadelphia fenders, Knutson trolley retrievers, Helios arc lamps, Imperial headlights, National trolley guard. Represented by Chas. J. Mayer, J. W. Porter, A. H. Englund, J. V. E. Titus, M. A. Berg, E. R. Mason, Ernst Boehme, H. G. Lewis, Jno. McSorley, F. C. Peck, T. F. McKenna, W. A. Armstrong, F. B. Massey, Edw. Hammett, Vincent Rhea, Geo. Watts, H. R. Swartley, E. B. Ross, C. B. Harvey, G. C. Hart, C. H. Bristol, W. D. Hamer.

- Electric Railway Review, Chicago, Ill.—Daily editions of Electric Railway Review issued each morning, Monday to Saturday inclusive; new edition of "Motorman and His Duties". Represented by Hugh M. Wilson, Daniel Royse, L. E. Gould, John B. Bennett, C. R. Mills, E. J. Hunt, W. P. Padget, John N. Nind, Jr., Harold F. Lane, F. Nicholas, B. M. Kimball, Miss Jennie Boyd, Joseph A. Kucera.
- Electric Storage Battery Company, The, Philadelphia, Pa.—One element type 71-R in tank, 12-pole carbon regulator, recording hydrometer, recording and signaling hydrometer, automatic cell filler and compensating hydrometer, positive and negative plates of the different types. Represented by Charles Blizard, Albert Taylor, G. H. Atkin, E. L. Reynolds, H. B. Gay, Robert C. Hull.
- Electric Traction Supply Company, St. Louis, Mo.—Overhead trolley line material, including flexible brackets, etc., and high tension insulators for voltages up to 100,000 volts. Car equipment material, including ordinary and recording registers, arc and incandescent headlights, trolley catchers, trolley poles, wheels, harps, roller bearing bases, gears and pinions. Represented by O. W. Uthoff, A. Cook, H. G. Paro.
- Electrical Review, New York.
- Electric Traction Weekly, Cleveland.—H. J. Kenfield, C. B. Fairchild, Jr., R. Myles Standish, George S. Davis.
- Etter, Charles F., Harrisburg, Pa.—Rapid ready change carrier for street railway conductors. Represented by Charles F. Etter.
- Eureka Automatic Electric Signal Company, Tamaqua, Pa.—Lantern and semaphore car counting signals, and track-operated crossing bell. Represented by H. W. Souder, Frank P. Boas, W. D. Zehner, R. J. Gerhard.
- Eureka Tempered Copper Works, North East, Pa.—Commutators, commutator segments, controller parts, brush holders, trolley wheels and ears. Represented by Fred Rundell, O. C. Hertzell.
- Evans, Almirall & Co., New York, N. Y.—Photographs of installations of the Evans-Almirall system of hot water heating by forced circulation for central stations, manufacturing plants, etc. Represented by Douglas Sprague, Benjamin Kauffman.
- Flexible Compound Company.
- France Packing Company.
- Franklin Car-Heating Company, Syracuse, N. Y.—No. 2 Franklin heater constructed of steel for city and interurban cars; No. 3 Franklin heater for largest interurban cars and steam coaches; No. 4 and No. 5 air jacket coil heater for city and interurban cars. Represented by Kenneth D. Hequembourg, Garrett H. Brown.
- Franklin Electric Manufacturing Company, The, Hartford, Conn.—Tantalum and high efficiency units with Holophane reflectors; Femco and Novi incandescent lamps; two test rooms showing new Holophane Novi railway reflectors, and vibrating machine illustrating conditions under which railway lamps are operated. Represented by P. S. Klees, G. O. Curtis, C. N. Thorpe, C. Leonard.
- Galena-Signal Oil Company, Franklin, Pa.—Compounded oils for power house and rolling stock lubrication; also for steam railway lubrication. Represented by Geo. A. Barnes, E. V. Sedgwick, Alf. Greene, Geo. J. Smith, J. E. Southwell, L. J. Drake, Jr., W. P. Wescott, W. A. Trubee, Wm. Walsh, C. E. Schaffner, J. V. Smith, W. C. Stier, C. H. Thomas.
- Garlock Packing Company, The, Philadelphia.—Fibrous and metal packings and mill supplies. Represented by L. E. Adams, W. R. Haggart, D. Newhall, B. J. Miller.
- General Electric Company, Schenectady, N. Y.—Railway materials of all kinds and Curtis turbines.
- General Fireproofing Company, The, Youngstown, Ohio.—Trussit for roofing, cold twisted lug bars and expanded metal for reinforced concrete, all united steel studding and herringbone expanded steel lath for interior partitions and cement siding construction. Represented by M. E. Murray, E. N. Hunting, F. C. Fowler, J. L. Sharkey, F. P. Kafka.
- Gibson Iron Works Company, Jersey City, N. J.—Gibson common-sense pumping grate, non-warpable shaking grate, spiral steam blower. Represented by Edward Gibson and Ralph Conrad.
- Globe Ticket Company, Philadelphia.—Improved form of mileage book, special package tickets, ticket destroyer, forms of patent transfers, patent ticket holder for carrying commutation tickets by passengers, interurban and city tickets, books, transfers, etc. Represented by W. C. Pope, P. C. Snow, R. G. Osman, W. P. Snow, James Elliott.
- Gold Car Heating Company, New York, N. Y.—Two-rod and one-rod cylinder heaters; two-rod and six-rod panel heaters; truss-plank heaters; cab, house and portable heaters; junction box heater for steel cars; switches, coils, etc. Represented by Edward E. Gold, J. M. Stayman, A. E. Robbins, E. B. Wilson, J. O. Brumbaugh.
- Goldschmidt Thermit Company, New York, N. Y.—Specimens of work done with thermit, including welded motor cases, pipe joints, street car rails, compromise joints; specimens of metals free from carbon, such as metallic manganese, chromium, molybdenum, ferro-vanadium, manganese-zinc, manganese-copper, manganese-tin, ferro-titanium, ferro-boron, etc.; crucibles, mold boxes and other apparatus required in the application of the thermit process. Represented by Geo. E. Pellissier, Henry S. Mann, C. F. Gailor, W. R. Hulbert.
- Gould Storage Battery Company, New York, N. Y.—Represented by W. E. Winship, Charles H. Bradley, Jr., H. N. Powers.
- Grip Nut Company, Chicago, Ill.—Grip nuts from $\frac{3}{8}$ " to $1\frac{1}{4}$ ", hexagon and square. Represented by E. R. Hibbard, J. W. Hibbard, B. F. Stewart.
- Grothwell, A.
- Hale & Kilburn Manufacturing Company, The, Philadelphia.—Car seats and seating for electric, suburban, interurban, subway and elevated railways, upholstered in plush, leather, imitation leather, and rattan, with spring cushions and backs, rattan seat covering, etc. Represented by A. F. Old, H. T. Bigelow, S. A. Walker, B. F. Pilson.
- Harrison, F. P., Electric & Mfg. Co., New York.—Armature and field coils, bells, gongs, commutators, cotton duck curtains, fibre insulating compounds, insulating paper and cloths, insulating tapes, trolley poles, rattan, asbestos, slate, motormen's oiled clothing. Represented by F. P. Harrison, W. H. Harrison, E. H. Cook.
- Hayward, S. W.
- Heany Fire Proof Wire Company, York, Pa.—Asbestos covered wire, asbestos tape, cloth and twine. Represented by H. L. Owen, T. A. Shock.
- Heywood Brothers & Wakefield Company, Wakefield, Mass.—Wheeler car seats for city and interurban electric cars, upholstered in plush, leather and rattan; reed parlor car chair. Represented by Bertram Berry, C. W. H. Frederick.
- Holophane Company, New York City.—Holophane scientific and prismatic reflectors for car lighting; reflectors for general car lighting and reflectors for individual lamps over seats for reading illumination. Represented by H. M. Lauritzen.
- Home Rubber Company, Trenton, N. J.
- Howe Mfg. Company.
- Industrial Magazine.
- International Register Company, The, Chicago, Ill.—International and New Haven fare registers, cord fittings, and round and square rod fittings, International detachable handles, conductors' punches, and trolley and bell cord, cord connectors and pliers, uniform buttons and caps, Heeren enamel badges. Represented by John Benham, Albert L. Tucker, Wm. G. Kirchoff, A. N. Loper.
- Johns-Manville Co., The, H. W., New York, N. Y.—Victor combination meters, both portable and switchboard types; overhead line material; "Noark" fuse devices; Transite asbestos fireproof lumber; moulded mica weatherproof sockets, arc lamp hangers, high tension insulators, rail bonds, J-M friction tape, Transite doors for transformer stations, controller linings; ears and clips, and several new forms of insulated cross-overs, section insulators, etc.; pipe covering, roofing and packing; samples of asbestos wood showing its various applications in fireproof construction of buildings, cars, etc. Represented by J. W. Perry, H. M. Voorhis, H. M. Frantz, R. R. Braggins, M. H. Crosswell, S. P. Russell, D. T. Dickson, E. D. Sparks, S. G. Meek, H. S. Corey, E. F. Quirke, W. F. Little, E. B. Hatch, C. W. Schultz, G. A. Saylor, F. J. Jewett, W. R. Seigle, A. E. Brown, H. R. Trainor.
- Jones & Laughlin Co., Pittsburg, Pa.
- Justice, Philip S. & Co., Philadelphia, Pa.
- Kalamazoo Railway Supply Company, Kalamazoo, Mich.—Root snow scraper and flanger, and street railway fender, improved Moore track drills, track drill chuck, improved high speed track drill bits and Kalamazoo improved reinforced pressed steel wheels. Represented by John McKinnon, Fred N. Root, David A. Moore.

- Kinnear Manufacturing Company, The, Columbus, O.—Steel rolling doors for car barns operated by hand or motor; steel rolling shutters for fire protection of exposed openings. Represented by F. C. Schmidt, E. H. McCloud, F. B. Billheimer, S. R. Hewitt.
- Lackawanna Steel Company, New York, N. Y.—Abbott rail joint plate, track guage plate, and composite railroad tie. Represented by D. H. Van Pelt.
- Locke Insulator Manufacturing Company, The, Victor, N. Y.—Steel transmission tower on which will be mounted its new 100,000 volt insulators, underhung type. Represented by W. T. Goddard, A. S. Watts, John S. Lapp.
- Lorain Steel Company, The, Philadelphia.—Girder rails, high tee rails, special track work, and electrically welded joints. Represented by H. C. Evans, S. P. S. Ellis, A. L. Verner, Wm. W. Kingston, A. S. Littlefield, S. P. McGough, F. J. Drake, Jos. MacCarroll, Jr., Carroll Burton, P. M. Boyd, E. B. Entwistle, H. C. Stiff, H. F. A. Kleinschmidt, H. B. Frye, Jr., Jesse B. Heller.
- Lord Electric Company, New York, N. Y.—Non-arcng lightning arresters for station, pole and car service; soldered rail bonds; aerial advertising device consisting of captive balloon and electric sign, retaining cable acting as electrical conductor; automatic car seat heat deflector; rotating type of lightning arrester and abnormal potential discharger. Represented by F. W. Lord, F. W. Erickson, E. M. Hamlin, G. B. Crane.
- Lord, George W. Co.
- Los Angeles Switch & Signal Co., Los Angeles, Cal.—Tower and automatic switch with miniature car and track showing operation of liquid-hydraulic, automatic and tower switches. Represented by W. J. Bell, R. B. Sumner.
- Lumen Bearing Company, Buffalo, N. Y.—Ideal trolley wheels, 6-inch and 4-inch truck and motor bearings, both in lumen and plumbic bronze and Yankee and Lotus babbit metals; alpha brass check plates; model of a journal box demonstrating the forced lubrication of its new type of truck bearing. Represented by E. P. Sharp, C. W. Stimpson.
- McCardell, J. R., & Co., Trenton, N. J.—One Trenton trolley wagon. Represented by M. J. McDonald, C. H. West.
- McConway & Torley Company, The, Pittsburgh, Pa.—Model cars equipped with the Janney M. C. B. coupler with radial movement, designed especially for interurban and electric cars; Cox rail joint. Represented by Stephen C. Mason, E. M. Grove, I. H. Milliken.
- McGraw Publishing Company, New York.—Jas. H. McGraw, Harold S. Battenheim, C. A. Battiste, H. W. Blake, J. M. Wakeman, Geo. W. Elliot, C. J. Doyle, Cale Gough, Walter Jackson, Mr. Onken.
- Macdonald, M., Cleveland, O.—Macdonald cash receipts and hat checks. Represented by M. Macdonald, A. J. Reynolds, T. J. Owen.
- Magann Air Brake Company, Detroit and Toronto.—Magann storage air brake system. Represented by E. C. Rutherford, Frank Harrison.
- Maryland Railway Supply Company, Baltimore, Md.—Spike strut rail fasteners. Represented by Charles Elliott.
- Massachusetts Chemical Company, Walpole, Mass.—Insulating paints, including Armalac, special Armalac, M. C. B. paint, Enamelac, Insullac, also Chattertons, cable compound and waxes, insulating tapes, including field coil, armature, reinsulating and friction tapes, splicing compounds, etc.; moulded car seat bumpers, sash rubbers, rubber springs, car step mats, field coil pads and rubber bushings; samples of cans, boxes, etc., showing style of package in which goods are shipped. Represented by A. T. Baldwin, L. O. Duclos, and A. E. Duclos.
- Masury, John W. & Son, Brooklyn, N. Y.—Represented by T. J. Ronan, T. E. Mulford.
- Moran Flexible Steam Joint Company, Louisville, Ky.—Flexible ball joints for steam, oil, gas, air and liquids; steam couplers; Burdon trolley catcher. Represented by C. N. Jenkins, W. T. Burdon.
- Morris, Elmer P. Company, New York, N. Y.—1800 feet catenary line construction, with 42 poles; full line of low tension material; malleable cross-arms, ornamental Bishop's crooks for arc lamps. Represented by Elmer P. Morris, W. J. Beckett, P. H. Holmes, H. S. Tonks.
- National Brake Company, Buffalo, N. Y.—Peacock brakes and the Benjamin steel tie. Represented by G. S. Ackley, W. D. Brewster, Frank D. Miller, W. W. Miller, John N. Akarman.
- National Brake & Electric Co., Milwaukee, Wisc.
- National Carbon Company, Cleveland, O.—Carbon brushes, dry batteries, arc light carbons, headlight carbons and flashlights. Represented by N. C. Cotabish, A. E. Carrier, F. D. Kathe, O. T. Weaver, A. C. Henry, Frank C. Park.
- National Car Wheel Co., Allegheny, Pa.
- National Fibre & Insulating Company.
- National Lock Washer Company, The, Newark, N. J.—National cam curtain fixture in curtains on full size models; balance protected groove curtain fixture in curtains on full size models; sash lock and sash balance on full sized car window models; samples of different sizes and patterns of lock washers. Represented by F. B. Archibald, W. C. Dodd, Daniel Hoyt and John B. Seymour.
- National Railroad Trolley Guard Company, New York, N. Y.—Trolley guards of various designs and metals for preventing electric cars from becoming stalled at steam railroad grade crossings; a safety appliance insuring continuous power under all conditions. Represented by O. W. Pierce, W. K. Page.
- New Departure Manufacturing Company, The, Bristol, Conn.—Liberty Cushion trolley harps in rigid and flexible head; trolley wheels; push car bells; overhead pull car bells; single tap car bells; sleet cutters. Represented by DeWitt Page, M. J. Horton.
- Newman Clock Co., Chicago, Ill.—Watchmen's Clocks, employes' time recorders and time recording apparatus. Represented by Charles G. E. Renshaw, George F. Baldry, August H. Nanz.
- New York Car & Truck Company, Kingston, N. Y.—14-D-5-X maximum traction truck; No. 24 M. C. B. short wheel base truck; No. 47 M. C. B. high speed interurban truck. Represented by F. W. Curtis, W. L. Boyer.
- Niles Car & Manufacturing Company, Niles, O.—One 60-foot passenger car for Washington, Baltimore & Annapolis Electric Railway. Represented by F. C. Robbins, J. A. Hanna, F. A. Richards, A. W. Schall.
- Nuttall Company, R. D., Pittsburg, Pa.—Gears, pinions and trolleys for modern electric haulage motors, trolley harps and wheels and sleet removing appliances, street railway motor compressor gears and pinions, samples of small special gears and pinions. Represented by F. A. Estep, George W. Provost, T. M. Cluley, R. M. Kirschner, Charles N. Wood, Milton Rupert.
- Norton Grinding Company, Worcester, Mass.—Ground axle and car wheels, revolving on their bearings to show accuracy. Represented by H. C. Cudworth, Hans Wickstrom.
- Ohio Brass Company, The, Mansfield, O.—Tomlinson automatic radial car coupler; Nichols-Lintern pneumatic track sander; Lintern car signal system; Armstrong journal oiler, Genuine bell metal motor bearings; "All Wire" rail bonds; and third rail insulators; porcelain insulators; overhead material of all kinds including catenary; construction tools. Represented by C. K. King, A. L. Wilkinson, C. E. Young, Nathan Shute, P. A. Hinds, C. H. Tomlinson, G. A. Mead, A. L. Price, F. S. Denneen, A. W. Dee, E. F. Wickwire, F. A. Strail, C. E. Delafield, W. H. Bloss, N. M. Garland, R. M. Campbell, S. H. Mattson, E. C. Brown, F. E. Johnson, F. H. Jameson, A. L. Havens, F. V. Cook, G. W. Cooper, J. E. Slimp, S. K. Colby.
- Ohmer Fare Register Company, Dayton, O.—Indicating, recording and printing registers and the Ohmergraph. Represented by John F. Ohmer, Charles W. Kettelman, Hiram Tyler, Walter S. Heaton, Clyde V. Funk, E. B. Grimes.
- Palmetto Metal Company, Chicago, Ill.—Babbitt metals. Represented by John H. Colvin, William E. Ackley, H. C. Igel.
- Pantasote Co., New York, N. Y.—Car seats upholstered with Pantasote, and various styles of Pantasote curtain fabrics. Represented by J. M. High, D. E. Bonner.
- Peerless Rubber Co., New York, N. Y.
- Pennsylvania Steel Company, The, and Maryland Steel Company, Philadelphia, Pa.—Tee and girder rails, special track work for street and interurban railways; switches, frogs, crossings, switch stands. Represented by Richard Peters, R. W. Read, Chas. S. Clark, L. H. Babcock, J. G. Miller, C. E. Irwin, W. C. Cuntz, Drew Allen, R. E. Belknap, N. E. Salsich, H. B. Green, J. A. Davis, R. C. Hoffman, Jr., J. C. Jay, Jr., R. W. Gillespie, J. B. Smiley, Thomas Blagden, C. W. Reinoehl, G. S. Vickery, C. A. Alden, W. M. Henderson, John T. Hill.
- Philadelphia Air Brake & Machine Company, Philadelphia, Pa.—Complete air brake equipment. Represented by William W. Lambert, J. E. R. Lambert, T. F. Kelley.
- Pike Adding Machine Company.

Pittsburgh Insulating Company, Pittsburg, Pa.—Insulated cloths and papers. Represented by James Todd, Dr. Walther Riddle, Phillip F. Norvell.

Pittsburgh Pole & Forge Company, Pittsburg, Pa.—Trolley poles, tubular iron poles, span wire poles, electric light poles, signal poles, roller rail benders, eccentric rail bender and pole brackets. Represented by J. P. Biggert, B. D. Foster.

Plomo Specialty Manufacturing Company, The, Cleveland, O.—Whitmore's Gear Protective Composition in service on gears and pinions of two-G. E. 81 motors; pinions that have been in service lubricated with Whitmore's Gear Protective Composition and with other compounds; blue prints. Represented by W. M. Lawyer, E. G. Fisher, S. W. Whitmore.

Powell, A. E.

Pratt & Lambert, Buffalo, N. Y.

Rail Joint Company, The, New York, N. Y.—Base supporting rail joints of "Continuous", "Weber" and "Wolhaupter" types. Represented by Benjamin M. Barr, H. C. Holloway, William A. Chapman, George W. Smith, G. M. Hager, J. C. Barr.

Railroad Gazette, New York, N. Y.

Railway Audit & Inspection Company, (Inc.), Philadelphia, Pa.—Represented by H. N. Brown, C. E. Horney, T. C. Cary, Chas. Goble.

Railway Gazette, London, Eng.

Ramapo Iron Works, Hillburn, N. Y.—Represented by Arthur Gemunder, W. B. Lee, J. B. Strong.

Recording Fare Register Company, The, New Haven, Conn.—Fare registers of various types, register fittings and car trimmings, center ringing device for registers, trolley wheels, trolley harps, trolley cord, and conductors' punches. Represented by M. DeForest Yates, Frank B. Kennedy.

Ridgway Dynamo & Engine Company, Ridgway, Pa.

Riverside Metal Company, The, Riverside, N. J.—German silver, phosphor bronze, cupro nickel, brass, in sheets, wire, rods and castings. Represented by W. P. McGlynn, L. J. Kane, R. G. Holtby.

Rooke Automatic Register Co., Providence, R. I.—Rooke automatic fare collector.

Rubberset Brush Company.

Russell Car & Snow-Plow Company, Ridgway, Pa.—Russell electric railway combination car and snow-plow size 6, mounted on trucks and equipped with detachable, adjustable steel noses—one double track and one single track, with air operating device. Represented by M. S. Kline, J. E. Logan.

St. Louis Car Company, St. Louis, Mo.—One car Forest City Railway type mounted on St. Louis Car Company's Number 47 truck. Represented by A. H. Sisson, Frank McCoy, Abe Cook.

Samson Cordage Works, Boston, Mass.—Waterproofed trolley cord; bell and register cord in colors; mahogany wire center armature cord; solid braided rope. Represented by F. J. Coakley, R. G. Whiting.

Schoen Steel Wheel Company, Philadelphia, Pa.

Security Register & Manufacturing Co, New York, N. Y.—Giles Allison.

Sherwin-Williams Company, The, Cleveland, O.—Car body color, roof and truck paint, floor paint, rattan seat, headlining color, varnish, dry color, insulating varnish. Represented by E. M. William, F. A. Elmquist, H. E. Billau, R. Clitz, G. A. Jacobs.

Smith, Peter, The, Heater Company, Detroit, Mich.—One No. 1-B heater, one No. 2-B heater, one No. 3-B heater, one No. 2-A heater, one No. 3-A heater, and special fittings used in connection with the above heaters. Represented by Peter Smith, E. J. Smith, D. W. Smith.

Southern Exchange Company, New York, N. Y.—Samples of southern cedar poles, octagonal long leaf pine poles and Georgia long leaf pine crossarms; photographs of mills, stock yards and standing timber. Represented by E. G. Chamberlin, W. E. Mitchell.

Speer Carbon Company, St. Marys, Pa.—Speer new re-enforced motor and generator brushes. Represented by J. S. Speer, G. P. Fryling.

Standard Motor Truck Company, Pittsburg, Pa.—Standard 0-50 type short wheel base (4 feet 6 inches), outside hung motor double truck of 50,000 pounds capacity for city and suburban, service mounted with 34 inch rolled steel wheels; standard 0-45 type maximum traction 4-foot 4-inch wheel base double truck of 45,000 pounds capacity for city and suburban service; standard C-50 type inside hung motor 6-foot 6-inch wheel base double truck of 50,000 pounds capacity for city and suburban service; standard C-60 type 6-foot 6-inch wheel base high-speed interurban double truck of 65,000 pounds capacity, mounted on 34-inch rolled steel wheels. Represented by A. W. Field, A. Christianson, W. G. Price, W. C. Cory, E. E. Buschman.

Standard Paint Company, The, New York, N. Y.—P. & B. baking varnishes, clear and black, finishing varnish, air-drying varnish, core-plate varnishes, electrical compounds, insulating tape, S P C armature and field coil varnish, Ruberoid roofing, colored roofing and flooring. Represented by J. N. Richards, C. E. Smith, J. H. Thomas, F. F. Van de Water.

Standard Roller Bearing Co., Philadelphia, Pa.

Standard Steel Works, Philadelphia, Pa.

Standard Varnish Works, New York, N. Y.—Insulating varnishes, including Voltalac; samples of solid compounds for use in connection with vacuum drying and impregnating apparatus; samples of various types of impregnated field, magnet and armature coils. Represented by John C. Dolph, L. Robinson, E. M. Heckscher.

Star Brass Works, The, Kalamazoo, Mich.—Kalamazoo trolley wheels and harps. Represented by O. P. Johnson, F. P. Crockett.

Sterling-Meaker Company, Newark, N. J.

Sterling Varnish Company, The, Pittsburg, Pa.—Sterling insulating varnishes and protective coatings for metals. Represented by James Todd, S. C. Schenck, C. L. Cool, Walther Riddle, A. S. King, W. V. Whitfield, C. A. Barker.

Stromberg-Carlson Company, Rochester, N. Y.

Symington Company, The, T. H., Baltimore, Md.—Symington journal boxes, Baltimore ball bearings, Gilchrist rail chairs. Represented by T. H. Symington, J. F. Symington, C. J. Symington, D. Symington, A. H. Weston, E. John Nichols, W. W. Rosser, Carl Tucker.

Taylor Electric Truck Company, Troy, N. Y.—One 8-foot wheel-base single truck, one Taylor improved S. B. double truck, one Taylor H. L. B. truck, one Taylor M. C. B. triple spring truck, also a full line of coil and elliptic springs for electric railway service and our T. M. C. steel tired wheels. Represented by John Taylor, C. H. Dodge, Thomas Thorne, W. E. Taylor.

Traction Railroad Equipment Company, The, New York, N. Y.—Hipwood standard car fender; Hipwood combined fender and wheel guard. Represented by Patrick Egan, George Hipwood, Oscar S. Davis.

Under-Feed Stoker Co. of America, The, Chicago, Ill.—Jones stoker and auxiliary equipment in operation. Represented by Chas. S. Crowell, W. T. Jordan.

Underwood & Co., H. B., Philadelphia, Pa.—Portable boring bar in operation reboring a Greene engine cylinder; portable milling machine in operation milling the valve seats on a Greene engine; portable crank pin turning machine; two-cylinder air motor in operation; portable Corliss valve seat boring bar; vacuum dash pots for Corliss engines. Represented by Edwin J. Rooksby, Edwin W. Whitaker.

Union Electric Company, Pittsburg, Pa.—General line of railway and lighting supplies. Represented by George W. Provost, Thomas M. Cluley, R. M. Kerschener.

United Copper Foundry Company.

United States Electric Signal Company, West Newton, Mass.—Electric block signals. Represented by John J. Ruddick, Roland F. Gammons, 2d.

United States Engineering Company, Philadelphia, Pa.—Nachod automatic signal for electric railways, with plan of single track block, connected up for operation and arranged for a life test with a motor driven contact maker. Represented by Carl P. Nachod.

United States Graphite Company, Saginaw, Mich.

United Uniform Company, Brooklyn, N. Y.

Universal Adding Machine Company, St. Louis, Mo.

Van Dorn, W. T., Company, Chicago, Ill.—One No. 17 drawbar, New York subway style; two No. 27 drawbars; one No. 11½ drawbar; one No. 21 drawbar; one emergency knuckle to couple to the M. C. B. coupler. Represented by W. T. Van Dorn.

Van Dorn & Dutton Company and Van Dorn Electric and Manufacturing Company, Cleveland, O.—Portable electric drills and reamers, armature coils, cable connectors, street railway gears and motor pinions. Represented by W. A. Dutton, H. L. Schneider, C. I. Cartwright.

Wallace Supply Company, Chicago, Ill.—Stanwood steel steps, Wallace door fixtures, car trimmings, Wallace sign holders, Wallace deck sash ventilator openers, Wallace parcel racks, Wallace anti-rattler door rollers, signal bells, car trimmings, steel gongs. Represented by Emil Metterhausen, Wesley Meeteer.

Walworth Manufacturing Company, Boston, Mass.—Standard weight and high pressure steam piping specialties, valves, engineers' supplies and tools. Represented by H. L. Rideout, L. V. Joyce.

Washburn Steel Castings & Coupler Company, The, Minneapolis, Minn.—Complete line of M. C. B. traction couplers, electric interurban couplers, and mine, plantation and lumber railroad couplers. Represented by J. L. Hopper, E. C. Washburn.

Wendell & MacDuffie, New York, N. Y.

Western Electric Company, Chicago, Ill.—Electrose line insulation, Shelby trolley poles, Kalamazoo wheels and harps, deltabeston wire, Amazon and Dryfield tapes, linen tapes and cotton sleeving, bronze and malleable iron ears, wood strain insulators, commutators, controller parts, axle bearings, insulating paper, insulating cloth, varnishes, registers, register fittings, mica, trolley catchers, trolley rope, foot gongs, pole brackets, bells, incandescent lamps, car wire, etc. Represented by R. H. Harper, F. D. Killion, A. E. Meixell, D. C. Guest, R. L. Lunt, F. C. Jaeger, H. J. Shreve, R. Roth, James R. Stuard, G. F. Livezy, A. L. Hallstrom, H. E. Scott, P. R. Ziegler, W. Harkness.

Western Tube Company, Kewanee, Ill.—Kewanee unions, flange unions, union ells and tees, union swing check valves, union valves and boiler couplings; high-duty metal regrinding valves, medium pressure globe and angle valves, extra heavy globe and angle valves, gate valves and cocks; HDM Eurema Y valves; swing check, globe check and angle check valves; quality cast iron fittings; malleable fittings, couplings and a full line of fittings and valves for power plant equipment. Represented by Frank E. Olin, N. J. Higinbotham, L. F. Hamilton.

Westinghouse Air Brake Company, Pittsburg, Pa.—See Westinghouse companies.

Westinghouse companies, Pittsburg, Pa.—The Westinghouse Electric & Manufacturing Company exhibits a full line of single-phase and direct current motors for electric traction; span of catenary construction with pantagraph trolley in operation; arc lamps; 500-kilowatt Westinghouse-Parsons steam turbine open for inspection (joint exhibit with Westinghouse Machine Company); Union switch system of multiple control; single-phase electric locomotive (on track space); photographic studio for production of souvenir postal cards. The Westinghouse Traction Brake Company exhibits AML equipment, electro-pneumatic brake system, portable blowing outfit, AMM and SME equipments, EL electric locomotive equipment, Westinghouse automatic car and air coupler. Represented by A. L. Humphrey, J. F. Miller, S. G. McConahey, E. A. Craig, S. D. Hutchins, W. V. Turner, Robt. Burgess, P. H. Donovan, T. L. Burton, E. L. Adreon, C. P. Cass, J. R. Ellicott, C. R. Ellicott, F. M. Nellis, W. G. Clark, F. V. Green, E. H. Dusen, Geo. H. Martin, W. S. Bartholomew, E. J. Olmstead, H. S. Clark, L. A. Osborne, W. M. McFarland, C. S. Cook, H. A. Coles, L. N. Reed, G. C. Ewing, Thos. Cooper, H. H. Van Staagen, J. C. Kyle, J. A. Brett, H. C. Stier, C. P. Billings, Q. W. Hershey, J. W. Busch, O. T. Smith, J. N. Dabarry, E. H. Sniffin, L. C. Bullington, H. Van Blarcom, L. A. Phillips, H. P. Childs, S. M. Broman, E. L. Clark, H. D. Bayne, J. C. McQuiston.

Westinghouse Machine Company, Pittsburg, Pa.—See Westinghouse companies.

Westinghouse Traction Brake Company, Pittsburg, Pa.—See Westinghouse companies.

Weston Electrical Instrument Company, Newark, N. J.

Wharton, Wm., Jr., & Co., Incorporated, Philadelphia, Pa.—Manganese steel special track work including a switch, mate and frog of each of the following constructions: standard easily renewable centre work, solid manganese steel girder rail work, including also solid manganese

steel crossing, T-rail work, and new insert manganese steel T-rail work, standard heel-less type switch, manganese steel housed point split switch, steam over-electric crossing with manganese steel on the steam run. Spring switch throws, anti-kickers, tongue locks, various models and illustrations of track work. Represented by V. Angerer, L. R. Ashhurst, R. C. McCloy, W. McLain, A. S. Partridge, J. C. Robinson, J. W. Stringfellow, G. R. Lyman, H. F. McDermott.

Wheel Truing Brake Shoe Company, Detroit, Mich.—Various styles of abrasive brake shoes for grinding car wheels. Represented by J. M. Griffin.

White, J. G. & Company, New York, N. Y.

Wilson Company, The, Chicago, Ill.—Daily editions of Electric Railway Review; The Railway Age; "Motorman and His Duties". Represented as shown under Electric Railway Review.

Wilson, Jas. G., Manufacturing Company, New York.—Rolling doors for closing car barns and freight sheds. Represented by A. H. Dodge, W. P. Waugh.

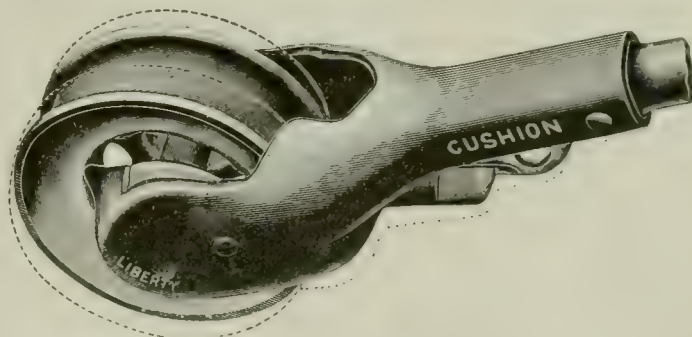
Wilson Trolley Catcher Company, Boston, Mass.—Wilson trolley catcher. Represented by Charles N. Wood, Bert C. Wilson.

Yale & Towne Manufacturing Company, New York, N. Y.—Electric hoists, chain blocks, overhead trolleys, model shop jib crane, shop pictures. Represented by C. W. Beaver, William Hazelton, F. J. Ford, F. A. Hall.

THE LIBERTY CUSHION HARP.

It is not unusual for inventions to be announced as of large importance as money savers. So simple are the improvements in principle and operation that those benefited marvel at the lateness of the discovery, yet after experience with such improvements it is often difficult to conceive how good results were obtained without them.

The Liberty trolley harp is an invention of this class. Several years ago this serviceable device was invented, and the flexible head trolley harp was offered to the street railway trade. The advantages of the flexible head were at once conceded and its value as an effective money and labor saving device was established. Indeed, so great was the interest in



Liberty Cushion Harp.

the improved harp that several street railway mechanics connected with some of the larger roads talked freely with the manufacturers regarding the essentials of an ideal trolley harp. They believed that the flexible head had been an important step toward the perfection of such a harp, but there was still lacking a harp that would reduce to a minimum the injury to wheels, poles and overhead, caused by arcing and other difficulties incident to a wheel leaving the wire.

The manufacturers of the already improved harp took these suggestions seriously, and after extended experimenting the cushion shank was developed and tested on various roads. Finally, after being tested and found successful on a hundred or more street railways, the Liberty cushion harp was placed upon the market.

About the same time, this harp was exhibited at the Columbus Convention, where it attracted merited attention. Since that time the harp has been further perfected and it may now be said that the invention has been fully developed.

The perfected harp is exhibited by The New Departure Manufacturing Company, which now owns the patents, in spaces Nos. 418, 420 and 422, on the Steel Pier. Representatives of the company are ready to demonstrate to those interested, the possibilities of this harp.

It may be said in this connection that the harps are particularly adapted for high speed and interurban roads.

The cushion, which is now conceded to be the important feature of the harp, consists of two steel buffer springs located in pockets in the ends of the shank, the outer ends of the springs being pressed against the inside wall of the harp shank. Under normal conditions, the springs hold the harp virtually rigid with respect to the shank and the trolley pole. In passing over obstructions, such as coupling sleeves, switches, circuit breakers, block signals, etc., in the transmission wires, the harp is forced down against the action of the buffer springs and instead of the pole being thrown down and the wheel leaving the wire, the springs hold the wheel tightly against the wire. In this way the shock is broken by the yielding of the harp, the rebound of the wheel is prevented and retention on the wire is secured. The spring is well housed within the shank of the harp and is protected from the weather and any possible accident.

The harps are made with rigid and flexible heads. The flexible head is a very simple device which allows the wheel to turn slightly, following the wire in taking curves. The wheels can be set and removed without the use of tools. Both the rigid and flexible head have the cushion shank.

The New Departure Manufacturing Company also makes a line of standard wheels. These wheels have proven to be of exceptional durability and satisfactory qualities. They are made of new metal, free from lead and well up to the high grade standard of New Departure products. So great is the confidence of the company in its products that they will forward harps for free trial to any railroad interested. These harps are successfully in use on many street railways in the country to-day, and yet they have been on the market only a short time.

Recently the manufacturer received a letter from a New England railroad, the substance of which was as follows: "We have been using the two trolley harps and wheels which you sent us for trial and so far have found them altogether satisfactory, our men even making efforts to try to run the wheels off the wire on curves and not succeeding."

The Gammeter Multigraph.

The American Multigraph Sales Company, Cleveland, O., is exhibiting its multiple typewriter and office printing press, the Gammeter multigraph, on the steel pier. The development of the uses of this device has been remarkable during the last year. Originally designed for the primary purpose of producing typewritten form letters, this use, although still of great importance, has almost become secondary to the use of the device for office printing. Any form within the dimensions of 8½ by 17 inches can be printed with the Gammeter multigraph on any kind of paper from tissue to card board. Any style or size of type desired can be reproduced, and it readily can be seen that the value of the machine as an office printing press is limited only by the needs of the owner. The saving which results from the use of the multigraph as compared with the regular printer's charge is said to average 50 per cent.—a figure so large as to make the machine pay for itself in a very short time in any office. For printing form work where the typewritten effect is not desired a direct inking attachment is used in place of the ribbon.

Strong Window Glass.

When glass of more than ordinary strength is desired for car windows, it is customary to use plate glass. Ordinary double-thick glass is generally used on account of the great expense entailed by the use of plate glass. As its low strength is almost the only unsatisfactory feature of ordinary glass for use in electric railway cars it will be seen that a glass possessing the properties of ordinary glass but the strength of plate glass will be looked upon with favor. Semon Bache & Company, West and Hubert Streets, New York, manufacture a glass that is claimed to combine the good qualities of ordinary window glass with those of plate glass. This glass is much harder than plate glass making it less liable to be scratched by flying sand and gravel. This glass is tough and elastic and retains its original finely-polished surface.

Among others the following companies are those using Semon Bache & Company's glass currently: New York City Railway Company, New York City; Metropolitan Street Railway Company, Kansas City, Mo.; Lackawanna & Wyoming Valley Railway, Scranton, Pa.; Cincinnati Car Company, Cincinnati, O.; St. Louis Car Company, St. Louis, Mo.; Western Ohio Railway Company, Lima, O.; Hartford & Springfield Railway Company, Springfield, Mass.; Coney Island & Brooklyn Railway Company, Brooklyn, N. Y.; Barney & Smith Car Company, Dayton, O., and Jewett Car Company, Newark, O.

LONG-LIVED BRAKE SHOES.

Receiving early assurances of great success with the Armbrust brake shoes for steam railroads, which have exceeded the manufacturer's highest expectations considering the short time that the shoes have been on the market; and seeing at once the greater possibilities of the Armbrust principles as applied to the traction brake shoe, the latter not being developed to the extent that the brake shoes for steam roads have been, the Love Brake Shoe Company, Chicago, took up the matter of getting out a brake shoe for street railways with the object in view of eliminating many of the heretofore bad defects in traction brake shoe service, and including all precautions for absolute safety from brake shoe breakages and at the same time reducing the great waste in scrap, thereby securing increased safety and great economy.

It is stated that only after the matter had received long and earnest consideration was the Armbrust traction car brake shoe placed on the market, and the efforts made have brought better results than was anticipated.

Spacing lugs are cast on the back of the shoe to space the shoe-body away from the brake head thus enabling it to wear entirely out without danger of wearing into the brake head even if the shoe should wear unevenly. A steel connector is cast in the spacing lugs (which construction does not weaken the shoe-body as might be the case were the steel connector cast in the body of the shoe) to prevent any broken parts from falling to the track and endangering the lives of people through wrecks, derailments, etc., thereby increasing the factor of safety to a maximum.

The spacing lugs perform the additional function of enabling the body of the shoe to be worn entirely out leaving only the steel connector and the spacing lugs as scrap. It will be readily seen that through this feature a great saving is effected. The reason for this is that after the Armbrust shoes are completely worn out, i. e., right down to the steel connectors leaving practically no scrap, the brake head is still ½ inch away from the shoe-body proper.

The Armbrust traction shoes may be applied to M. C. B. brake heads or any special brake heads used by traction systems, with or without flanges.

Air Versus Vacuum Drying.

If electrical coils are treated under vacuum, this process instead of closing up the pores does the very reverse and by evaporation the moisture and air are removed from the interior almost as rapidly as from the surface. Thus it is not only possible to remove moisture economically and absolutely, but also to remove it at a temperature so low as absolutely to prevent deterioration of quality. This is one of the most important features where insulating material for electrical apparatus is concerned. It is not alone the gain of time or application of a low temperature which is of the greatest importance, but the dryness of the insulating material. An absolutely dry insulation will insure a perfect insulation.

When drying by means of heated air, the drying material cannot be brought to a higher degree of dryness than the heated air itself, the latter always carrying a small percentage of moisture; and even could the drying material go below this percentage it would naturally reabsorb the moisture from the heated air. Under vacuum the slow evaporation, such as exists under atmospheric pressure, is greatly accelerated by lowering instead of raising the temperature, as the boiling point is reduced from 212 degrees F. to about 95 degrees F. These desirable features are incorporated in the Passburg patent system of drying and impregnating in vacuum, which is controlled by the J. P. Devine Company, 428 Brisbane Building, Buffalo, N. Y.

Emergency Valve.

The principles involved in the design of the Providence car fender are recognized more and more by railroad managers as being most reliable and efficient. A fender to be at all reliable must be dropped to the ground before striking an object and it must be so designed and constructed as to stand the hard usage that such a feature requires. The Providence fender, manufactured by The Consolidated Car Fender Company, Providence, R. I., embodies these features and during its twelve years of service on street railway systems has demonstrated its value as an all-round efficient and practical life-saving device. The company reports a constantly increasing business. It is interesting to note that of two fenders recommended for consideration by the city council of Peoria, Ill., in the equipping of the Peoria Railway Company's cars, the "Providence" was adopted by the company and a contract made for this type of fender.

Electric Railway Review

DAILY EDITION

PUBLISHED BY THE WILSON COMPANY

IN HONOR OF THE ANNUAL CONVENTIONS OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AND OF ITS ALLIED ASSOCIATIONS OF ACCOUNTANTS, ENGINEERS, CLAIM AGENTS AND MANUFACTURERS, AT ATLANTIC CITY, N. J.

Subscription in advance, including regular weekly issues and daily editions published from time to time in places other than Chicago, postage free; one year, \$2.00; foreign, \$5.00; Canada, \$3.50; single numbers, 10 cents.

PUBLICATION OFFICES: 147-151 North 10th Street, PHILADELPHIA

EDITORIAL OFFICES: The Steel Pier, ATLANTIC CITY, N. J.

BUSINESS OFFICES: 100 Harrison Street, CHICAGO; 150 Nassau Street, NEW YORK; 1529 Williamson Building, CLEVELAND.

VOL. XVIII

PHILADELPHIA, PA., OCTOBER 15, 1907

No. 15b

At the Atlantic City convention there are men from every engineering, operating and executive branch of electric railway activity. The cares and petty trials of daily routine will be forgotten and each man will look upon his particular work with the longer focus which leaves out the finer and more perplexing details.

The imagination will be given an opportunity to perform its function of pointing out possible future improvements and developments. In addition to the benefits derived from the interchange of ideas with men who have worked on similar problems, those who attend the conventions will be able to view the problems connected with their departments from a distance and to overlook insignificant obstacles to the adoption of new methods and devices. When a department head is continually beset by minor troubles it is sometimes difficult to properly consider larger ones; but intricate problems may be solved frequently if they are viewed from a distance.

===

When announcement was made of the programme for the recent convention of the National Association of Railway Commissions, which was held at Washington,

Co-operation With Commissions. D. C., last week, it was felt that there probably would be important developments affecting electric railways. The report on "Construction and Operating Expenses of Electric Railroads" submitted by a committee of which W. O. Seymour of Connecticut was chairman, was rather a report of progress, its substance being that the committee could find no way at the present time to harmonize the methods of accounting practiced by steam and electric roads, as each appeared to be satisfied with its own system. The committee asked to be discharged from further consideration of the matter, and with the understanding that another committee would be named to make another attempt to solve the riddle, this report was adopted. For several years the American Street and Interurban Railway Accountants' Association has been represented at the conventions of the National Association of Railway Commissioners by a committee of three delegates, and Mr. Ham who was one of the Accountants' representation this year urged that the various railroad commissioners arrange to attend the Atlantic City convention. It is understood that the interstate commerce commission and the Public Service Commission of the state of New York will be represented here. The New York commission is now at work upon a classification of operating expenses with the intention of formulating it in season to become effective on January 1 next. In view of the pending action of the New York Public Service Commission and the probability of action by the interstate commerce commission at an early date, which it is safe to say will be followed very closely by other state commissions, the discussion on the revision of its "Classification of Operating Expense Accounts" by the Accountants' Association here promises to be very important—even if it does not result in changes—as there will be an opportunity to present the ideas of the electric railway accountants to the commissioners before final action is taken.

In his address before the Claim Agents' association, the acting president, H. C. Bradley, who is claim agent of the Chicago Union Traction Company, touched upon a very serious condition confronting the street railway systems in cities where there have been controversies over franchise matters, and cited the constantly increasing

difficulty which his own company had met in successfully resisting fraudulent claims for damages. He also mentioned the situation in Philadelphia, where the personal injury expense in the last few years had been increased from 2½ per cent to about 7 per cent of the gross receipts. The marked improvement in Philadelphia since the contract of the Rapid Transit Company with the city became effective (the police now discouraging instead of aiding ambulance chasers) shows that protection of the street railway companies in this regard is very largely a matter of efficient administration by the municipality of its police powers. The point made here is another illustration of the importance of considering and properly acting on the various problems which affect the public relations of railway corporations.

===

It would seem reasonable that an institution depending upon the public for its right to do business and also depending upon the public to provide a market for its securities would be willing to give to that public a comprehensive statement regarding its operations. Such, however, appears not to be the case with electric railways in general. Reference to the financial manuals, reports of state railway and corporation commissions, and similar books shows that in but six of the states, namely, Maine, Massachusetts, New Hampshire, Connecticut, New York and Virginia, is it practicable to obtain comprehensive information concerning the operations of electric railway companies. In these states the reports submitted show general data as to earnings, operating expenses classified under four heads, and the balance sheet. The total mileage of electric railways in these six states comprises a little less than 23 per cent. of the total for the country. A few companies operating in the District of Columbia, Illinois, Indiana, Iowa, Maryland, Michigan, Minnesota, Missouri, Oklahoma and Pennsylvania, make public reports which are as comprehensive as those in the other six states mentioned, but these companies are the exceptions rather than the rule. Of the companies which do not report in such detail and which operate nearly two-thirds of the total mileage of the country, less than one-third give figures on gross earnings and total operating expenses, the rest contenting themselves with making public a statement as to the corporate name and the officers. There are only two reasons why a company should not make full and complete returns as to its operation: (1) It is not earning money enough to make a good showing. (2) It is earning too much money. In the first case a report should be made in order that the investing public may be protected. In the second case the public which is providing the excessive earnings should be made acquainted with the fact.

The report of the committee on "maintenance and inspection of electrical equipment" is especially valuable because it contains definite recommendations. It has been no small task for the members of this committee to compile, consider and draw reliable conclusions from the vast amount of data submitted on the various information blanks sent out from the secretary's office. The report shows, however, that this work has been conscientiously done, and that reliance may be placed on the recommendations which the committee sets forth in its report. With regard to control equipment of the K-type the returns from the data sheets make evident that notwithstanding the various conditions under which the cars having such controllers are operated, some roads are inspecting their platform controllers more often than is needed. The report cites the fact that "Too many overhauls and inspections are not conducive to economy, while on the other hand too few mean failures. There is always some part of the equipment which requires attention more frequently than any other. A study should be made of this part and endeavor made to improve it until it is no longer the first one to need attention; then the periods of overhauling and inspection can be lengthened to meet new conditions." In discussing the M-type and the electro-pneumatic type of multiple-unit control, the committee included in its report a definite program of procedure for overhauling the equipment on a 60,000-mile basis. The different items in the program of inspection which should be followed are concisely stated, and it would seem that those roads using multiple-unit control could well afford to have these instructions for inspection printed in such form that they could be presented to the inspection staff.

From week to week we have had considerable to say in favor of the early adoption of standards as they have been considered by the committee of the Engineering association. One of the equipment parts for which standards will be recommended is the brakeshoe. In the Electric Railway Review for September 21, 1907, page 335, was published a report of the meeting of the "Standardization" committee of the American Street and Interurban Railway Engineering Association which was held in New York on September 12 and 13. The report of this meeting includes the controlling dimensions which resulted from a very thorough discussion of brakeshoes. It will be noted that two general types were favored, one suitable for wheels with treads three inches wide and over and the other suitable for treads less than three inches in width. Detailed drawings of these two types of shoes have appeared as illustrations in the technical press, but yet it is always more satisfactory to obtain one's idea of an object by viewing it rather than by studying a drawing. Realizing this, F. W. Sargent arranged to have in the exhibit of the American Brakeshoe & Foundry Company aluminum models and actual shoes and heads made in conformity to the standards which will be recommended. One of the heads is similar to that in common use on steam railroads with some slight changes which do not interfere with the interchangeability or reversibility. This head would be used for shoes on wheels having 3-inch treads or wider up to and including the M. C. B. standard wheel tread and flange. The second shoe is designed for the accommodation of treads narrower than three inches and is more particularly adapted for wheels having treads from 2 to 2½ inches. It is noted that this smaller head and shoe were designed along the same lines as the larger one, but because of the narrow width of the brakeshoe the head is made 2 3-16 inches wide rather than three inches wide. It should also be noted that this shoe will not interchange with the larger shoe and head. With regard to the adoption of standard shoes, it seems of the utmost importance that decisive action be taken at this week's meetings.

Proposed Standard Brakeshoes.

PROGRESS TOWARD STANDARDS.

Recognizing that the problem of standardization is an especially difficult one to solve, it is pleasing to note the progress that already has been made toward the adoption of unified standards for axles, journal boxes, brakeshoes and wheel treads and flanges. The standardization committee of the Engineering association during the summer has held two meetings, one at Cleveland and one at New York, which have been attended by representatives from all the fields interested, including electric railway construction and operation and the manufacturing of supplies for electric railway use.

At these meetings the subjects, as earlier enumerated, have been discussed one at a time, and as we recall, the transcript of the discussion at the Cleveland meeting comprised some 180 typewritten pages, while that for the New York meeting included about 150 pages. Those present at the meetings seemed to recognize the importance of the subject which they were discussing and under the guidance of W. H. Evans, chairman of the committee, closely confined their remarks to the comparison of the various proposed dimensions for the different parts to be standardized, with such introductory remarks as would indicate from their points of view how important it was that some standards be adopted at once. For these elementary reasons and for the diligence of the chairman and committee who were at each meeting, assisted by President Adams of the Engineering association, the electric railway fraternity should be grateful.

Definite sets of dimensions were determined upon to be recommended as standards for the various parts of the equipment considered, including axles, journal boxes, brakeshoes and wheel treads. At both of the committee meetings probably no other subject elicited such a spirited discussion as that of determining the proper sizes for axles. In the choice of axle dimensions is laid the foundation for the possible standardization of all other truck parts. Therefore, the choice of a definite number of axles and controlling dimensions for these axles was no mean task. As a result of discussion by operating officials and those engaged in the manufacture of motors, trucks, wheels, journal boxes and axles, six standards are to be recommended, with M. C. B. standard journals ranging from 3¾ by 7 inches to 5½ by 10 inches, motor-fits increasing by ½-inch increments from 4½ to 7 inches, gear-fits increasing from 5½ to 8 inches and wheel-fits from 5 7/16 to 7 15/16 inches. The capacities for which these axles are designed vary from 15,000 pounds for the 4½ axle, having 3¾ by 7 journals, to 38,000 pounds for the 7-inch axle having a 5½ by 10-inch journals. The horsepower capacity of the motors, which can be used on the various types of axles, has been carefully considered and through the assistance of representatives of motor manufacturers recommendations will be made outlining, within limits, the proper size of motor to accompany the various axles.

The committee in its last discussion at New York submitted a set of dimensions for the six axles to be recommended which included the following: Size of journal, motor, gear and wheel-fits, distances between wheel hubs and also centers of journals, maximum capacity, horsepower, length of gear seat, gear face and pitch, diameter of gear hub and motor-bearing flange, and finished width of gear hubs on wheel and motor side.

It is readily appreciated that when these controlling features for each of the six axles have been determined upon the existing wide variation in truck details must become more uniform. The results of uniformity in practice are too well appreciated to need further discussion at this time. It is especially to be desired that when the report of this committee is presented for discussion confidence be placed in the Engineering association and it be accepted.

ADDRESS OF PRESIDENT ADAMS.

It is a great pleasure to attend a convention of this association in whatever city it may meet, but to be able to combine the association enjoyments with the great advantages of Atlantic City makes a very fortunate coincident. I cannot begin to mention the numerous qualifications of this delightful "City by the Sea" and I would not if I could, as there are a number of gentlemen who are only waiting the opportunity to give you all the information they have upon the subject.

This is the fifth annual convention of this association and the second to be held under its present name—the first three being held under the name of "The American Railway, Mechanical and Electrical Association."

Your executive committee has prepared a programme for this meeting that covers a very broad field. This has been brought about by the assigning of committees to various subjects, in addition to the papers to be presented by the gentlemen who have so kindly consented to honor us.

The advantage of committee work in connection with our association has been impressed upon your executive committee even more forcibly during the past year than ever before.

This year the committee on "Way Matters" was augmented by several committees, who have reports to present upon important branches of the subject. The work of the "Standardization" committee has also demonstrated the necessity of going further into committee work, as the subject is so broad it is necessary to sub-divide and appoint committees to handle various parts of the equipment. These should be appointed to take care of wheels, axles, brake shoes and heads, motors and various other important items.

The practice of steam roads in this respect is to have standing committees to take care of subjects of this character, and it is equally essential that this association handle these questions in the same manner, in order to obtain the best results.

I desire to call your particular attention to the report of the "Standardization" committee, but, before going into details, let me say, that, owing to pressure of business, Mr. Wallerstedt had to relinquish his duties as chairman, and it was with great regret that I accepted his resignation; Mr. Wallerstedt, however, kindly consented to remain a member of the committee. This association is greatly indebted to him for his work in the past as, chairman of the committee, for under his guidance a great deal of the foundation of this report was prepared. W. H. Evans was appointed chairman to fill the vacancy on July 3, 1907.

The report, as submitted by the "Standardization" committee, represents the most important one that has been presented in the history of the association, and, although the work of the committee has been somewhat slow, it represents not only the views of the operating men, but those of the manufacturer as well. Invitations were extended to the manufacturers interested to be present at committee meetings, upon which occasions all the subjects were fully discussed, and the report may be considered as having the concurrence of the manufacturers.

It shows that certain steps have been taken toward uniform practice in gearing for motors, the committee having met with a cordial response from the motor designers, and further steps in the question of uniform design in certain of the motor parts is only a question of time.

It is exceedingly desirable that definite action be taken on the report at this meeting, in order that a start may be made in the direction in which we have been looking for a long time, and, although the recommendations of the committee may not meet all the requirements of to-day's practice, and may not meet the ideas of all the members even for future practice, it is the earnest desire of the committee that the subject be considered as their recommendations covering the best practice. It may be necessary to add to or deduct from them in the future, but, with a good foundation on

which to work, the matter will be comparatively simple.

The importance of the adoption of these recommendations, from a commercial standpoint alone, is very great. For example, the brakeshoes and heads that are recommended will reduce, to a minimum, the number of patterns required and the stock to be carried will be decreased accordingly, as the manufacturer will be able to supply standard shoes upon short notice. Also, in good practice to-day, brake-shoes are scrapped at between 40 and 50 per cent of their original weight. With the narrow tread shoe recommended, the scrap will run from thirty to forty per cent. Prices will also be affected, as, by reducing the number of parts to be carried, the manufacturers will thus be able to give the consumer the benefit of lower figures.

If these recommendations are adopted, as I confidently expect them to be, it then rests with the members of the association to put them into practice by their incorporation in specifications for new work and rebuilding. In this way they can be taken hold of with the least possible expense.

In the name of the association, I desire to thank the individual members of this committee for the noble work they have done in connection with the report, and the Association is particularly indebted to W. H. Evans, the chairman, for his untiring efforts in this direction. The valuable assistance and co-operation given this committee by the representatives of the manufacturers cannot be over-estimated and their efforts are fully appreciated by this association.

The report of the "Standardization" committee is to be presented at the Tuesday afternoon session and a cordial invitation is extended to all railway representatives to be present and enter into the discussion of this important subject.

The report of the committee on "Maintenance and Inspection of Electric Equipments" covers a vast subject in a very able manner and the data presented is exceedingly valuable; the report shows the necessity of further investigation along these lines and several standing committees should be appointed to deal with the same for the future.

Every item of our programme is worthy of special mention, but, as they speak for themselves, I will not attempt to go into further details.

To the reference I have already made to the co-operation of the manufacturers in the work of the "Standardization" committee, I wish also to add that they have rendered valuable assistance to several other committees in their work during the past year, and the officers of this association have had a number of inquiries from representatives of the manufacturers regarding the work of the association—all indicating the desire to co-operate with us. This is exceedingly gratifying as, in the problems we have to meet, a combination of ideas representing the producer and consumer usually brings a solution giving the best results. We are glad to have this co-operation and we desire the manufacturer to feel that he is welcome at our conferences; in fact, our association has a membership which is intended to encourage this feeling. I refer to the associate membership, which is open to such representatives.

In the "Question Box" there is a question that suggests to me an investigation which will be very profitable to this association. Briefly, it is the number of men employed in maintenance upon the various operations covered by the engineering field of railroading. Of course, conditions vary with each system, but take, as an example, the rolling stock maintenance. It is possible to obtain the number of cars and motors operated, men employed on maintenance, the car or ton miles run and the general character of road and service; then, by making deductions and separating this data into groups, according to population or otherwise, it can be made of great value. The other branches can be treated in a similar manner. I submit this subject for the careful consideration of your next executive committee.

The Manufacturers' association has surrounded us with a wonderful exhibition and I understand that this Steel pier

has been the only limiting feature to the size of the same. We appreciate the efforts they have put forth in connection with these exhibits and I thank them in the name of the association.

Throughout the past year I have received great assistance and support from the executive committee and other members of this association, and I desire to take this opportunity of expressing to them my sincere thanks and appreciation of their efforts.

ADDRESS TO THE CLAIM AGENTS BY THE ACTING PRESIDENT.

It devolves upon me as the acting president of your association to make a few remarks on the assembling of the association at its third annual convention. There is something appropriate in the coming of this convention of claim agents to Atlantic City. This city is far famed as the place of rendezvous of persons who are able to and wish to spend money lavishly. There is no class of persons probably who spend more lavishly than claim agents, not because they wish to, but because they cannot help it. They will find here an atmosphere very similar to that which prevails in their offices when business is going full blast.

The problem with which we, as claim agents, are compelled to wrestle, is a growing one. It is hardly strong enough to speak of it as a growing problem. It is leaping up like Jack's famous bean stalk. In my own city, not only is the number of claims per annum increasing very rapidly, but there is a very constantly increasing difficulty in successfully resisting fraudulent claims in the courts. We have to contend not only with the ordinary prejudice which exists against corporations—in itself no small matter—but there is an added prejudice, a specific feeling of hostility to our street car companies, growing out of the long agitation concerning franchises, in the course of which the clamor of the public, political demagogues and newspapers has been directed against our companies. And I am advised that the problem is becoming more difficult in the other cities covered by our association. To mention just one example. You are all doubtless familiar with the report of the Philadelphia Rapid Transit Company recently published, which shows that the enormous increase of money expended on personal injury claims, running progressively through several years, has at last caused a deficit in the finances of the company. The report shows that the personal injury expense has increased during the last few years from about 2½ per cent of gross receipts to about 7 per cent of gross receipts.

This situation shows the continued need for our organization, and admonishes us that our organization should be closer and its work more thoroughly organized and effective than ever before.

The history of this association proves that it has been of immense value to its members along two lines, the one theoretical and the other intensely practical. The discussions and interchange of views which have taken place at our conventions, and the question box department, have enabled every member of this association to keep abreast with the most wide-a-woke and progressive theories which have been worked out by the individual members. In one sense this branch of our work is theoretical, but after all it has great and direct practical values, in the increased efficiency with which we are enabled to handle our departments.

But the intensely and directly practical advantage which I had in mind is this. There has been developed within the past few years what may be called the personal injury tramp. He goes from city to city. He usually has some personal deformity which can be made of considerable value as a personal injury asset. In the beginning of his experience, he sometimes suffers an injury more or less serious, and succeeds in collecting from a street car company, either by

settlement or by litigation, a considerable sum of money. Then the idea occurs to him that, by going to different cities, he can assess his injuries and infirmities against a number of street car companies in succession. The temptation is great to thus reap harvest after harvest of easy money. I have noted in a large number of records in our cases, which bear the ear marks of being fake cases, that the testimony of the claimant himself shows that he has lived in a number of other cities before coming to Chicago, and often his residence there, at the time of the claimed accident, has been very brief.

Now, it is apparent that if this association can ferret out and defeat only a few of such claims per year, thus saving a few verdicts and judgments which run into the thousands of dollars each, the entire expenditure of time, labor and money in keeping up this association and holding its conventions has been saved in the result of those few cases alone. I would make this suggestion. In the first investigation of the case, when it is an easy matter to get at the facts, and when the sources of information have not yet been sealed up by the skilful personal injury lawyer, it would be well to investigate closely how long the claimant has lived in the city where the claim has been presented, and also what other cities he has lived in for a number of years previously. If we do this in all cases and then promptly communicate with the members of our association in other cities, we might find that the personal injury tramp has prosecuted his calling to an extent which is appalling and beyond our belief.

There are other questions in which we are vitally interested and which will come before us during the convention, which I might touch upon in this address, but I shall not enter upon them, believing that the chief excellence of a president's address is brevity. Such questions will receive the attention which they require when reached in the due course of discussion.

At our last convention we re-elected S. L. Rhoads as presi-

At our last convention we re-elected S. L. Rhoads as president. He severed his connection with the Philadelphia Rapid Transit Company, and as by leaving that service his duties as president ceased, on March 28 last he sent his resignation to the executive committee.

Mr. Rhoads was an energetic man in the claim agent work, affable and thoroughly up to date. And as a body we have lost a strong member and a good officer. Socially, a good friend, and in whatever avocation he follows I wish him well.

We must thank the officials of the parent organization for their continued support and cordial treatment during the year.

In conclusion, I desire to thank the officers of the association and its members for their hearty co-operation during the past year, and for the harmony which has made this year one of the most successful in our history.

What is so rare as a bather in October?

It is difficult to please everybody—some of the delegates at the Columbus convention complain that, although the bathtubs are more plentiful here, they miss the sawdust in the exhibit halls.

Arthur S. Partridge arrived Sunday afternoon with the St. Louis delegation, numbering about fifty people. The party occupied two special cars. It didn't require so many to see that President Beggs got to the convention all right, but St. Louis never does things in a small way.

Major Evans—but what's the use? Every one knows that the genial major is present. He has never missed a convention, and looks to be good for at least 27 more meetings yet.

The scrap from those steel-back brake shoes of the American Brake Shoe & Foundry Company now compete with picture postal cards for they come back by mail, there is so little of it.

REPORT OF THE COMMITTEE ON MAINTENANCE AND INSPECTION OF ELECTRICAL EQUIPMENT.*

In considering the nature of the report to be submitted your committee felt that it could best serve the interests of the association by finding out, so far as possible, the present practices in the maintenance and inspection of electrical equipment of the member companies and to point out to some extent the good and bad practices with such suggestions and recommendations for further improvement as would seem advisable.

To this end, early in the summer, there was prepared and sent out question blanks asking for considerable data and, while some of the information asked for may seem lacking in importance, it has been said to your committee that the mere endeavor to supply the information has brought to the attention of operating men conditions which otherwise would probably have gone unnoticed for some time. Your committee realizes that it is impossible to make recommendations that will fit all conditions, but, if we are to learn to shoot we must have a mark to shoot at.

The maintenance and inspection of car equipment is such an important item in the reliability of operation of a street railway system that the period of overhauling and inspection should be very carefully fixed. Too many overhauls and inspections are not conducive to economy, while, on the other hand, too few mean many failures. There is always some one part of the equipment which requires attention more frequently than any other. A study should be made of this part and endeavor made to improve it until it is no longer the first to need attention; then the periods of overhauling and inspection can be lengthened to meet the new conditions, etc.

Control Equipment.

In reply to the question as to the "Frequency of Inspection of Control," the answers were:

K Type.		
Daily—13	5th day 1	300 miles 1
2d day 1	7th day 8	500 miles 1
3d day 7	14th day 2	

Multiple Unit Type.

Daily—1	500 miles 1
3d day 1	1000 miles 1
7th day 1	1200 miles 1

It is evident from the above that, notwithstanding the varying conditions, some are inspecting unnecessarily often while others are not giving sufficient attention.

Your committee recommends that the control equipment of the "K-type" be given a thorough overhauling for every 60,000 miles of service as follows:

Controller should be taken apart, thoroughly cleaned, defective parts replaced, wood scraped and shellaced and other parts of the controller painted with insulating paint. The controller should then be given a break-down test of not less than 1500 volts alternating current for five seconds. With controllers in good condition your committee believes that periodical inspections on a basis of from 300 to 500 miles service—depending upon the conditions of operation—would be sufficient and the most economical, and desires to call attention to the importance of giving careful attention to the fit of controller and reverse handles on spindles, as a loose fitting control handle will sometimes make it impossible to make the proper contact on the last point. It also renders the pointer useless as an indicator to the motorman and has a tendency to make him careless in the operation of the controller as the notches cannot readily be distinguished. A loose fitting reverse handle will sometimes prevent the reverse being thrown quickly thus being the means of causing an accident when an endeavor is being made to stop the car by reversing.

Multiple Unit Control M-Type.

Your committee recommends an overhauling on a 60,000 miles basis as follows:

All coils to be removed from the contractor, reverser and circuit-breaker boxes, thoroughly cleaned and painted with an insulating paint. Interior of boxes cleaned and painted; contact stripes between coil frames inspected for loose contacts; all working parts thoroughly inspected and worn parts replaced where necessary; wires inside of contact box thoroughly painted and when reassembled given an insulation test of 1500 volts alternating current. It would then seem to your committee that periodical inspections on a basis of from 600 to 900 miles of service would be satisfactory.

As the experience of some of the operating companies with this type of equipment is rather limited the following

points are suggested as requiring attention at such times.

Examine for broken shunt straps and broken hinge pins. See that interlocks are properly adjusted and that small arcs do not form between the fingers and discs, thereby burning finger and disc, which would eventually cause a defective contact at this point and a dead car. Clean the disc and finger the fine emery cloth. Keep the arc chutes and plates clear of all copper caused by contactors breaking current. See that all connections are tight. See that springs are not broken and are in good order insuring good contact when closed. See that plungers do not bind and that contactors break free when the current is thrown off. Contact plates should not be worn so low that screws holding them are burned. Blow out contactor box with compressed air. Note condition of wiring in the box. Clean the master control cylinder and use a small amount of vaseline on the fingers. See that the handle is of proper fit and works perfectly free. The adjustment of controller should be looked after very carefully as there are no adjustment screws on the contact fingers. Note condition of throttle. Clean throttle discs and fingers and see that adjustment nuts are not loose. Do not clean throttle plunger unless it shows signs of sluggishness. Great care must be taken when cleaning plunger. Clean reverser and note adjustment and condition of plates and fingers and that the reverse throws in properly. Use no oil or grease on contactor or reverser finger or plates. A great deal depends on the close adjustment of interlocks. All bearings on contactors and interlocks must be made loose. When a contactor box becomes coated inside with a yellow coating caused by the burning of copper, short circuits are very likely to occur if this is not cleaned off.

Multiple Unit Electro-Pneumatic Type.

Overhauling on a 60,000 miles basis is recommended as follows:

Clean the drum and adjust fingers of master switch; inspect cab switch terminals and see that they are held rigidly and no strands of wire are broken. Repair, clean and carefully adjust line relay, limit switch and battery relay. Limit switch should be adjusted with ammeter. Take apart, clean scrape and shellac drums of motor cut-out switch and reverser; replace any parts that will not make the mileage and adjust the finger tension. Strip switch groups of all magnets, switch arms and moving parts, replace worn parts when necessary. Replace worn or burned arc shields; adjust all magnet valves to operate at proper voltage; replace defective shunts; adjust and clean all interlocks and interlock fingers; examine all insulation and make as good as new; examine piston leathers and see that they are flexible and replace those badly worn. Storage batteries should be cleaned of sediment and acid strength adjusted. Grid diverters should be cleaned, the insulation renewed where necessary, and all connections tightened. Control jumpers should be tested by passing seven amperes of current through them for three minutes, at the same time giving jumper the same motion that it has when in service. Clean and adjust circuit-breaker; thoroughly blow out all piping and air chambers connected with the control.

On short period inspection the following is the practice on a road having inspection periods based on a 600-mile service.

Master Switch—Clean and lubricate every tenth inspection.

Cab Switches—Inspect terminals each inspection day. Close jaws of cab switch to fit tight each inspection day.

Line Relay and Limit Switches—Clean with crocus cloth each tenth inspection.

Inspect connections each inspection day.

Motor Cut-off Switch and Reverser—Inspect finger tension and oil drum contactor each second inspection and feel the terminals to see if the wires are O. K.

Inspect interlocks each twelfth inspection; oil reverser switch toggle each tenth inspection.

Circuit Breaker and Switch Group—Clean armature and valves each tenth inspection. Inspect contacts each inspection day. Clean arc chutes each inspection day.

Blow out with compressed air all switches and grid diverters each third inspection.

Inspect all grid diverter connections and oil all pistons each inspection day, see that all terminals are tight and inspect wires. Wipe off insulators. Inspect shunts and battery connections each inspection day. Add distilled water to take care of evaporation when necessary. Test specific gravity each thirtieth day. Test battery relay and inspect terminals of battery switches each inspection day.

Inspection.

In reply to question as to "Whether inspection is made by day or night?" 20 answered by day, 7 by night, and 9 both day and night.

*Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 14, 1907.

We believe that it is well understood that inspection made by night is less reliable and more expensive than that made by day.

Your committee would urge that very careful consideration be given this question by those doing inspection work by night. It has been found on a number of roads where at first thought it seemed impossible to have inspection done during the day that by careful study it was found possible to arrange for the work being done in the daytime, and that this has resulted in an improvement to the service as well as being more economical.

The replies to the question as to "What determines the frequency of inspection: Whether brakes, control, commutator work or oiling?" would indicate that on 75 per cent. of the equipment "adjustment of brakes" was the first part of the equipment requiring attention, although several companies report motor brushes and oiling as requiring first attention.

It would seem, therefore, that a satisfactory slack adjuster for brakes is very much needed in order to obtain length of service from this part of the equipment equal to that provided by the later types of electrical equipment.

Car Wiring.

In reply to the questions as to "What is done to maintain car wiring in a safe condition?" "How do you test car wiring, including light, heat, motor wiring?" and "How is light, heat, motor wiring installed—in canvas hose, conduit, cleats, moulding or in transit?"

The answers indicate a general tendency toward iron pipe conduit installation with a periodical test for insulation break-down. Your committee believes this to be the best practice, but that in the re-wiring of old equipment it is frequently necessary to modify this and use iron pipe conduit under the cars where exposed to wheel wash, and cabling or boxing wires in the interior of the car.

Your committee recommends that in all cases where wires are run through metal conduit before reaching the main fuse or circuit-breaker, a wire or ribbon fuse be placed on the roof of the car near the trolley of such capacity as would blow only in case of short-circuit of wires before reaching the main fuse or circuit-breaker.

One company reports the use on a large number of cars of a factory-made cable, which consists of a number of flexible insulated wires made up in cable form, the outside covering, or jacket, being made of fire-proof material woven around the wires, tapes being led out through the covering.

Trolleys.

Replies to question "How often do you inspect trolley apparatus?" shows that 90 per cent. inspect them daily, four every seven days, one every 10 days, two from 300 to 500 miles, and two roads report inspecting trolley wheels every trip.

This would certainly indicate that improvement tending to increase life and reduce the necessary attention is much needed. One company reports that with the use of an automatic trolley lubricator they find it only necessary to inspect trolleys every 60 days. Another road reports that with a similar device the labor required to take care of the trolley wheels is reduced 75 per cent., and the life of the bushing is increased nearly 100 per cent. It, therefore, appears to your committee as being well worth investigating by railroads having trouble in maintaining trolley bushings.

Replies to the question "How often do you replace trolley bushings?" show that for light cars in city service the bushing usually lasts as long as the wheel, but with heavy equipments and high speed, the trolley bushing is the weakest part of the equipment, the wheel lasting from two to three times as long as the bushing.

Your committee would call attention to the importance of having trolley contact springs of sufficient capacity and in good order so that they will carry the current from the wheel to the harp, and thus prevent burning between bushing and spindle. Two companies report using trolley wheels without bushings.

Safety Devices.

In the matter of safety devices for the protection of wiring and apparatus, your committee recommends the use of a fuse in addition to circuit-breaker on all equipments requiring current-carrying capacity of over 200 amperes. The fuse to be of slightly greater carrying capacity than the circuit-breaker, and would also call attention to the importance of overhead trolley cars being properly equipped with lightning arresters, and that these be periodically inspected and tested to insure their being in proper working order.

Armature Repairs.

The growing tendency of operating motors at high temperatures due to increased service requirements has brought to the operating men the question of making repairs with insulating material suitable for withstanding the higher temperatures.

Your committee feels that sufficient attention has not been given by operating men to the question of motor temperatures. If a motor does not melt the sodder or actually get on fire, the average car barn foreman gives the matter no further consideration, whereas motor temperatures should be followed closely, and where this is found to be higher than the motors were designed for, effort should be made to find the cause and remedy it.

For insulation of armature coils wound with round wire, and where the ultimate temperature rise is less than 65 degrees C., cotton-covered and varnished cambric insulation is sufficient.

Where ultimate temperature rise is 65 to 100 degrees C., asbestos covering for the wiring is necessary.

In the use of asbestos material your committee would call attention to the vital importance of impregnation with moisture repelling varnish.

The asbestos should be considered as a fire-proof material and a good spacer, rather than a good insulator.

Armature coils, and especially those wound with asbestos-covered wire, must be held rigidly in place in the armature core to exclude all movement or vibration in the slot or at the ends.

By some roads it is considered good practice to impregnate an armature after it is wound by heating the armature and revolving it in an impregnating bath. The advantage of this method is improved insulation and rigidity of windings in the core. The disadvantage is the difficulty of raising a coil should it ever be necessary to patch up an individual coil.

Experiment is suggested with the use of all fire-proof insulation of armature coils; that is, asbestos-covered wire; spacing and wrapping with mica and wrapping with asbestos tape. It is suggested that this process may give longer life even under moderate temperatures than the cotton-covered, oiled-cambric wrapped coils.

Repairs of Bar Wound Armatures.

Where the original equipment was bar wound it is recommended that insulation be mica, partially, if not wholly; where bars are to be replaced it is preferable to replace with bars similar to the original, that is, with insulation of mica. However, should it be necessary to repair at short notice and no mica-insulated bars are at hand, a varnished-cambric insulated bar is recommended, appreciating that the life is not as great as mica and shorter as the working temperature is higher.

Referring to the question "What test do you give coils for short circuits?" The reports show about equal use of alternating current and direct current for this test. The committee would recommend the alternating current transformer test as a very satisfactory one. For testing armature windings the usual yoke transformer test and bar to bar test are recommended. For bar wound armatures it is further recommended that a test be made by applying full load current through the brushes in their normal position on the commutator at such a frequency as to give approximately full voltage across the brushes; armatures in all cases to be outside of their frames.

Referring to the question "What insulation test do you give armature coils?" Reports show the use of 3300 volts alternating current as maximum and 500 volts direct current as minimum. Majority between 1000 and 2000 volts alternating current.

Your committee recommends an insulation test between windings and ground as follows:

For roads using trolley:

New armatures—2500 volts alternating current, 5 seconds.

Old armatures—1000 volts alternating current, 5 seconds.

For roads using third rail where voltage fluctuations have to be taken into consideration:

New armatures—3000 volts alternating current, 5 seconds.

Old or partly repaired armatures—1500 volts alternating current, 5 seconds.

Commutator bar to bar test and between armature coils before windings are connected we recommend:

New armatures—220 volts direct current, 5 seconds.

Old armatures—110 volts direct current, 5 seconds.

As to the question "Have you any preference for rolled or drawn copper over drop-forged segments?" in 22 reports where preference was stated, 12 favored rolled or drawn copper and ten drop-forged.

Your committee recommends for commutators hard drawn copper as possessing greater uniformity in size and hardness over the forged bars and corresponding superiority in life and service.

Your committee wishes to call attention to the importance of material and workmanship in the construction of commutators being such as to insure a solid structure which will not shrink, become loose, or get out of true.

Built-up mica is preferable for commutator segments, but it is very important that the building-up should be even and compact. Assembled commutators should be baked at 230 degrees C. and compressed while hot to insure solidity, clamps being tightened before pressure is released.

The best method of maintaining sizes of armature shafts and bearings has been much discussed. To the question "How many sizes of shaft journals on one type of armature in use?" the replies have been: 7 report 1 size; 6 report 2 sizes; 6 report 3 sizes; 2 report 4 sizes; 2 report 5 sizes, and 1 reports 12 sizes.

In regard to allowable difference in diameter between sizes: 8 report 1-16 second; 5 report 1-32 second, and 4 report 1-64 second.

After considerable discussion your committee has come to the conclusion that owing to the wide variety of conditions it is impossible to suggest any one set of standards to fit them all, and recommends that each road select such standards as best fitted for its own conditions.

Referring to questions "Do you sleeve worn shaft journals with steel tubing?" and "Do you apply same hot or cold?"

We find that the practice of sleeving worn armature shaft journals with steel tubing is becoming quite general, and is in the opinion of your committee without doubt good practice.

With but one exception these sleeves are applied hot. Your committee recommends applying sleeves hot, with an allowance of .004 inch for each inch in diameter.

Referring to the question "Do you bore your babbitted armature bearing shells or babbitt to size?"

While it is the general practice to bore rather than to babbitt to size, your committee suggests that possible economy and good results may be obtained by babbitting near to size, and complete finish by forcing a broach or finishing plug through the shell giving a hard smooth surface.

In reply to the question "What grade of steel wire do you use in banding armatures?" Four use bronze wire Nos. 16 and 17, others use tinned steel wire, usually No. 17, two report No. 18, and one No. 19 B. & S. gage. There appears to be lack of sufficient attention as to the quality of the wire.

Your committee would call attention to the necessity of using a high grade of wire on high speed motors, and would suggest that for motors exceeding 75 h. p., band wire should have an ultimate tensile strength of 125,000 pounds per square inch, while for large motors operating at a maximum armature speed of 1,200 revolutions per minute or upward, the band wire should have an ultimate strength of 175,000 pounds, or a sufficient additional number of turns of wire of lower ultimate strength to be equivalent thereto.

Your committee would suggest, on account of higher motor temperatures, the importance of using solder suitable to these temperatures must not be overlooked, and would recommend on all motor work the use of commercially pure tin solder, owing to its high fusing point and greater reliability.

As a flux, resin dissolved in alcohol is recommended, and the use of any flux containing acid or salts is condemned.

In reply to question "Do you have evidence of old cores materially increasing armature temperature?" The answers have been 9 in the affirmative and 18 in the negative.

It is the opinion of your committee that this is not a serious matter, and, owing to the difficulty of properly reassembling the laminations, the advantage given by dismantling the core and re-insulating the laminations is doubtful.

Where necessary to reassemble laminations they should be drifted and filed to make the core slots smooth and true.

In reply to question "Do you manufacture your own field coils?" Replies from 18 roads owning 100 cars and upward stated that 17, to a greater or lesser extent, manufactured their own field coils; one did not.

In reply to question "Do you use asbestos-covered wire for fields? If so, are you satisfied that the results obtained justify the use of asbestos-covered wire at extra cost?" and "What experience have you had with field coils wound with cotton-covered wire impregnated by vacuum process with solid compounds?"

Some replies indicate the use of wire having a layer of asbestos paper and single covering of cotton, which at one

time was quite extensively used. Some reports show the use of all asbestos-covered wire and the companies satisfied with it at increased cost. One road reports ownership and use of vacuum impregnating plant using there what is known as solid compound. Although others report that they have in use fields, vacuum impregnated with solid compound, there are but two adverse reports.

It is evident that considerable is yet to be learned from actual experience as to the comparative value of field coils wound with all asbestos-covered wire and vacuum impregnated with solid compound.

Your committee recommends for fields where temperature rise will not exceed 65 degrees C. that the wire be cotton-covered and coil impregnated with solid compound and wrapped with varnished cambric, further wrapped with heavy webbing and dipped in varnish.

For fields where temperature rise is 65 to 100 degrees that the wire be asbestos-covered, and coil impregnated with solid compound and wrapped with asbestos tape, the asbestos tape also thoroughly impregnated. The above recommendation for temperatures between 65 and 100 degrees C. applies to strap-wound fields, as well as those of round wire.

Replying to questions "What test do you give to field coils in shop?" and "What test do you give field coils in use in motor?" Reports show that a majority of the larger roads are using coil-testing instruments such as are on the market for following up the conditions of field coils. One elevated road reports the use of full load alternating current, detecting short-circuited fields by difference in temperature or by drop in voltage. One interurban road reports bridge measurements of resistance for testing fields for short-circuits or number of turns.

In the absence of better facilities the use of the ordinary field-testing instruments with induction coil and telephone ear-piece is valuable, but your committee recommends that where alternating current can be obtained it is desirable that some form of transformer test be used.

For an insulation test of fields in motor your committee recommends the same voltage of alternating current as was recommended for the test of armature as follows:

For roads using trolley: New fields—2500 volts alternating current five seconds. Old or partially repaired—1000 volts alternating current five seconds.

For roads using third rail where voltage fluctuations have to be taken into consideration. New fields—3000 volts alternating current five seconds. Old or partially repaired—1500 volts alternating current five seconds.

Air Compressors.

Your committee recommends that air compressors be given a thorough overhauling and test, electrically and mechanically, at intervals not exceeding 50,000 miles and periodical inspection at 1,000 mile intervals.

Miscellaneous Motor Maintenance.

In considering the subject before it, your committee has felt that repairs of troubles to electrical equipment after they have occurred form only a part of its work; another part hardly less important, is to consider the prevention of troubles before they occur.

In seeking preventive measures, it is well to look into what our troubles really are; analyzing them, tracing cause and if possible, devising remedy. The old adage "No chain is stronger than its weakest link," finds application on many electric railways in the car motor, proving to be the weak link in the chain.

Neglect of inspection, continuous overloading, or gross abuse of equipment on the road will naturally cause motor troubles, but assuming that these conditions are obvious enough on most roads to be kept within reasonable limits, there still remain troubles which warrant study and analysis.

Inasmuch as a large portion of motor troubles occur at the commutator, the estimated causes of commutator troubles, as shown by data sheets in answer to the following questions, should be of interest.

To question "What proportion of your commutator and brush holder troubles do you attribute to—"

"(a) Fast feeding of controller? (b) Quality of brushes? (c) Quality of commutator bars? (d) Quality of commutator mica? (e) Design of characteristics of brush holders? (f) Other causes?"

In a number of replies these figures were omitted but from figures submitted representing all parts of the country and nearly 10,000 cars the following averages were taken, each road's figures contributing to the average in proportion to the number of cars owned.

The percentage and relative magnitude of the several causes of trouble at the commutator, are shown graphically herewith.

Referring to diagram, Figs. 1 and 2, let us follow the principle laid down by Abraham Lincoln, "One thing at a time and the big things first"—and consider—

Fast Feeding of Controllers.

This is an evil which in the opinion of your committee will always exist so long as the rate of acceleration is dependent upon the judgment and thoughtfulness of the motorman. We recommended, wherever practicable the use of such automatic devices operated electrically or otherwise, as will limit to a fixed maximum the amount of current the motor may receive. Much of the fast feeding is done by motorman through thoughtlessness and not realizing its harmful effect upon the equipment. To such cases an educational effort,

by operating men or brush manufacturers to obtaining brushes suitable to the various types of motors and conditions of operation, and it recommends that the further consideration of the association be given the subject either at the hands of a special committee or that specialists of the manufacturing plants or research laboratories be invited to contribute papers throwing light on the only partially understood details of brush practice, pointing the way to the best and most intelligent methods.

Miscellaneous Causes.

Under this head, troubles reported form, in the aggregate, quite a feature of the total of bad results at the commutator, but no one item is pre-eminent. The troubles largely arise from local conditions of equipment and service.

The various items have been enumerated as follows:

Broken springs; loose holders or yokes; weak fields; reversing; wrong setting of brushes; insulation of commutator core; electric brakes; carbonized string hands.

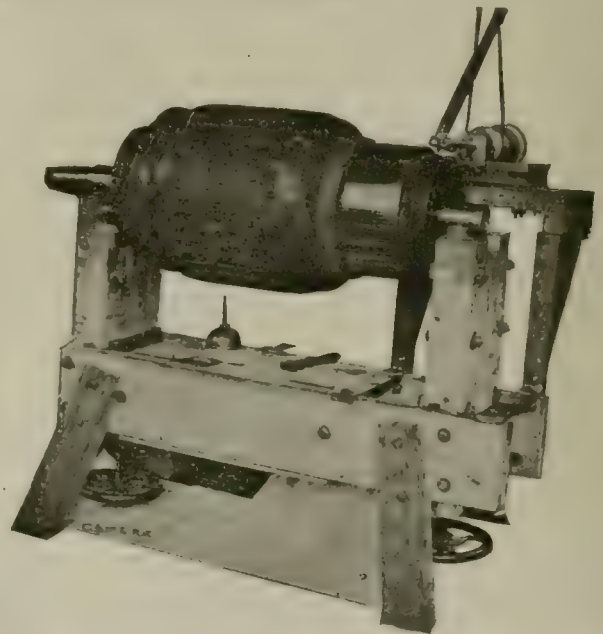
Second Day—Cut Titles—Insert Gal 38—Report Committee Report Committee Maintenance Elect Equip.

Brush Holder Design is a subject which your committee suggests receive the careful attention of each individual member, and errors of design or workmanship which may have escaped the attention of the manufacturer through their not having been brought to his notice by the user, may be brought out and corrected. Improvements in electric machinery have been frequently made at the suggestion of the user, who has constant opportunity to observe its behavior in everyday service, and the progressive manufacturer is always glad to receive intelligent criticism from "the man behind the gun."

Quality of commutator mica is one of the causes which are very generally assigned for unsatisfactory results at the commutator. Interesting evidence of this is found in answer to question "Do you consider grooving mica below the surface of the commutator effective in improving commutation?" Expressions from 33 roads, representing 13,810 cars, is as follows:

In favor of grooving mica. 23 roads, or 73.3 per cent. of cars
Not in favor of grooving... 7 roads, or 9.5 per cent. of cars
Non-committal 3 roads, or 14.2 per cent. of cars

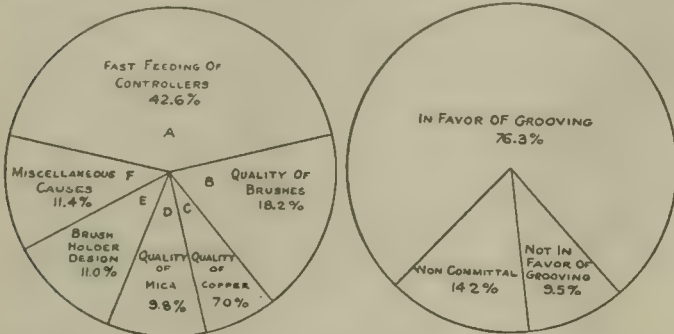
One reply to Question No. 8 is as follows: "Yes, if using soft brushes of hard mica. Would do this more, if it were easier to do. Those who approve of grooving and are prevented by lack of convenient facilities, might look with favor upon a home-made device built, at small expense, along such lines as are shown in photographs.



Maintenance and Inspection of Electrical Equipment—Figure 3—Commutator Grooving Device.

The apparatus consists of a substantial oak armature stand with V-blocks to take the end of the armature shaft, the V-block at the commutator end is adjustable vertically by a screw attached to hand wheel shown beneath. The V-block at the pinion end can be adjusted laterally as well as vertically.

At the commutator end is a shelf on which are two slides carrying the boxes of a buzz saw shaft. The saw is



Maintenance and Inspection of Electrical Equipment—Figures 1 and 2—Causes of Commutator Troubles Averaged from Data Sheets.

thorough and persistent, with the assistance and co-operation of the operating department should be made and your committee is confident that the resulting benefit will amply repay for the time and trouble expended. For interurban lines particularly there should be determined, experimentally, the distance a car will travel while building up from rest to full parallel, to receive the most rapid acceleration the motors can safely stand. This distance should be fixed as the minimum allowable, and its observance insisted upon.

Quality of Brushes.

From data received of trouble experienced with quality of brushes, on road reports no brush trouble whatever, but aside from this one exception, prevalence of brush-holder trouble in some degree, appears to have been well nigh universal.

The widest variety of opinion is expressed describing the qualities of brushes, most satisfactory. Regarding hardness preferences run between soft, medium soft, medium hard and hard. Several replies in regard to hardness favor a brush hard enough to dress down the mica, but at the same time soft enough or containing graphitic or other lubricant to maintain a smooth commutator surface. Regarding price, one road uses the cheapest brush while another holds the best is none too good. Regarding the conductivity of brushes two roads prefer brushes of high resistance, one calls for a brush of low resistance and one advocates plating of brushes with copper to increase conductivity.

Regarding specifications, few roads have any and those submitted are of a general character calling for uniformity of size, evenness of quality, freedom from breaking and crumbling and, in general, that the brush must give satisfactory service. In a few instances, beveled edges are advocated. Regarding size of brushes, many replies urge the uniformity of size so that brushes shall be a good fit in the holders, not loose so as to rattle around, nor so tight as to stick.

Regarding treatment of brushes by boiling, a large proportion favor no treatment at all; 21 roads are opposed to boiling brushes in paraffine against seven roads which favor it and two additional which favor boiling if brushes are very hard. Five roads favor boiling in oil, two in vaseline and one in soap.

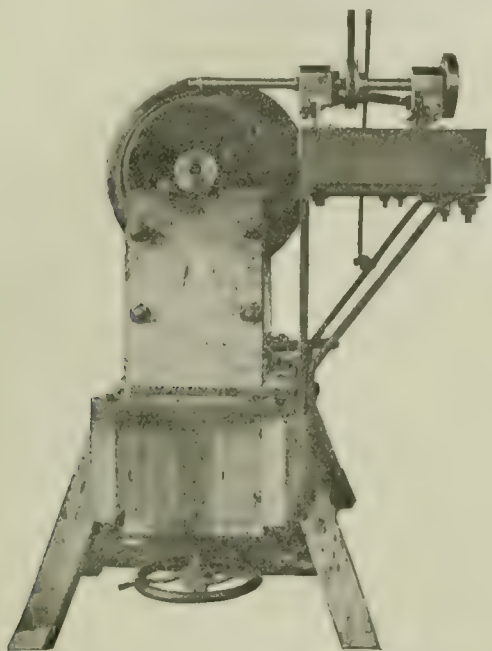
Test for Brushes.

Most roads have no test other than the test afforded by everyday service while several suggest breaking the brushes, and the fracture will show the grain of the brush and whether it is homogeneous and free from lamination and hard specks to irritate the commutator.

Brushes in General.

Replies indicate the quality of brushes has caused a troublesome, and in some cases, a serious problem of maintenance and that the problem is of sufficient magnitude to warrant careful investigation and study. Your committee feels very strongly that sufficient attention has not been given

1¼ inches in diameter, .02 inch thick, and is driven at about 1000 r.p.m. The saw is fed the length of the commutator by means of a hand lever, shown. On the opposite end of the shaft from the saw is a fly-wheel. It takes about 5 minutes to set the work and 25 minutes to groove a 75-h.p. railway armature of 117 segments, making a uniformly creditable job of the grooving. The principle of grooving mica appears to your committee to be correct, and in some cases more urgent than others, and recommends that in cases of high



Maintenance and Inspection of Electrical Equipment—Figure 4—Commutator Grooving Device.

mica or troublesome commutation a trial of grooving mica be made.

Motor Lubrication.

Reports from 34 roads show 29 lubricating on a time basis; 3 on a mileage basis and 2 on a combination of the two methods. Of the 29 roads lubricating on the time basis the figures are not in all cases complete or definite, but as nearly as may be determined the periods between lubrication are shown on the following table:

TABLE SHOWING PERIOD BETWEEN TIMES OF LUBRICATION OF 29 ROADS		DAILY	2 DAYS	3 DAYS	4 DAYS	5 DAYS	WEEKLY	10 DAYS	2 WEEKS	3 WEEKS	MONTHLY	2 MO	3 MO
A	ARMATURE BEARINGS												
	OLD TYPE MOTORS	***											
	MODERN TYPE MOTORS		*	***		*	***						
B	MOTOR AXLE BEARINGS												
	OLD TYPE MOTORS	***											
	MODERN TYPE MOTORS		*	**		*	**			*			
C	TRUCK JOURNAL BEARINGS												
	OLD TYPE MOTORS	***	*				***		***	***	***	*	
	MODERN TYPE MOTORS						***	**	***	*	***		
D	AIR COMPRESSORS												
	OLD TYPE MOTORS												
	MODERN TYPE MOTORS												
E	MOTOR GEARS												
	OLD TYPE MOTORS												
	MODERN TYPE MOTORS												

NOTE: EACH "DOT" REPRESENTS THE PRACTICE OF ONE ROAD. % INSPECT EVERY WEEK. LUBRICATE WHEN NECESSARY

Lubrication of Armature and Motor Axle Bearings.

One of the most important movements of recent years in railway motor design has been the change from the old grease cup to the waste-packed chamber for lubricating motor and axle bearings. The replies received seem to indicate that all roads have not taken full advantage of this improvement from the fact that a number of roads oil armature and axle bearings every night, regardless of the fact that waste lubrication enables the period of lubrication to be extended from three to seven days with perfect safety, and with a saving of both labor and lubricant. That in most cases the old design of motors required armature bearings to be oiled every night admits of but little argument; but your committee would urge that a sharp distinction be drawn between the types of lubrication, that the old type motor be oiled

every night or on a corresponding mileage basis, but that the modern motor be not oiled every night merely from force of habit, but that the period be lengthened to as great an extent as true economy and the proper lubrication of the bearing will permit. For this period 1,000 miles is recommended for a fair average.

Truck Journal Lubrication.

For the interval between truck journal lubrications, most replies concentrate at the weekly and 30-day periods, both of which appeal to your committee as good practice; the weekly period for interurban and the 30-day period for city cars, or corresponding periods on the mileage basis.

Motor Gearing.

Your committee would recommend inspection of gears and pinions each 1,000 miles supplying lubricant if needed, believing that a small quantity of gear grease applied frequently will insure a better economy of lubricant than heavy doses administered at long intervals.

Your committee would call attention to the higher duty required of pinion material on the larger sizes of motors, as, for instance, a 40-h.p. motor pinion has a 5-inch face, while a 200-h.p. motor pinion has but 5¼-inch face. It is, therefore, of vital importance that consideration be given to pinion material being of quality suitable for the higher duty.

Mileage Versus Time Basis Governing Inspection.

Of 33 roads submitting data, 3 are governed strictly by a mileage basis, 2 used a combined time and mileage, while the rest are governed by time only. There seems to be a growing tendency, however, to give importance to the mileage element, and most roads keep a strict mileage record so that the mileage of any car can be readily arrived at between any two dates.

Your committee regards the miles run as a more rational measure of wear and tear on equipment requiring inspection than hours or days, and that the mileage sheet in the files is a more reliable guide than the calendar on the wall. Your committee recommends that the tendency to give weight to mileage rather than to elapsed time be maintained, and where consistent, carried to its logical conclusion, viz.: the mileage basis to the exclusion of the time basis.

The method of obtaining mileage is substantially uniform on the various roads. The individual mileage for each car is furnished daily from the transportation department, usually through the auditor's office, and is then transferred in the mechanical department to books, tables or charts, and the total miles run from the first of the month, or first of the year, posted daily, so that to obtain the mileage between any two dates becomes merely a matter of subtraction.

The intervals between motor overhauling vary as widely as do the equipments and condition of service. Seven roads have no stated time, while from the rest, the general average, for interurban cars is six months; for city cars, one year.

Rules for inspection on a number of roads have been outlined on the data sheets. There is a general tendency in inspection to adopt the wise practice of specialization. The work is divided up and each man is assigned and made responsible for a certain part of the work on all cars coming under his care; for example, one man is responsible for the oiling; one man, for brushes and brush holders; and one man and helper, for brake shoes and rigging, etc. Your committee would recommend this practice and would have inspection report forms printed where the inspectors sign for each car inspected, and thus place himself on record. In all cases records should be such as to enable the responsibility to be definitely placed and indicate when inspection and repairs were made.

In Conclusion.

It has been our aim in the foregoing report to avoid exploiting the individual views of members of the committee, and instead, if possible, to make the report as based on the data sheets, a composite of the best judgment of the railways of the association taken as a whole. We regret that many of the roads belonging to the association have failed to send in data sheets. However, a large number have been received, forming a representative and valuable showing, and your committee wishes to thank those members for their co-operation in furnishing the data and for the careful and painstaking manner in which it has been prepared.

Your committee desires to acknowledge and express its appreciation of the valuable assistance rendered by Messrs. E. H. Anderson, of the General Electric Company, and J. L. Davis, of the Westinghouse Electric & Manufacturing Company, in giving the benefit of their judgment and experience in the preparation of this report.

Conventionalities

The Seattle Electric Company is represented at the convention by J. B. Lukes, who is accompanied by Mrs. Lukes.

Get a transfer from F. P. Harrison. It is good on any road and any old time. While waiting for a car sing the song on the "other side."

R. J. Jacobs of the Sherwin-Williams Company did not arrive with the other representatives of the company—he stopped to get married.

Those Pittsburg stogies that C. E. Young has at the booth of the Ohio Brass Company cost him a hard run to catch his train at Pittsburg.

One of the long distance travelers to arrive at the convention halls Sunday was W. J. Tunnah, of Little Rock, Ark. Mr. Tunnah joined the St. Louis party at St. Louis on Friday.

C. G. Goodrich, vice-president and managing director of the Twin City Rapid Transit Company and also ex-vice-president of the American association, was one of the early birds among the exhibits Monday morning.

The entertainment committee announces that because of the fact that the delegates and guests are so widely scattered it appears inadvisable to attempt to arrange for the ladies' roller chair parade this afternoon.

Harper Smith will take photographs of exhibit spaces without charge for negatives, but a charge of 50 cents each will be made for prints. Applications should be made to Mr. Smith, at 1613 Boardwalk.

Attention is called to the fact that tickets for the theatrical performance on Wednesday evening will be distributed from the box office, entrance to Steel pier, on Wednesday from 11 a. m. to 1 p. m.

So far the weather has followed the prediction "brite and fare," and the presence of N. W. Storer's grasshopper (genus Pantographitis) in the Westinghouse exhibit on the Steel pier would indicate that summer is still with us.

The Detroit United Railway is represented among the early arrivals by Messrs. Fullerton, Bullen and Parker, with their wives. Other representatives are expected but it will not be found wise to ask them why the Cubs ate the Tigers.

The fact that G. W. Spear, of The Dearborn Drug & Chemical Company, mistook their Philadelphia representative, G. Frank Duemler, for a visitor from another booth only goes to show how great are the number of their representatives.

In connection with the reception a ladies' committee has been named, consisting of Mrs. A. L. Whipple, Mrs. Richard McCulloch, Mrs. C. C. Castle, Mrs. D. B. Dean, Miss Reed, Miss Ada Reed, Mrs. W. H. Heulings, Jr., Mrs. J. W. Porter and Miss G. Cox.

Among the extensive varieties of plants which the Westinghouse companies are said to foster are found a "Rosie" and a "Lili." It is pleasing to note that these specimens are classed as "hardy perennials" and not of the "common or garden varieties."

There will be a yachting party on the champion sloop yacht, Tuesday afternoon at 2.30 P. M. Delegates desiring to avail themselves of this excursion will please call at the booth of the Ohio Brass Company, on the north side of the pier and obtain full particulars.

P. P. Crafts, general manager of the Iowa & Illinois Railway Co., Clinton, Ill., and of the Joplin & Pittsburg Railway Co., Pittsburg, Kan., arrived here with his wife Monday. John A. Prescott, secretary and treasurer of the Joplin & Pittsburg, is also attending the convention.

The Accountants' association will have an informal lunch

and social afternoon to-day at the Chevy Chase room of the Marlborough-Blenheim hotel. Secretary Elmer M. White expects a full attendance. The object is to permit informal talks regarding subjects in which the accountants are interested.

The members of the entertainment committee who are not married are said to be matrimonially inclined. Most of them have decided that expert feminine advice is required to determine what color of ties and other raiment may be safely worn with the gaudy decorations to which they are heirs in their official capacity.

President Adams, of the Engineering association, in his endeavor to furnish the electric railway field at large with accepted standards, urges that the delegates of all associations make special effort to attend the meeting of the Engineering association this afternoon, when the subject of standardization will be discussed.

The prizes for the Ladies' clock putting contest at the Country Club of Atlantic City on Wednesday afternoon and for the Golf tournament for Friday afternoon are on exhibition in the office of the Street Railway Journal, Steel pier. The prizes are cups properly engraved, two being for the ladies' contest and four for the golf tournament.

The social event of the weew is the reception in honor of the presidents and other officers of the four railway associations in the Solarium at the Marlborough-Blenheim at 9 o'clock this evening. The entertainment committee is particularly anxious to have every one at the reception as there will be no other opportunity so favorable to meet and become acquainted with the officers of the several associations. The Marlborough-Blenheim orchestra will furnish music for the occasion, and Miss Lucy Isabelle Marsh, soprano, New York, and Edward Evans, baritone, Philadelphia, will render several vocal selections. Light refreshments will be served and after the reception there will be music for informal dancing until 12:30.

Oren Root, Jr., who has recently been appointed general manager for the receiver of the New York City Railway, hopes to be able to find an opportunity to escape from the multifarious duties of his new position to make a flying trip to the conventions on Wednesday or Thursday. Like all men who have honors thrust upon them, Mr. Root is more or less the victim of a variegated publicity at the hands of the daily press. The New York Journal recently published a portrait purporting to be one of Mr. Root, but which in reality was a photograph of an entirely different person. Several other papers have used the so-called likeness for cartooning purposes, with the result that the citizens of New York have very little idea of Mr. Root's real appearance. In case the strap-hangers hold an indignation meeting and decide to call upon the general manager and forcibly demand satisfaction, the situation may have its advantages.

The convention special from Chicago was run over the Pennsylvania, leaving Chicago at 12 noon on Sunday and arriving at Atlantic City at 11.15 a. m. Monday. The train was in charge of Frank S. Bamford, city passenger agent, Chicago, and composed the best Pullman, electric lighted equipment, with Pennsylvania dining cars and observation and library smoking car. The run was made on schedule without a hitch, and everyone highly pleased. The party included on the train were: A. L. Havens, J. Jordan, F. N. Baylies, H. J. Tate, J. Benham, H. F. Monroe, Frank Perry, C. K. Knickerbocker, W. S. Bartholomew, G. B. Hippe, A. J. Maish, W. Smith, A. S. Littlefield, S. P. McGough, H. T. Bigelow, J. G. McMichael, G. H. Atkin and wife, D. C. Gust, Frank Ryan, F. H. Jamison, E. A. Nethercutt, W. Worth Bean, J. W. Buell and wife, Mr. Martin, Jno. Miller and wife, Mr. Sloan, B. M. Lathrop, P. P. Crafts and wife, E. A. Mason and wife, Mr. Henkle, Fred Brazier, W. W. Rosser, W. L. Arnold and wife, N. C. Draper, W. J. Kelsh, Lee Fisher, C. J. Ellis, C. F. Hewitt, Mr. Bradley, and some thirty-five others.

ENGINEERING ASSOCIATION—MONDAY AFTERNOON SESSION.

The fifth annual meeting of the American Street and Interurban Railway Engineering Association was held at Atlantic City, N. J., October 14-16, 1907.

President H. H. Adams called the meeting to order at 2:40 p. m. on Monday and introduced John I. Beggs, president of the American association, who spoke in part as follows:

Address of Mr. Beggs.

I am sorry, gentlemen, that your president has misrepresented the character of the few words that I may have to say to you by dignifying them with the title of an address, because I do not intend to "address" you. I have come down here, as a matter, first, of duty, but, much more, a matter of pleasure and privilege, to say, "God speed" to you in the work in which you are engaged, and as president of the American Street and Interurban Railway Association.

Prior to the time when the present plan of administering the affairs of the great street and interurban railway companies was inaugurated, very much of the time of the American association, under its former, and likewise its present title, but more particularly its former title, was taken up by discussions of subjects which are now, in my judgment, very much more intelligently and effectively considered by the Engineering association, through its various standing committees. This of itself is of very great advantage to the American Street and Interurban Railway Association and the various companies holding membership therein, and of incalculable benefit to all the street railways of the country whether they hold membership in the American association or not; and it is unfortunate in my judgment that all the companies throughout the country cannot be brought to realize the great advantage to themselves, as well as to us who have spent so much time in our efforts to promote the interests of these various properties throughout the country, in taking membership in these associations. I therefore trust that as the members of these various associations come in contact with the representatives, the officers or the owners of these various companies throughout the country, that they will impress upon them the great advantages to be derived from membership in this association, and by the contribution of their ideas, their experience, and, not least, their annual dues,—though they might be small—that we may be enabled to do greater and more effective work for all these companies the country over.

If there ever was a time when it was imperative that the representatives of these properties should stand shoulder to shoulder, now is that time. I am one of those who believe that we have in general nothing to apologize for to the national, the state or the municipal governments throughout this country. They owe a debt to those who have staked their capital and their reputations in these various enterprises that never will be paid, and never can be paid, much though they may criticize, denounce and abuse those who are in the active administration of these properties. I say this knowingly, because, possibly, no one in the business has been more freely criticised than myself; and one of the first elements that is essential, in my judgment, in the successful administration of these properties that come so closely in contact with every one in the various communities in which we operate, is to be able to take adverse criticism without breaking down under it, knowing that we are doing the best that is practicable under the circumstances.

I always qualify before legislative or municipal bodies, by specifying not the best that is possible, because the best that is possible would mean the bankruptcy of every company of this kind in the United States, but the best that is "practicable," taking into consideration all the elements, the financial as well as the operative elements, and if they would be more reasonable with these properties we should be very much better enabled to give a higher quality of service, which is the constant aim, I believe, of every street and interurban company throughout this country. It is, at least, of every one with which I have intimate association or knowledge.

I do not think there is any one of the affiliated bodies of this American Street and Interurban Railway Association that is of so much importance to the public that is served as is the affiliated body to which I now have the privilege and pleasure of saying these few brief words before your regular programme is taken up. Upon you devolves much of the labor and the responsibility for the method in which it is performed, its intelligence, experience and skill, upon which, in turn, are dependent the comfort and the celerity with which these communities will be transported from one point to another.

I have watched with a great deal of interest during the past twelve months the work and the progress that have been made by your committee on "Standards." This appealed to me strongly; it still appeals to me strongly, and will continue to do so, because I feel that you are now only making a beginning. It has been said to me within the last two or three days that you are simply doing what we have been doing in Milwaukee for several years. Well, that is commendation which is very pleasing to me. At the same time it is very gratifying to know that we are in line with what you gentlemen think is best to be done in standardizing certain appliances and methods of application to the various parts that we are compelled to use from day to day, and are using more severely from year to year.

I well remember, twelve or fifteen years ago, when it was thought that a 4-inch axle was ample for street car use, and I remember being severely criticised, nearly twenty years ago, when I strenuously arraigned the character of construction of a street car body that was designed for double motor equipment, which we thought was of such immense capacity in those days—two 15-horse-power motors, the old No. 6 Sprague. I mention that because I was more familiar with that than some of the others. You know how trifling that would be to-day, when we are constantly reaching out. I am now considering seriously the adoption of motors of practically 100 horse-power, four of them, under our standard city cars. That would have been thought very heavy equipment for our heaviest interurban lines a few years ago, and yet I feel that that is absolutely essential now to give that degree of comfort, safety and speed which is demanded in this rapidly moving age.

This committee on "Standardization" means more than simply a better facilitating of shop work, or track work. It means to the executives in charge of these properties the finding of a way in which to meet the commercial needs of the roads more satisfactorily. It appeals directly to those who are charged with raising and expending capital, because as we get down to standards we are assisted in reducing costs. I remember very well when, about eleven years ago, I took hold of one of the properties with which I am connected still, to see whether it was possible to earn its fixed charges. It had come out of bankruptcy only about six months before, and was not then earning the interest on its bonds, after having been scaled down in various ways. I think we had nearly every type of motor and every size of axle. For a good many years it took some 21 or 22 different types of brakeshoes to keep the shop running.

Now, it is much easier for us and we can work much more advantageously, when we get the type of brakeshoe down to one or two, and when the standard axle is 5 or 5½ or 6 inches, as we may come to—say 5½ inches, possibly, which is our standard at the present time, and has been for several years. Standardization is farther-reaching than may appear simply to the master mechanics or the engineers charged with keeping in repair and in operative condition the equipment on our line. It will enable the management to keep a larger percentage of the equipment on the street, and that is very important from an administrative standpoint. There are roads in this country though they are becoming less in number, that have a percentage of their equipment constantly in the shop, which would almost bankrupt a small road, or a large one either. A well run shop or road ought to have at all times at least 95 per cent of its equipment ready to carry passengers at the congested hours, and this would be a saving in every way. That is what standardization will do.

I consider that the work that this affiliated association has to do is of vital importance to the executive heads of every company administering this class of business throughout the United States. You here are the right hands of the executive heads of our companies. It does not make any difference how I may plan, as president and general manager, or one or the other, of these companies. If we are not able to get the intelligent and untiring interest and enthusiasm of the men who are at the head of our shops and roadways, it is almost impossible for us to make a success of the administration, and there is so much at stake in these days.

On every street corner, in every legislative body, there are people who are conjuring up imaginary ills that they are supposed to suffer because of the manner in which these public utilities are being operated—and, as I consider it, unjustly so. Consequently, there is all the more reason why these utilities should be operated in such manner as not to leave even the shadow of a suspicion of a lack of intelligent administration.

I speak of this matter with considerable feeling because for the past twelve months one of the companies of which I am the head has been grilled by the railroad commission of Wisconsin, upon complaints entered by the common council,

and later in an attempt by the city to violate a contract entered into seven and one-half years ago, whereby we agreed to the reduction of our rate of fare from a straight 5-cent fare and with no obligation on the part of the road to give any transfers at all (although they have been given to a certain extent) and with no requirement to carry free any of the police or fire department—all those things were conceded, and since that time we have been selling 25 tickets for a dollar, and six tickets for a quarter, whichever they preferred—the conductors must be equipped with both classes of tickets all the time—and to give universal transfers—notwithstanding that these great captains of industry that run our city councils thought it was incumbent upon them to obtain their constituents, in order to permit them the more advantageously to play to the galleries, to instruct their city attorney to demand a three-cent fare. In fact, they made it a two-cent fare, but the legal acumen of their attorney prevented him from attempting that. Our books were demanded. We did not resist the demand at all, although we might have done so. Our books were taken by a firm of reputable, able certified public accountants, for many months under a large corps of experts; the books of every company were thrown open and given to them entirely from the first day of January, 1897, to the 31st day of December, 1906, a period of fully ten years, in order to show whether or not the earnings were such as would give a fair return upon the capital and enable us to give a lower rate of fare to the city. And as I approach the sunset of life, at least possibly, the sunset of my career in this line of active business, it is one of the most gratifying experiences of my life that those accountants commend in the highest terms the manner in which those books were kept for the full period of ten years, never dreaming that they would ever be demanded in an investigation of that kind carried on by adverse accountants.

Furthermore, all the facts brought out gave evidence of uncommon ability and capability in the administration of that property, and along the line of the article in the morning issue of the *Electric Railway Review*, the most severe criticism, gentlemen, that the administration of that property was subjected to was that we had charged operation with too great an amount carried to depreciation reserves, and that I consider the highest compliment ever paid to me as the executive head of these properties. We have invested in 5 per cent bonds \$350,000 to the credit of our Injuries and Damage reserve, and \$450,000 in 5 per cent bonds to the credit of our Fire Insurance reserve and the highest amount the company ever charged against operation and carried to the credit of our Injuries and Damage reserve in any one year was 4 per cent and during a large part of the period of ten years only 3 per cent, and the largest amount we ever carried for fire insurance was 1.5 per cent, for several years only 1 per cent, but the city wishes now to credit these amounts back to profit, to show that if we had not charged up these amounts we might have been able to have afforded the lower rate of fare.

These are some of the reasons why it is so absolutely necessary that you gentlemen who are associated with the executive heads of these various companies, by your loyalty, enthusiasm and unsleeping energy, which you have displayed in the past and will no doubt display in the future, and which is so necessary to enable the companies to make up a record of that kind, in order if your books are demanded some day, that you may not hesitate to put them on the table and let them see the cards.

These are the things that count, gentlemen, in instructing and educating the engineers of these various cities that a much better type of construction would be given by these various roads if they would only permit it, and I think that if you will stand together, and that each of us, when called on to help some other company, will do it cheerfully, I think great good can be done; and I desire now, and shall do it at the meeting of the American association, to thank the various companies we called upon in Milwaukee for the willingness with which they permitted the various members of their operating staffs to come to the city of Milwaukee and give testimony as to the comparison of service there.

I am glad to be able to say, gentlemen, that after the most exhaustive examination before the Railroad Commission of the State of Wisconsin, that we came out of the ordeal fully and absolutely vindicated, and we stand better before the community now than we have stood at any time in the past 10 years, during which I had been there, and there has been little question since the time of this examination, and all that was demanded of us as the result of our investigation was that we should have to give at least as good service as we had been giving, and that, gentlemen, is the end to which we should all work, and I believe that is the earnest desire on the part of certainly 99 per cent of all these companies in the country, to give just the best service that is practicable. I was frank to say before the Railroad Commission that we could not promise to give the best possible service—

the best possible service might be given by some one, but it could not be given by me, as that would be equivalent to giving every one a seat at all hours of the day, and that is absolutely impracticable from any point of view, because many people would not go home till morning.

Now, gentlemen, I desire to express to the officers of your Association and to pour various members and committees the appreciation of the president and of the members of the American Street and Interurban Railway Association for the fidelity with which this affiliated association has stood up behind the American Street and Interurban Railway Association. There has been absolute harmony. There has been no cause for friction, and no friction has occurred, and that condition I feel is absolutely essential for the maintenance of the harmonious relations existing and for a continuance of the effective work which is being done by these various associations, and I appeal to you to continue in that same line.

President Adams thanked Mr. Beggs, in the Engineering Association, for the remarks. He then called upon C. L. S. Tingley, president of the Accountants' Association, who spoke in part as follows:

Remarks of Mr. Tingley.

The thought which was running in my mind particularly when Mr. Beggs was speaking was as to the pulling together of the various associations and how they are all interwoven. The Accountants' association, and the accountants of the various roads, are in rather an anomalous position, we are neither a revenue producing department, nor do they build property; in fact, we are the historians of the organization, and in order that our history may be authentic, and that it may be of value, not only to the management, but to ourselves and to you, we must have your cordial and hearty co-operation. We ask your co-operation, in order that our statistics may be worth something. As an association, our association asks your co-operation in order that the various plans which from time to time are formulated, for the betterment of the accounting, for the making of statistics more valuable, may be properly shaped up on the technical side.

President Adams next called upon Past President Olds of Milwaukee, who spoke of the early days and the changes that have since taken place.

President Adams then delivered his annual address which will be found elsewhere.

The report of the executive committee comprised a summary of the minutes of meetings held during the year. The treasurer's report showed receipts for the year of \$1,412.66; expenses \$1,376.08, balance on hand \$36.58. The chair announced that a committee of nomination would be appointed later.

In place of report of committee on control apparatus F. E. Case, General Electric Company, presented a paper which will be found elsewhere.

The chair announced that Mr. Cooper of the Westinghouse Electric & Manufacturing Company, who had been invited to present data, had been detained by an accident and would not be present. In his stead, N. W. Storer briefly described the Westinghouse Electro-Pneumatic type of unit control. Following this, the report of the committee on Maintenance and Inspection of Electrical Equipment was presented by L. L. Smith. After an interesting discussion on this report, the meeting adjourned.

Railroad certificates requiring validation should be deposited with Secretary Swenson as soon as possible. Mr. Swenson may be found on the right of the entrance to the steel pier. The holders of special round trip tickets and other tickets on which a validation is necessary to obtain a reduced fare for the return trip will find it to their advantage to give the matter their prompt attention.

Street railways with cars operated by manual power are in use at Mombasa, in East Africa. The light, narrow-gauge tracks are laid through the street, and in the unique system of operation the cars are for hire, like cabs, or are the private property of officials and wealthy residents. They are little 4-wheel cars with one or two cross seats, and each is propelled by two natives. Spur tracks are run into private grounds, so that persons can take the cars to their doors.—*Engineering News*.

RECENT IMPROVEMENTS IN CONTROL APPARATUS FOR RAILWAY EQUIPMENT.

BY F. E. CASE, ENGINEER, RAILWAY EQUIPMENT DEPT., GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

I have been asked to present some new features of multiple-unit and hand control, and will therefore, describe some of the new pieces of apparatus that the company which I represent has brought out since the last meeting. I appreciate this opportunity for bringing these to your attention and shall endeavor to confine myself to points of direct interest.

For some little time we have felt that the standard forms of K-type series parallel controllers were not entirely satisfactory for service operating conditions. While these controllers successfully handle the ordinary arcing and currents, if a motor or other part of the equipment becomes damaged so as to take an excessive amount of current through the controller, the capacity for disrupting arcs is exceeded and short circuits sometimes occur. The use of higher operating voltages has also imposed a greater duty upon the platform type of controller. We have, therefore, designed a new line of cylinder controllers with improved magnetic blow-outs, which can be safely used where the voltage peaks may reach 750. The present line of controllers comprise three sizes as follows:

The K-34 controller, which is suitable for use with either two 150-hp. or four 75-hp. motors rated at 500 volts.

The K-35 controller, for use with either two 100-hp. or four 50-hp. motors and less.

The K-36 controller, for use with two motors only of a capacity of 60-hp. each or less.

As some of the newer railway motors are based on a horsepower rating at 600 volts, the capacity of these controllers at this voltage will be correspondingly increased.

The K-34 and K-35 controllers produce the bridge connections by means of which full current is maintained through all the motors during the transition from series to parallel. The acceleration of the car will, therefore, be smoother than with the connections where the circuit was opened or one motor was shunted and the strain on motors and gearing will be reduced. The bridge connections, however, are not produced by the K-36 controller as they were not considered so essential on small equipments and they also require a somewhat greater space, making the controller correspondingly larger.

The main operating handle in all sizes of these controllers is directly connected to the operating cylinder without the intervention of gearing. The reverse switch and handle are located at the left of the controllers in order to permit a better arrangement of the new style of magnetic blow-out, differing from the previous K-types of controller in this respect.

In order to secure an efficient magnetic field for extinguishing the arc, when opening the circuit, each controller finger—or set of fingers where several are mounted on a common base—is provided with an individual blow-out coil and arc chute. These blow-out coils are mounted on the contact finger blocks and are provided with thin steel pole pieces placed above and below the finger and additional steel plates are embedded in the arc deflector partitions which distribute the magnetic flux across the arc chutes in a line parallel to the shaft and at right angles to the arc, thereby projecting the latter away from the cylinder and not against the division plates of the arc deflector, as in previous cylinder controllers of the K-type. This form of magnetic blow-out insures the extinction of the arc under very abnormal conditions and should reduce the burning and wear of fingers and segments to a minimum.

The K-34 and K-35 controllers provide six breaks in series when opening the circuit under ordinary conditions and in case No. 1 motor becomes grounded and short circuits the breaks between No. 1 and No. 2 motor, there will still be four breaks in series to open the circuit. In previous controllers four breaks were provided in series under normal conditions, but a short circuited motor might reduce this number to two and I believe that many cases of controller trouble have resulted from this cause.

In order to simplify the construction of the controllers and to eliminate as far as possible parts which might be a source of trouble, it was decided to abandon the connection board as used in the K-10, K-6, K-28 and similar controllers and bring the car wiring cables directly to the contact finger bases. The terminals provided are of the clamp form which does not require the use of solder and there are no set screws to injure the wire. The clamps are very accessible and the leads can be quickly connected and disconnected when desired.

Cut-out switches are located near the top of the controllers where they are more accessible and are not so exposed to the collection of dust and in consequence less trouble from short circuiting is to be expected.

The omission of the connection board leaves additional space in the controller which has been utilized for lengthening the reversing cylinder and placing all of the contact fingers with their clamp terminals on the outer side, where they are very accessible for inspection and repair.

An improved method of securing the cylinder castings to the shaft has also been used. The shaft is of hexagonal section and is wrapped with a number of thicknesses of thin sheet insulation which is cemented together and put under a heavy pressure to bring to the exact dimensions required. The cylinder castings fit over this insulation and are securely held by means of steel keys the width of one of the hexagonal faces. Heavy set screws passing through bosses on the casting bear against these keys and hold them firmly. This construction provides an excellent insulation between the castings and the shaft and at the same time absolutely prevents the former from shifting. If necessary, the castings can readily be removed from the shaft and replaced by others without the use of special tools or fixtures.

Improvements in Type-M Control.

A number of improvements have also been made in type-M control.

In order to economize in space a new form of contactor in several sizes has been designed which is narrower than the present contactors and is also simpler in construction. This produces a heavier contact pressure than previous contactors of the same capacity without requiring any more operating current. New contactor boxes have been designed for the new contactors in which the control circuit fuses are placed at one end, thereby simplifying the control circuit wiring. The length of the contactor box suitable for use with four 60-hp. motors is about fifty-four inches over-all and for four 125-hp. motors is about seventy-two inches.

There have been many discussions regarding the comparative merits of automatic and non-automatic control for street car or similar service, where great variations in load of car and conditions of track are encountered. With a current-limit relay set for one rate of input to the motors, it is obvious that the amount of current which will start a light car satisfactorily on a level track may not be sufficient to start the same car loaded on a grade or curve. In several instances to overcome this objection we have provided switches to cut out the current limit and permit a greater amount of current to flow through the motors in an emergency. This arrangement, however, makes it more difficult for the motorman to notch up without slipping the wheels, and we have, therefore, proposed the use of two relays of different current settings; one to be used for normal operation and the other to be cut in by means of a small switch when it is necessary to obtain a greater motor torque.

A radically new design of contactor for alternating current operation has been developed. This contactor has a very efficient magnet for operating it and a pressure as great as that in our direct current contactors is obtained. As a matter of fact this contactor is just as simple in construction as the latter and operates with perfect freedom from the disagreeable humming incident to most alternating current magnets. The same type of magnet is used for operating the reverser, oil switch and other devices requiring to be operated by means of magnets.

So much has previously been said about the use of contactors in conjunction with K-type of controllers, that I think there is no need of taking up time with this matter.

New Circuit Breaker.

We have developed a new electrically controlled circuit breaker of smaller capacity than the previous one, known as the DB-105, for locating under the car. This circuit breaker may be used with either type-M or cylinder platform control, and it is enclosed in an iron box to protect it from wheel wash and dirt. A small double-throw switch located conveniently near the motorman, is used for setting and tripping the circuit breaker from the platform.

Fuse Boxes.

The MA-11 copper ribbon fuse box used with equipments of 300 to 500-hp., has been criticized on account of the difficulty in replacing a fuse, and to overcome this we have designed a fuse box, known as the MA-14, having a hinged lid similar to the smaller size, the MA-13. This fuse box is made of fireproof moulded insulation instead of sheet fibre.

There have been many opinions expressed regarding the proper design for a trolley base, and we have attempted to incorporate in a new case, known as the US-13, the desirable

*Presented before American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 14th, 1907.

features recommended by our railway friends, and to eliminate those points which various types of trolleys in service have proved to be objectionable. The following is a brief specification:

Vertical roller bearing, comprising 31 steel rollers $\frac{1}{4}$ inch in diameter by $5\frac{1}{2}$ inches long; four tension springs adjusted with one screw; capacious oil well; resilient spring stop; height, 5 inches; weight, approximately 100 pounds; maximum pressure at 45 degrees, with 14-foot pole and high-speed fork and wheel, 35 pounds; the pressure increasing slightly at a lesser height and decreasing at a greater; minimum pressure at 45 degrees, with 12-foot pole and small wheel, 18 pounds.

It is believed that this trolley base is one which can be universally used for both high speed and city service with excellent results. The master mechanics of several different railways have examined the base and given favorable opinions on it.

CLAIM AGENTS' ASSOCIATION.

Henry C. Bradley, acting president of the Claim Agents' Association, called the session to order at the St. Charles hotel at 3 o'clock Monday afternoon. The reading of the minutes of the last meeting was dispensed with. Mr. Bradley made the annual address of the president.

B. B. Davis, as treasurer, reported that during the year ending September 30, 1907, the total receipts were \$922, from which had been expended \$912.74.

As secretary, Mr. Davis then presented a report which outlined his work during the year.

Mr. Beggs' Address.

After being introduced by Mr. Bradley, John I. Beggs, president of the American association, made an address, of which an abstract follows:

It affords me pleasure, gentlemen, to see here at this opening session a number so greatly in excess of what I had the pleasure of seeing, and to whom I addressed a few words 12 months ago, and I think 12 months before that.

I am glad to see that there is that interest manifested on the part of the various companies which are members of the American Street and Interurban Railway Association, which induces them to send so many of you gentlemen to meet together at least once a year and exchange experiences as to how best to counteract the efforts of the ambulance chasers and the various attorneys that in every community are attempting to make a great number of people believe that they are badly injured whether they are or not.

I think that one of the best things that railway corporations can do is to permit the heads of their claim departments to make occasional visits to the offices of other companies, and exchange experiences and see the method employed by others in dealing with claims. In the companies that I administer I have realized the value of that and have not only permitted but requested the heads of the claim department, the chief claim agent, the attorney and the surgeon to make visits to other cities to see whether there was not something that could be learned from them that had escaped us in our efforts to check exactions.

My advice to the claim department of any company is to try to keep as many cases as possible out of the courts. I am well aware that what I am about to say is directly the opposite of the policy pursued by many companies. The principle which I impress upon claim departments is, first, to get all the evidence, not only that which is favorable, but that which is unfavorable. Many times companies are subjected to great and unnecessary expense simply because the investigators in the claim department get only the favorable side of an accident case. It is quite as important, and, in fact, more important to get the worst side of the case in order that the executive head of the company may be able to determine whether it is a case that ought to be settled, or whether it is one to take into the courts.

In support of this general policy (which I know is contrary to that pursued by many companies), is the fact that one of the companies which I administer has not had a case in court which has finally been sustained by the higher courts in a period of three years, and at the end of each of those three years we have had fewer cases on the dockets of the courts of that city than we have had at the beginning of that year. That is the direct result of this policy that I have outlined.

In my judgment, every policy should be based upon the principle of right. If we know that through the negligence of our employes a person is injured, we are legally and

equitably liable to pay for it, and we should determine whether there is such liability existing, and then if it can be settled upon any reasonable basis, settle as quickly as possible. It is a valuable asset in the trial and settlement of these cases before the judges and before the general reputable lawyers of any community, that any case having merit need not be taken to court.

On the other hand, if you are convinced that there is fraudulent intent, my directions to the claim departments are that if that case can be settled for \$500, and it will take \$5,000 or ten times \$5,000 to defend it, defend the case!

The company which I represent has just been undergoing an examination by the city in which its books for 10 years, from January 1, 1897, to December 31, 1906, have been thrown open. An expert firm of certified accountants examined the books. This is the result of an effort by the city to force us to give a lower fare than four cents. The accountants who made this examination, after spending several months in exhaustive work upon our books, report that the management of the company gave evidence of uncommon capacity, and the one thing which they criticized among others, is that we have created reserve funds unnecessarily large, the point being that this reserve fund might be carried back to profit and loss account, instead of having been charged to operation for a period of 10 years, little by little, and thereby it might be that they could compel the city to give a lower rate of fare than four cents.

Now, then, gentlemen, we have accumulated \$150,000, invested in 5 per cent securities and if we were to go into liquidation today, if our franchise was to expire by limitation, or anything of that sort, this reserve fund would all be needed to settle the claims then pending.

In the Milwaukee company, ever since I have been connected with it, I have pursued one course, and that is that all connected with the claim department must come from the platform of a car. We do not employ young attorneys as investigators. We employ the brightest and keenest and most intelligent of our motormen and conductors, and there is no other avenue into the claim department. A claim agent who has been a motorman can check up the motorman in an accident. It sometimes happens that a motorman will try to put the blame on some one else, and sometimes the man who is in charge of sending out the cars will try to lessen the company's blame for the accident.

The meeting then adjourned to 10 A. M. Tuesday.

PATENT PROCESS CASTING.

The advancement made in the manufacture of all lines of railway equipment, the great increase in size, power and high speeds brought about by the rivalry in competition and increased business, has made it necessary to improve the quality of materials, especially in bearings, to maintain and operate successfully and economically the very heavy type of equipment now being manufactured.

In this connection the More-Jones Brass & Metal Company, of St. Louis, Mo., which has been in the manufacture of bearing specialties for over 34 years has invented and patented a process for the manufacture of bronze and brass bearings by which they are made similar in grain and nature to that of tool steel. The process is said to make the metal absolutely proof against grit and impurities, because no sand is used in connection with their manufacture. The bearings are cast in composition metallic molds, so constructed as to avoid cold shot and keep the metal thoroughly mixed. A portion of the floating top is drawn off to take away impurities that might be contained in the metal, and to leave the bearing deposited of uniform heat, thereby avoiding any shrinkage and producing a perfect and uniform material. Many comparative tests have been made which show the material when cast by patented process to be 30 to 50 per cent. stronger in both cross-brakeing and compression strength. The variation of percentages is only shown by the difference in the compositions. The specific gravity of the metal is displaced by gas and steam in sand casting. The porousness, together with the gritty impurities in sand-cast metal causes friction and rapid wear. The wearing comparison of the metals has been thoroughly tested on many of the large railroads and traction lines the reports of which indicate that the bearings cast in the patented process show 40 to 50 per cent. less wear on the metal, and 40 to 50 per cent. less wear on the shaft, and the frictional heat greatly reduced.

While the process greatly improves the quality of the material for bearing purposes, at the same time it does not increase the cost of manufacture. Proof of the strong indorsements of material made by this process is fully demonstrated by the enormous growth of the business of the More-Jones Company.

Among the Exhibits

The Chicago Pneumatic Tool Company is showing in operation its Duntley electric drill wound for 550 volts for use in drilling holes for railbonding and similar work. There also is on view a specially designed portable grinder to operate on street railway circuits. These tools have been on the market for some time and have met with general favor wherever used.

The booth of the Gold Car Heating & Lighting Company in Space 403 to 417, on the south side of the pier, is proving very attractive these days, not only on account of the elaborate display of electric heaters, but also on account of the pretty souvenirs being given away.

Whitmore's gear protective composition, manufactured by the Plomo Specialty Manufacturing Company, Cleveland, O., is said to give an unusually satisfactory record of mileage. The excellent condition of the gears and pinions after a number of months of use would seem to indicate that on account of its long life the use of this product would eliminate the serious difficulties and excessive expense incurred by the frequent renewals of gears and pinions.

In hard center construction for special track work William Wharton, Jr., & Company are exhibiting their "R. C." work, the manganese steel centers of which are held in place by bolts and nuts. A half section of a frog of this construction in the Wharton exhibit shows clearly the method employed to hold the centers. While the Wharton people claim that their centers rarely require renewal, they say that with this construction a center can be renewed in less than an hour under traffic.

W. P. Cosper has resigned as representative of the Electric Service Supplies Company to engage in the manufacture of hot water heaters and controller regulators.

The Massachusetts Chemical Company is presenting its friends with a serviceable souvenir in the form of a corrugated rubber pad which may serve a variety of purposes. It may be used for an ink stand, water pitcher stand or a jardiniere stand, etc.

The exhibit of the Dressel Railway Lamp Works of New York is to be found in booths 922 to 924 in the Ball Room. A line of samples of their products is shown that will interest many. Any information desired will be cheerfully furnished. Visitors are invited to register and catalogues will be mailed to those desiring them.

The Niles Car & Manufacturing Company, Niles, O., is shipping a great many of its cars on their own wheels in regular steam railroad trains. This is made possible by the use of M. C. B. standard drawbars, wheels, journal boxes, air brakes, etc., many of the Niles cars being for operation under approximately steam railroad conditions. The company is shipping 25 large cars to the Washington Baltimore & Annapolis Electric Railway, Washington, D. C., in regular trains over the Baltimore & Ohio Railroad; ten 56-foot passenger cars to the Northern Electric Company, of Chico, Cal., which are going the entire distance on track, and a short time ago delivered 17 cars to the Ft. Dodge Des Moines & Southern Railroad, Ft. Dodge, Ia., in this manner. It also is building twenty-four 57-foot cars for the Chicago Lake Shore & South Bend Railroad, which will be hauled in regular trains by the steam railroads.

State Highway Commissioner McDonald of Connecticut, one of the leading authorities in the country on street construction says: "Macadam roads are the best if you could

only hold them together without constant repair. Bitulithic is a most scientifically constructed macadam road that is held together by a waterproof bitumen, and is, therefore, the best of permanent pavements."

The Samson Cordage Works wants everybody who is interested in economies of maintenance to look at its exhibit of trolley cord and bell cord and compare the samples with other cords that may have been observed on street cars.

The representatives of the Western Tube Company gave us an interesting half hour in describing the advantages of the Kewanee Union and one does not have to be a technical graduate to appreciate its many superior points. But in order to hear about the patented "brass to iron thread connection" and the compressed air under water test, those who are interested would do well to visit Booth 918 and learn for themselves.

The Danville Car Company has acquired the sole rights to the Looney Patents covering the combination hand and dump car. This car has many novel features. It is a side and end dump car or a flat car, as may be desired, and should save at least one man on every section.

A sample car can be seen at the Danville Car Company's exhibit.

The Under-Feed Stoker Company of America, General Offices, Marquette Building, Chicago, is represented at the convention in Exhibit Spaces 0-28 and 0-30, by C. S. Crowell, district manager of the Philadelphia office, and W. T. Jordan, district manager of the New York Office of that company in charge. A stoker in operation comprises the main feature of the exhibit.

In order to be more centrally located the Columbia Brake Shoe & Foundry Company has moved its offices from the Perin building to suite No. 1310, Traction building, Cincinnati, O. This company in its new offices is located in the very center of the traction interests of Cincinnati.

United Railways Company of St. Louis has ordered 300 Mason safety treads for car steps.

The St. Louis Car Company has just floored 55 cars with American Mason Karbolith flooring for the New York Central & Hudson River Railroad Company.

The Green Traveling Link Grate, manufactured by the Green Engineering Company, Chicago, is extensively used in large power plants, and is unusually well adapted for generating steam under any type of boiler. With it any of the low-grade Western fuels can be used. The machine is entirely automatic, can be removed from the furnace for inspection or repair, and the parts which are subjected to heat are easily removable. The nature of the chain forming the grate surface compels it to be constantly kept clean and the air spaces open. It requires less than ½ horsepower per stoker to operate, and perfectly smokeless combustion is continuously effected. The latter point is one of the greatest importance in cities where smoke ordinances are rigid, and the Green Engineering Company can guarantee smokelessness if their designs are followed.

Several hundred steps of Mason safety treads for station stairs are being made for the Northwestern Elevated of Chicago. These safety treads are carborundum filled with steel base. The same company is also making a large number of treads for car steps for cars for the same railroad company through the American Car & Foundry Company of St. Louis; these car treads are lead filled with steel base.

If you don't believe it see Rooke about it. He is on hand for the express purpose of convincing every unbeliever that the Rooke Automatic Register won't let a nickel get away.

The ease of attaching brazed rail bonds is well illustrated in the working exhibit of the Electric Railway Improvement Company, Cleveland, Ohio. The making of the joint is very quickly performed, a brazing heat is obtained in 45 to 60 seconds and the car can be almost instantly taken from the track. A 10-minute schedule is seldom delayed while the brazing cars are working on the line. The exhibition car has been sold, since the opening of the convention, to the Rochester Railway Company.

The Buckeye Engine Company, Salem, O., is showing photographs and plans of a very complete line its well known steam engine. This company is now selling a gas engine that is up to the high standard of the Buckeye steam engines.

In its Thompson-Ryan generator and the McEwen engine the Ridgway Dynamo & Engine Company, Ridgway, Pa., claim a power unit of particular merit. The balancing coils of the generator produce almost sparkless operation of the brushes. It is claimed that by the arrangement of these balancing coils all the advantages of inter-poles are realized on a generator.

The exhibit of the France Packing Company, Philadelphia, Pa., is especially interesting to the engineer for it is composed of the many kinds of packing manufactured by this company, lubricator or grease cups and steam stoppers.

Ladies will please take notice that the bird on exhibit at the booth of the National Brake Company is not a souvenir.

The Lorain Steel Company, of Philadelphia, Pa., is showing at its booth as complete a line of rail section and special work as has ever been displayed at a convention of the association. The special work shown includes this company's well-known Chicago type of tongue switch, which is made with a Guarantee Steel brand of surface plate and a tongue of the same quality of steel. This tongue switch contains a very simple adjusting device at the pin, which allows the removing of the tongue without disturbing the pavement surrounding the switch. The company is also showing a Tadpole heel switch, which is designed to distribute the jar of a passing car over the entire surface of the heel. It has no pin and has no openings beneath the tongue in which dirt and water may collect. This switch is also manufactured from Guarantee steel, and was designed to conform to the prevailing desire among railway men to get away from the use of pins in the tongue. The Philadelphia type of switch, which may also be seen at the booth, contains a screw and wedge adjustment—which facilitates the removal or the adjustment of the tongue when repairs are necessary. Other things that may be seen on exhibition is a new type of grade-crossing special work, which is made of solid steel, instead of three rails, as is usual in this type of crossing; 75 sections of rails and standard hard center frogs, as used by steam and electric railways.

One of the new firms represented at the convention and showing its products in booths on the steel pier is the Pittsburgh Pole & Forge Company, of Pittsburgh, Pa. This company was organized less than a year ago and is now engaged in the manufacture and sale of trolley poles. At the booth the representatives, J. P. Biggert and B. D. Foster, are exhibiting their high test poles undergoing a drop strain of 90 pounds and showing a deflection of 14 inches. The quality of the poles is evident when the strain is released, as no permanent deflection is noticeable. The company's "hot" joint process as used in the construction of span wire, electric light and

signal poles is also demonstrated. There is a growing tendency among railway men to demand that the tensile strength of their trolley poles be specifically given and the Pittsburgh Pole & Forge Company states it is prepared to meet this demand.

The General Electric headquarters are at its exhibit opposite the main entrance on the Steel pier and in the Marlborough-Blenheim parlor No. 113. Among the representatives in attendance are: J. G. Berry, manager railway department; W. J. Clark, manager traction department; W. B. Potter, engineer railway and traction department; E. D. Priest, F. E., Case and A. H. Armstrong, engineering department; C. C. Peirce, Boston; J. J. Mahoney, S. W. Trawick, New York; R. E. Moore, Philadelphia; H. L. Monroe, Chicago; George D. Rosenthal, St. Louis; E. H. Ginn, Atlanta; H. C. Houck, Cincinnati; H. N. Ransom, W. G. Carey, Schenectady; F. H. Gale, in charge of advertising department.

A recent development in the line of carbon brushes is the reinforced brush, as manufactured by the Spur Carbon Company, St. Mary's, Pa. This brush is the result of many years spent in the manufacture of all kinds of carbon brushes. Carefully conducted experiments show that the reinforcing process increases the mechanical strength and makes a more dense brush, thereby increasing its efficiency.

The Kalamazoo Railway Supply Company wishes to call attention to its Root scraper and flanger. The representatives say that there is no better proof of the efficient service the scrapers are giving than the fact that nearly every railroad in the snow belt has them in use, and these roads are increasing their orders every year. The exhibit is at booths 78 and 80.

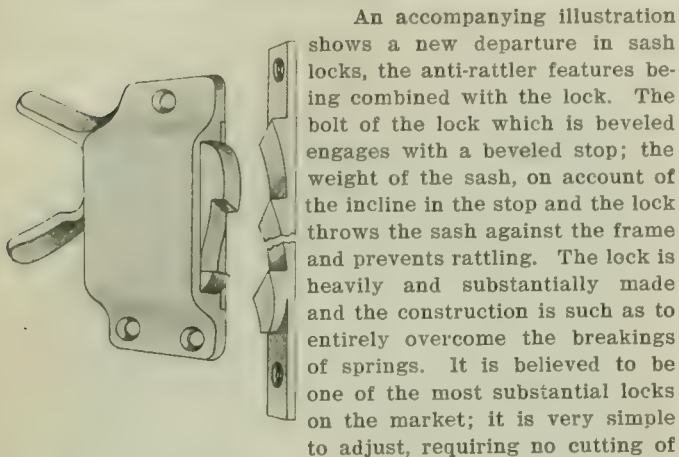
The T. H. Symington Company is showing this year a new design of lid especially adapted to electric cars operating almost exclusively over city streets. This lid is applied to and removed from the box by means of a short bar used as a lever. It is of simple construction, consisting only of the lid and a helical spring, the spring being fastened to the lid, but so located as to be entirely protected from possible blows by wagon hubs. There is no projection on the outside face of the lid except a small lug near the top, which serves the purpose of a handle.

GRIP NUTS.

The Grip Nut Company is represented at the convention by B. F. Stewart, who, at the company's space, No. 323, on the south side of the pier, is demonstrating and giving opportunity for engineers to demonstrate for themselves the soundness of the theory on which the grip nut is designed. The point of superiority which is claimed for the grip nut may be most clearly brought out by a brief description of the method of manufacture. The nuts are cold punched from special bars of fairly hard open hearth steel. The bar is rolled with a slight arch in the central portion so that the cross section shows two slightly inclined portions, one at each side, joined by a flat arch. After punching the blank nut is threaded, using a tap a little larger (about 1/1000 inch for the smaller sizes) than the bolt which it is to fit. Then the threaded nut is placed in a press and the arch slightly flattened so that the thread is distorted at two diametrically opposite points. The flat sides of the nut give portions of undistorted thread which permit the nut to be started on the bolt by hand. When two-thirds of a turn is made, however, the downwardly deflected sections of the thread come into bearing and a wrench is then required. The distorted sections of the thread bear against the outer surfaces of the bolt thread, while the straight portions of the nut thread bear on the inner surfaces of the bolt thread, as is the case with the entire thread of an ordinary nut. Thus the nut grips both

sides of the bolt thread. As grip nuts are designed for use principally as second or check nuts they are made thinner than the ordinary holding nut. The grip nut contains in itself the opposing thrusts which are secured by the pressure between two nuts when an ordinary type of check nut is used, and therefore does not jar loose as would two nuts with straight threads.

A COMBINED ANTI-RATTLER AND SASH LOCK.



An accompanying illustration shows a new departure in sash locks, the anti-rattler features being combined with the lock. The bolt of the lock which is beveled engages with a beveled stop; the weight of the sash, on account of the incline in the stop and the lock throws the sash against the frame and prevents rattling. The lock is heavily and substantially made and the construction is such as to entirely overcome the breakings of springs. It is believed to be one of the most substantial locks on the market; it is very simple to adjust, requiring no cutting of

PAINT FOR ELECTRIC RAILWAY USE.

When considering the question of the best paint for electric railway cars, it should be remembered that the cost of applying a poor paint is equal to the cost of applying a good one; and that the cost of a good paint is only a small per cent. more than the cost of a poor one. If a poor paint is applied the necessity of repainting will have to be met considerably sooner than if a good paint had been originally applied. It should also be remembered that in many cases a poor paint gives absolutely no protection and in this way is almost worse than none.

Canvas, on account of its elasticity, has been found to be almost an ideal covering for a car roof and is superseding tin for the roofs of steam coaches. In using canvas for a roof cover it is necessary that an elastic preservative be used for its protection. If the canvas does not possess this elasticity it is little better than tin and will soon leak under the rough usage and not withstand the constant twisting and vibration to which car roofs are subjected. Inelastic oils and lead and ordinary minerals that dry very rapidly, becoming hard and brittle, do not make a satisfactory paint for canvas.

As elasticity is the life of paint it would seem that more elastic oil as a vehicle mixed with elastic pigments should make a good wearing and protective combination. The St. Louis Surfacers & Paint Company, St. Louis, has developed a paint for canvas roofs that thoroughly fills the fibre with a preservative and at the same time seals up the canvas so that water has no opportunity to penetrate. The "Metal" canvas preserver is said to be perfectly elastic and under no conditions will it stiffen the canvas. This paint is applied as a foundation preservative and priming coat and can be followed by two or more coats of "Metal" canvas roof paint of any desired color. While this paint has remarkable elasticity it is claimed to be extremely durable.

For the protection of metallic surface such as steel work about cars, trolley poles, iron bridges, tanks and steel structures "Metalsteel" paint is claimed to possess the necessary elasticity to prevent the paint cracking and peeling. Metalsteel paint is in a variety of colors, but black, brown, gray and red are the colors ordinarily used. For use on metal car bodies "Metal" coach and car surfaces is first applied and is followed by the usual coats of paint and varnish.

A MEANS FOR RELIABLE INSPECTION.

The value of intelligent inspection should not be underestimated. The manufacturer may guarantee the life of an axle, for example, yet a defective axle, causing an accident with its accompanying suits for damages, renders him (the manufacturer) only liable to the replacement of the axle.

The purchaser, however, must bear the bulk of the expense. It might be very conservatively stated that the expense of one such accident would be ample to secure the services of inspection on all material bought by the purchaser through many years. Nor is the actual cost of the accident and damages any measure of the complete loss. The loss of the public confidence is a loss to the railway company not to be overlooked. The retention of reliable inspectors furnishes to the public an assurance that every effort is being made to protect their lives and property.

In the matter of inspection work Robert W. Hunt & Company is in a position to inspect the material of small purchasers. With men stationed constantly at the various manufacturing plants, it can give the small orders of purchasers as sufficient and efficient inspection as the large orders and at an expense only proportional to the size of the order. The cost of inspection from any individual source not maintaining men permanently at manufacturing plants would, on small orders, of necessity be entirely disproportionate to the cost of manufacture.

The firm of Robert W. Hunt & Company, engineers, bureau of inspection, tests and consultation, is a large one. It maintains offices in Chicago, New York, Pittsburg, San Francisco, Montreal, London and Buenos Ayres, with staffs of inspectors located at various manufacturing plants throughout the United States and Canada, as well as in Europe. During the 18 years which this firm has been in business it has enjoyed an enviable reputation, which can be ascribed to the competency and integrity of the employees under an ideal management. While the employees of the company can be classed in two departments—engineering and inspecting—yet there is no definite line between the two. They co-operate. In general the inspection work is under the direction of the technical men, engineers. Furthermore, these engineers are constantly being detailed on inspection work while on the other hand the inspectors as specialists in their lines, render the engineers valuable assistance.

The company's staff of mechanical, civil and electrical engineers has shown ability in a consulting capacity as the designer of power plants, electric railways, lighting and heating plants, cement and gas plants, and in the investigation and appraisement of mining properties, etc. The advantage of having the advice of a large staff of experienced engineers in consultation is unquestionable.

The corps of inspectors consists of a large force of practical and experienced men, experts each in his line. The company makes a specialty of the inspection of general railroad material, such as rails, bridges, locomotives, cars, as well as all accessories, such as splice bars, bolts, spikes, car wheels, axles, etc. In this connection some conception of the extent of the business might be drawn from the fact that they inspect very nearly 75 per cent. of the rails manufactured in the United States. Beside general railroad material they inspect almost every class of material, including cement, pipe, boilers, etc.

The McKee Tieplate.

The recent railroad wrecks which have attracted so much attention from the public have occurred not only where wooden ties have been used, but also where steel ties, which it was expected would show ability to withstand the severe strains of high speed and heavy rolling stock, were in service. It is impossible to attribute all of the wrecks to any particular cause, but it is intimated that spreading rails have been found in a large number of instances. On the supposition that spreading rails was the cause of most of these wrecks, the subject of the tieplate, as the best known device for the prevention of rail spreading, is of interest.

The original tieplate was merely a flat steel or iron plate which rested between the tie and the rail, and which had spike holes punched in it, through which the rail was spiked to the tie. This plate, while much more efficient than spikes alone, in many respects was not entirely satisfactory, and since its introduction railway engineers and manufacturers of tieplates have been endeavoring to obtain a plate which would better meet the requirements of service. The Hart Steel Company, of Elyria, O., is firm in its belief that such a tieplate has been obtained. The plate referred to is known as "McKee" type, and is already in use on the lines of many large railway systems. It is a shoulder plate designed to minimize the throat-cutting effect on the spike, and is also provided with flanges in order to afford the greatest strength for a given weight and maximum adhesion to the tie. In addition to showing these features the McKee plate is also reinforced at the outer edge of the rail where tieplates have shown a tendency to buckle, and this, it is believed, gives sufficient strength to make spreading of the rails an impossibility.

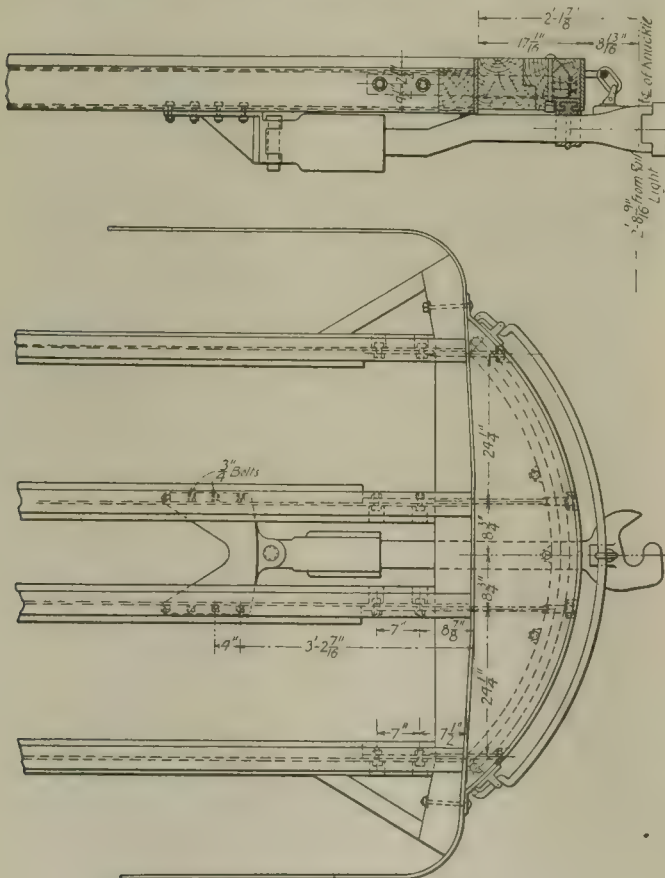
M. C. B. RADIAL COUPLERS.

Where interurban roads operate passenger cars in trains as well as handle freight in foreign cars a coupler of the Master Car Builders standard contour, possessing the ability



Washburn Coupler—Type of Head and Attachment.

to operate around short radius curves, is of great assistance in handling trains. The type of coupler shown in the accompanying illustrations was designed by Edwin C. Washburn and is manufactured by the Washburn Steel Castings & Coupler Company, Minneapolis, Minn.



Washburn Coupler—Plan and Elevation.

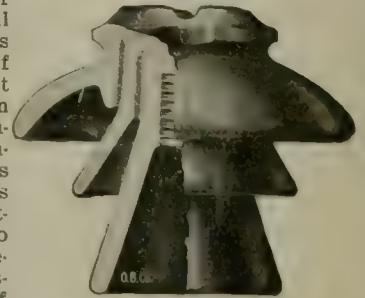
It will be noted from the illustrations that the coupler and draft rigging are so mounted that they can swing radially about a pin connecting them to a standard radial drawbar anchor, bolted to the center sills of the car by $\frac{3}{4}$ -inch bolts. The drawbar is provided with a spring yoke draft box and spring of the required strength. For the accommodation of radial couplers the car bumpers may have the same general outline as shown in the accompanying illustration. By using bumpers of this shape with radial drawbars it is possible to couple cars on curves as sharp as 40-foot radius.

In order to uncouple cars from the side when on curves an uncoupling lever bent to the same radius as the bumper is mounted so that the handles at its two ends may be conveniently reached under all conditions of track curvature.

A single link sliding on this rod connects it to the uncoupling pin of the M. C. B. type of coupler head. The link is of such dimensions that while it may slide along the rod from one side of the car to the other it still provides a means of uncoupling no matter what position the couplers are forced to take on curves.

PORCELAIN INSULATORS.

As a demonstration of the remarkable developments which have taken place in the porcelain insulator industry, the insulator exhibit of The Ohio Brass Company, of Mansfield, Ohio, is well worthy of inspection. This display, which is in charge of C. E. Delafield, sales agent of the high-tension division of the company, is very comprehensive, including samples of porcelain insulators for all classes and conditions of service, from those adapted to telephone work up to and including insulators designed for 75,000-volt transmissions. The product of this company is of the highest order, and furnishes an admirable example of the perfection which has been reached by the modern pottery in this line of work. Samples selected for the exhibit were carefully chosen to show the different designs which are adaptable to various conditions, and include single, two, three and four-piece insulators. The accompanying illustration shows one of the popular forms for high-tension transmission work. It is a four-piece insulator of a rated capacity of 45,000 volts, the members being joined by cement.



Three-Piece Cemented Insulator.

The Ohio Brass Company controls the entire output of a large and modern pottery, and is prepared to furnish anything in the insulator line for all practicable working voltages and for any climatic conditions. A handsome and instructive high-tension insulator catalogue is being distributed at the exhibit.

THE DANVILLE STEEL-PANEL CAR.

Many changes have taken place within the last 10 years in the construction of cars for city and interurban service. The designs from which the present interurban cars have been built have been put to severe tests. The city cars have evolved practically from the omnibus lines to the present state of perfection. Ideas of railroad men and car builders have been exploited and developed as conditions required. Patents galore have been issued on different types of construction and various ideas have been exploited and exploded. Great stress has been laid for years upon semi-convertible features and the great value of semi-convertible cars where a sixteenth of an inch was gained on each side of a car to permit the crowding in of another passenger.

Car construction has gone to such extremes that with the embodiments of these ideas the railroads have become loaded up with rolling stock which is costing enormous sums of money to maintain. The day is not far distant, however, when simplicity and strength in construction will receive their due attention. The cost of maintenance must also be considered, and with poplar—the wood which for years has been used as siding on concave or straight-sided cars—becoming scarcer every day, the question of a substitute necessarily must receive attention. This is believed to have been found in the steel-paneled car. The steel panel is far superior to any wood panel, is more easily replaced and adds greater strength to the car body. Steel for the side lining is superior to wood; if properly applied it acts as a truss and adds to the strength of the body.

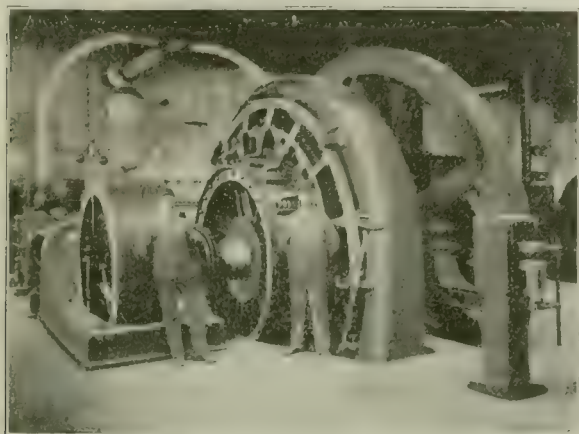
The Danville Car Company, Danville, Ill., has developed a car on these lines and will be glad to furnish any information on this subject. A sample section of this car is on exhibition.

The Indianapolis & Eastern Traction Company is completing a station at Dunreith. The building will be a combination station, waiting room and car barn and substation.

WESTERN ELECTRIC RAILWAY GENERATORS.

One of the types of direct-current generators built for street railway service, and worthy of special mention, is that designed and built by the Western Electric Company.

The pole pieces, which are built up of thin laminations, are cast into the frame, a heavy clamping plate being used to support the pole pieces during the casting process, thus insuring their perfect alignment. An exceptionally large contact area is afforded between the pole piece and yoke by making that part of the pole piece which is cast into the yoke of a notched shape. This cast-in construction not only gives a magnetic circuit of low reluctance, but also a per-



Western Electric 800-Kilowatt Railway Generator in Plant of St. Louis Transit Company.

fectly balanced one, which prevents the possibility of sparking arising from unequal magnetic distribution.

Another noteworthy feature of these machines is the construction of the armature winding. That part of the armature conductors, which lies outside of the armature core, is much enlarged in section. This gives a low armature resistance with a correspondingly low copper loss, and high efficiency at the high load points. This construction also enables the machine to stand heavy overloads without excessive heating, as it gives a greatly increased radiating surface at the points exposed to the maximum windage.

Since the completion of the new Hawthorne plant covering 110 acres, and designed especially for the manufacture of electric power apparatus, this company offers exceptional facilities for the production of electric apparatus.

THE NATIONAL SASH BALANCE.

The National Lock Washer Company, Newark, N. J., is the manufacturer of the well known "National" sash balance. It is a specially made spring roller held in brackets, placed out of sight at the highest part of the sash slide. The roller is held to the sash by two belts, one at each end of the roller. These belts are connected with the roller by brass straps locked in the groove of the roller, and the lower ends connected to the sash by hooks secured to the belting by brass straps. These hooks fit into the eyes which screw into the top of the sash, thus making it easy to take out the sash when necessary. The screw eyes are made with a special thread and will sustain many times the weight required. They also can be raised or lowered one or more turns to equalize the belt on each side. If a stronger tension is required, one belt at a time can be unhooked and passed around the roller. If less tension is required, the belt can be unhooked and one turn taken off, making it unnecessary ever to take the roller down to regulate or adjust it. All wearing parts are of sheet brass, making it practically indestructible.

The movement of the sash with this balance is easy and noiseless. The belting connections are simple and strong and do not come in front of the glass where an upper sash is used.

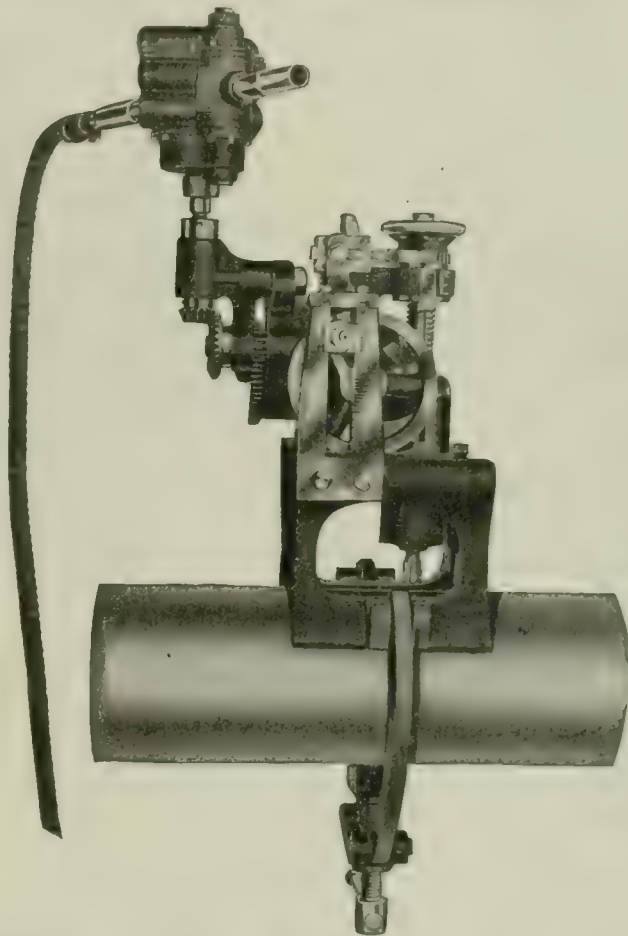
The tension of the balance roller is set to lift all but about three pounds of the weight of the sash. For example, if the sash weigh 25 pounds the balance roller lifts 22 pounds; the remaining three pounds are lifted by the person operating the window. If used in combination with the "National" sash lock the window is held at any point desired by the levers of the lock. When the window is to be closed compress the levers and it will gently sag down. When the bottom of the window has reached the weather strip on the sill cap, the window, by gravitation, will lower itself to the bottom and lock securely on the sill.

Two springs are placed on the edge of the sash—on the right hand side or on the same side as the lock—none on the opposite side. The four face springs bear against the stops and press the sash firmly against the outside stops. These springs make allowance for any swelling of the framework that may be caused by dampness.

RYERSON KEY-SEATING MACHINE.

The key-seating machine illustrated herewith was exhibited at the Master Mechanics' and Master Builders' Convention at Atlantic City last June by Joseph T. Ryerson & Son, 18 Milwaukee avenue, Chicago, Ill., and attracted more than passing interest. While it is primarily designed for use in a locomotive shop, it has many other applications which make it an interesting tool to electric railway men. The machine will cut keyways in locomotive axles, either before or after the engine is assembled, it being so designed that it can be thrown up and clamped on the axle.

The advantages of a machine of this character are at



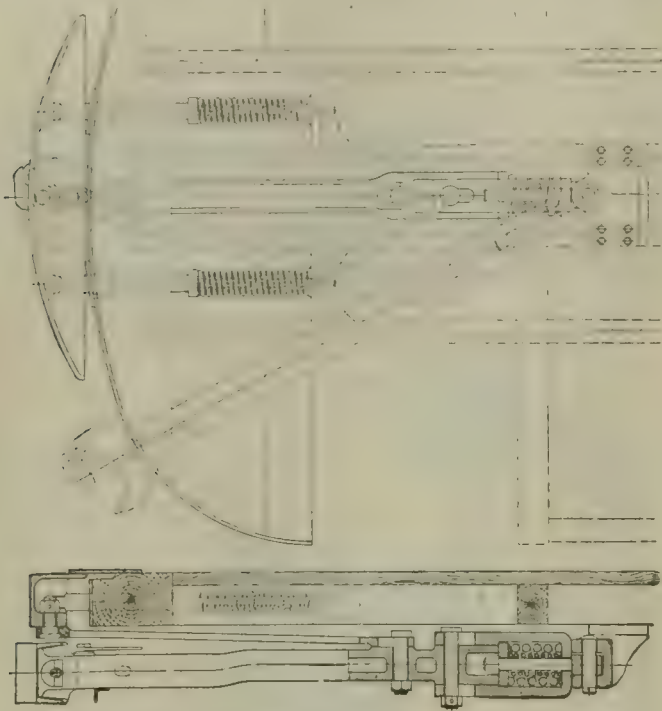
Application of Key-Seating Machine.

once apparent to every mechanical man who is acquainted with the difficulties of locating and cutting key seats for eccentrics. The machine will cut a keyway in a small part of the time which other machines take, and the work done is practically perfect and standard in size. The use of the machine avoids all possibility of the key seat in the axle and eccentric not corresponding, as is often the case where keyways are laid out and cut before a locomotive is assembled. It thus does away with the use of an offset key with its correspondingly weakened construction. The machine is operated by an air or electric motor, both the vertical and horizontal feeds being entirely automatic, so that no attention is necessary after the tool has been placed in position and the motor started. The machine weighs approximately 100 pounds, and is 8½ inches long at the base. It will cut any standard size keyway, cuttings as close as one inch from the driving box.

The Pennsylvania Steel Company manufactures frogs and switches for steam railroads of every design. The Ma-nard frogs, designs 151, 152, 153 and 160 have manganese centers to relieve the load strain on wings and points of frogs. The Vaughan patent switches are made by this company.

M. C. B. COUPLER FOR ELECTRIC CARS.

The McConway & Torley Company, of Pittsburgh, Pa., the pioneers in the manufacture of the M. C. B. coupler has on exhibition in sections 1115-19, an adaptation of the Janney



M. C. B. Coupler for Electric Cars.

M. C. B. Coupler designed especially for use on electric and interurban cars. A practical demonstration of the operation of the device is shown by working models of cars equipped with $\frac{1}{4}$ -size couplers. In this equipment the couplers have a wide range of radial movement so as to operate practically over the sharp curves present in most interurban and city lines.

ALLIS-CHALMERS PRODUCTS.

Allis-Chalmers Company's space (Sections 201-211) contains a very extensive exhibit of air-brake apparatus, together with photographs and other representations of steam turbines, Corliss engines, gas engines, hydraulic turbines, condensers, generators, rotary converters, motors and power and electrical machinery of every kind, such as constitute complete traction equipments for power houses, sub-stations, cars, etc.

One of the most interesting features of this exhibit will be found in the new Type J Emergency Valve for use with straight air-brake equipments. The principal advantage of the straight air-brake system, as is well known, lies in its simplicity and in the fact that the brakes may be applied and released gradually; but it formerly had one serious defect, for when two or more cars are run in a single train having this equipment, if the train should break apart the brakes would not be applied automatically. Moreover, in the ordinary straight air system the control of the train is in the hands of the motorman alone, whereas, with the automatic system, the brakes can be applied by the conductor in case of emergency from any one of the cars in the train.

The Allis-Chalmers Company's straight air emergency valve was designed to overcome these two points of deficiency in the straight air-brake system, so that it is now possible, by using the emergency valve, to equip with straight air trains of two to four cars, which will have all of the advantages of the simplicity and positive action of that system, and at the same time possess the automatic safety features to be applied in case of a break in couplings or hose connections. This, it will be readily seen, puts the control of the brakes in the hands of the conductor as well as in those of the motorman.

Another object of especial interest will be the new Type OB pneumatic governor. It is, of course, a recognized fact that the reliable operation of an air-brake equipment depends largely upon the governor, which, by automatically controlling the compressor, maintains the supply of air at any pressure required. The types of governors thus far put in

service have always had, however, a number of serious disadvantages, and immediately after entering upon the manufacture of complete air-brake equipments under the Christensen patents the Allis-Chalmers Company directed its engineers to design a governor which would overcome the objectionable features experienced heretofore. How well they succeeded may be shown in a reference to the first trial which this apparatus sustained outside of the company's own works.

Prior to the placing of a very large order it was given an exhaustive test by the engineering department of the Manhattan Elevated Railway, New York City, in a series of 234,000 continuous operations, breaking a current of 35 to 40 amperes, at 600 volts, without any attention whatever during the period of the test, which would be equivalent to about two and one-half years' service under ordinary conditions.

The Allis-Chalmers Exhibit is in charge of W. S. Heger, assistant to the president, and J. H. Denton, manager of the air-brake department.

PYRAMID METAL.

The Egyptian Metal Company, of Trenton, N. J., is manufacturing white alloys and babbitt metals of the highest grade under the trade-mark of "Pyramid." The company is also putting upon the market a superior cheap babbitt for lining car journals.

The high grade white metals were first manufactured in Egypt, where the formula was discovered some years ago, but the American company is the only company in existence that is manufacturing babbitt metal under the original Egyptian formula. In Egypt the metal was used extensively and was thoroughly tested upon the railways. It was also used extensively on the principal street railways in Canada, where it was under close observation, with such success that it was determined to organize a manufacturing company in the United States. The metal is, therefore, not an untried babbitt metal, but one which has stood up under the most severe tests.

Many of the rolling mills, rubber works and flour mills in Canada are also using this metal, where it has successfully stood the hardest tests that can be given a babbitt metal, and where other high-class babbitt metals have failed.

The company has in its possession many testimonials certifying that the metal is unsurpassed for securing cool running and long life of railway motor bearings. The average life of the best motor babbitt manufactured by the company has been over 60,000 miles, and in many cases it has run over 100,000 miles, as at Toronto and Montreal. The roads at those points for many years had trouble with their motor bearings, owing to the heavy traffic and wear upon the rolling stock. Since using Egyptian metal the cost of the up-keep of the bearings has been considerably reduced.

It is especially adapted for heavy motors, as it does not beat out of the shell under any conditions.

If the metal bears out all the statements made of it, it would seem to supply a long-felt want for a really excellent, thoroughly reliable motor babbitt metal at a reasonable price.

The manufacturing company is well equipped at its factory at Trenton for a large output. Edward H. Chapin, with offices at 556 West Thirty-fourth street, New York City, who is sales agent for the National Car Wheel Company, and who has long been well and favorably known in the street and steam railway field, will act as special representative for the Egyptian Metal Company, promoting its sales in connection with that of the National Car Wheel Company.

The president of the company is Samuel Wilson, who was for more than twenty years superintendent of the Pullman Palace Car Company, and the directors are all men of high standing.

Paradoxical.

The nervous foreigner got up and went back to the conductor of the street car.

"Pardon, m'sieur," said he, "but ze car, he run so slow, and why, if you pleeze? Ees it not so?"

"Yep," replied the conductor. "We can't help it, though. You see, the car ahead is behind."

The foreigner's eyes opened wider. "Would you mind saying him again?" he asked apologetically.

"I say," replied the conductor, louder than before, "that the car ahead is behind. See?"

The foreigner returned to his seat. "Ze car- ahead, he is behind?" said he to himself. "Most wonderful, most astonishing is zis country."—*Bagology*.

THE NEW DEPARTURE MANUFACTURING COMPANY'S PRODUCT AND POLICY.

The New Departure Manufacturing Company of Bristol, Connecticut, one of the exhibitors at the conventions, was established some years ago in a small way and is now one of the leading concerns of New England, and growing very rapidly. The policy of the company has been to market goods that are new departures. These new departures according to the rule of the company must be thoroughly tested improvements. From this unique policy the company derives its name, and its history has been one of many successes in exploiting progressive, practical and proven inventions.

THE A M L BRAKE EQUIPMENT.

The Westinghouse Traction Brake Company's A M L equipment as exhibited on the Steel Pier is designed to meet the requirements of first-class subway, elevated or other electric railroad high-speed passenger service, where cars are ordinarily operated in trains of from five cars upward.

For such service a quick-action, automatic brake system is essential in order to most safely and efficiently satisfy the rigid demands. For high-speed train operation safety is the prime requisite, the brake apparatus must therefore possess the ability to obtain and hold without diminution a high maximum cylinder pressure in cases of emergency.

Next to safety in the handling of trains comes flexibility, or the ability to control the movement of the train accurately, easily, smoothly, and with the least expenditure of energy.

The above conditions require: (1) a quick serial action of the brakes in both services and emergency, but especially in the latter case; (2) a rapid recharging of the auxiliary reservoirs in order that the system may be always ready to respond to reductions in brake-pipe pressure, no matter how quickly they may follow a release; (3) the ability to graduate the release of the brakes as well as their application; (4) a protection against excessive cylinder pressure being obtained during service operation when not desirable; (5) the possibility of obtaining a much higher brake cylinder pressure in emergency than in service application with the ability to hold this high pressure without loss, except from unavoidable leakage, until released.

All these features are combined in the A M L equipment, which is, therefore, especially adapted to the rigid requirements of the most modern rapid transit installations.

The L triple valve is of the "pipeless" type and possesses, in addition to the ordinary functions of all quick action triple valves, the following improved features of operation: quick service, quick recharging of auxiliary reservoirs, graduated release of the brakes, and a high emergency cylinder pressure. A safety valve on the triple valve serves to prevent the obtaining of undesirably high brake cylinder pressures during ordinary service operations where high speed brake pressure is carried. When an emergency application of the brakes is made, however, this safety valve is automatically cut out and the high pressure obtained in emergency is held without being reduced, thus affording a maximum retarding power throughout the entire stop.

The brake valve used is of the rotary type, simple and compact in construction, and mounted on a pipe bracket to facilitate removal without breaking any pipe joints.

A supplementary reservoir is used in addition to the usual auxiliary reservoir for the purpose of securing a graduated release of the brakes, to assist in recharging the system and to secure a high cylinder pressure in emergency applications.

The other pipe, called the main reservoir line, connects the main reservoir on each car to each other and to the feed valve on the operating brake valve. The air supply for the system is therefore drawn from each reservoir in the train. To make certain that each air compressor furnishes its proper share of the air required for operation, a device called a "synchronizing valve" is incorporated in each governor. This valve is connected to the main reservoir line and is so arranged that when any one compressor in the train begins to operate and slightly raises the pressure in the main reservoir line, each synchronizing valve automatically cuts in the governor to which it is attached. In this manner the pump labor is equally distributed among the various compressors throughout the train and the danger of the entire burden of work being thrown on one compressor, when its governor happens to be set to cut in slightly higher than the rest, is eliminated.

This equipment is of the highest development of the purely pneumatic brake, and possesses to a maximum degree those features of safety and economy so necessary to the successful operation of modern electric train service.



Factory, Office and Salesroom of the New Departure Manufacturing Company.

The trolley specialties of the company are no exception to this rule. The Liberty cushion harp possesses qualifications that have long been in demand by modern street railways. The demonstration of this harp at the New Departure booth is one of the most interesting features of the convention.

The New Departure people are also the largest manufacturers of bells in the world. The mere fact that they manufacture bells perhaps is not unique but many new methods of operating them have been adopted on doors, tables, fire apparatus or street cars, etc.

All who attend the conventions who visit the New Departure booth will find Mr. Page and Mr. Horton, who will be glad to demonstrate the various New Departure trolley specialties.

Electric Car Heaters.

Some years ago it was considered that a given quantity of electrical energy in an electric heater would give a fixed amount of resultant heat, no matter at what temperature the heater was operated. At the present time much attention is given to the proper location of the heaters and the rate at which the heat is given off is carefully adjusted in the design of the heater. It is now considered the best policy to operate the heaters at such a rate that the air coming from them is at a comparatively low temperature.

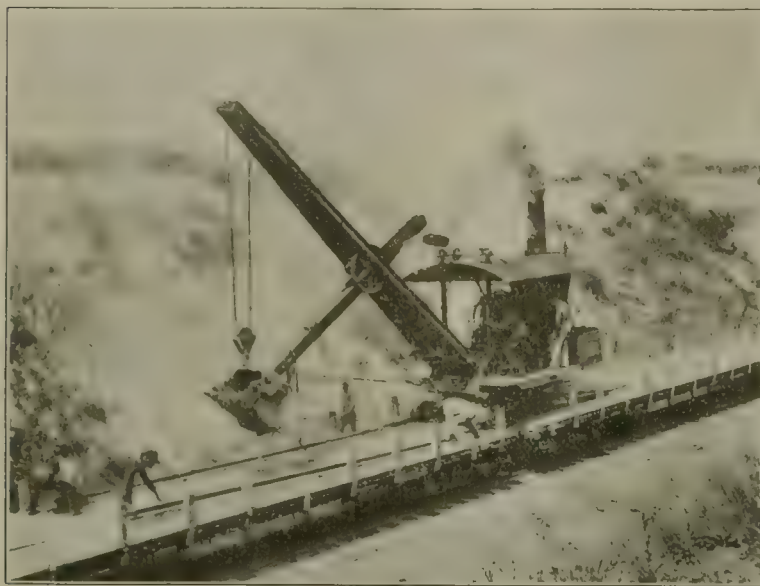
The Gold Car Heating and Lighting Company, 17 Battery Place, New York in its line of electric heaters pays particular attention to constructing a heater in such a way that the circulation of air around and among the coils will be sufficient to keep the temperature of the air warmed, reasonably low: By thus keeping the air temperature at a low value the front of the heater itself does not become hot enough to scorch clothing coming in contact with it and on account of this low temperature, when a panel type of heater is used, but little heat is radiated at the back of the heater where it would be wasted.

The open construction of the resistance coils prevents an accumulation of dust and dirt on them with the accompanying unpleasant odors when the heaters are in operation. Another feature worthy of note in these heaters is the method of getting three degrees of heat with only two wires from the controlling switch to the heaters.

THE "BROWNING" RAILROAD DITCHER.

The accompanying halftone engraving shows the "No. 9" ditcher which The Browning Engineering Company, Cleveland, O., manufactures for railroad work. The machine shown is steam-driven, but can be easily equipped for electric drive if desired. It is then particularly suited for operation on electric railway lines.

These ditchers, one of which was recently sold to the



Browning Ditcher at Work.

Illinois Central Railway, are built to run along the top of standard flat cars, and are used in widening cuts, deepening ditches, digging in gravel pits where the output is not too heavy and all similar work.

The ditcher should be used on standard flat cars of as nearly the same height as possible and not less than 80,000 pounds capacity. Cars of 100,000 pounds are to be preferred as they are stiffer side-ways and do not roll down on to the side bearings and truck springs as easily as lighter cars do. When the dipper is being pulled through the bank. Steel underbody cars are better than those with wood sills and steel trusses, although either can be used.

The rail sections furnished are 22 feet long, 5 feet 10½ inch gauge, and have permanent sling chains. By hooking the center ring of the chains over a hook in the dipper handle the sections are easily shifted from one end of the car to the other. These sections are simply two 60-pound rails oined together by a pair of crass bars at each end, riveted to the top side of the rail flange, so that the rails lie pectly flat on top of the cars, and do not in any way inure them for other use.

Three men ordinarily are required to run the ditcher. The engineer handles the hoisting or digging lever and the propelling and swinging levers. He stands on the lefthand side of the dipper and has a free view of the bank into which he is cutting, the machinery, and the boiler (steam gauge, water glass, etc.). The cranesman stands on the righthand side and operates the lever which controls the in-and-out motions of the dipper. He also pulls the trip rope that opens the bottom of the dipper and dumps the material on the cars. It is his duty to "hook on" the rail sections and guide them into place when they are shifted along the cars. Where the work is heavy a fireman is required, although in some cases the engineer can take care of that part himself. The engineer is the only one of the three requiring any particular skill.

The ditcher is started at the inner end of the last car in the work train, with the track sections so laid that it is working at the extreme outer end of one, while the other is laid on the car ahead. As fast as the car is loaded the ditcher is propelled backwards until it has cleared the first rail-section which then is swung around and laid in place back of the ditcher. This operation takes about two minutes. In ordinary earth the ditcher should make a complete cycle in 45 seconds, and load a standard car in about 20 minutes. These cars hold from 12 to 15 cubic yards. Of course the character of the soil and the shape of the bank have a great

deal to do with the capacity of the ditcher. For instance, if the bank is high enough so the dipper can completely fill itself, it will have a much greater capacity than it will if only a half-dipper full can be dug at a time.

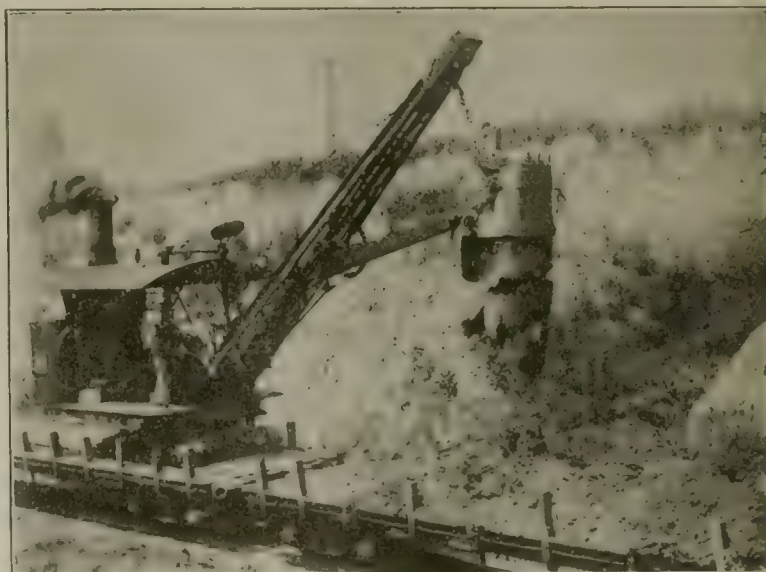
The dipper handle consists principally of two oak timbers with a four inch opening between them with racks along the top side of each arm which engage with pinions on the "shipper shaft." This shipper shaft runs in bearings on the boom and has a brake-wheel at one end, by means of which the cranesman controls the in-and-out movements of the dipped. The racks and pinions are kept in mesh by the "saddle block." This is simply a casting carried by a bearing on the skipper shaft, and extending down between the two timbers forming the dipper handle, with a plate on the bottom on which the dipper handle rests and slides.

The cut or ditch can be started eight feet from the center line of the track, and at a height of 10 feet above the rail heads the dipper will reach out about twenty-four feet from the center line.

The ditcher has a steam syphon through which water is taken from the locomotive tank by means of a rubber hose connection. This usually takes about ten minutes once or twice a day, according to the time the ditcher is in continuous operation. The ditcher tank holds water enough for about four or five hours continuous running.

When it is necessary to run the work train out of the way of regular trains the ditcher is run to the end of the car upon which it is working and the boom lowered sufficiently to clear any overhead structures. The ditcher is firmly locked to the track by setting both the hoisting and propelling clutches. If it is to be transported for any great distance it is always well to block the wheels in addition. It does not take over two or three minutes to lower the boom and have the ditcher ready for movement.

It is usual to have two cars in the work train free so that the ditcher when running to a sidetrack to clear the main line or to take water, may be run to the end of one car, and the dipper and boom lowered on to the same car sufficiently to clear bridges, etc. The extra traction section then extends over on to the next car. If necessary, however, the extra sections can be loaded on the car carrying the ditcher.



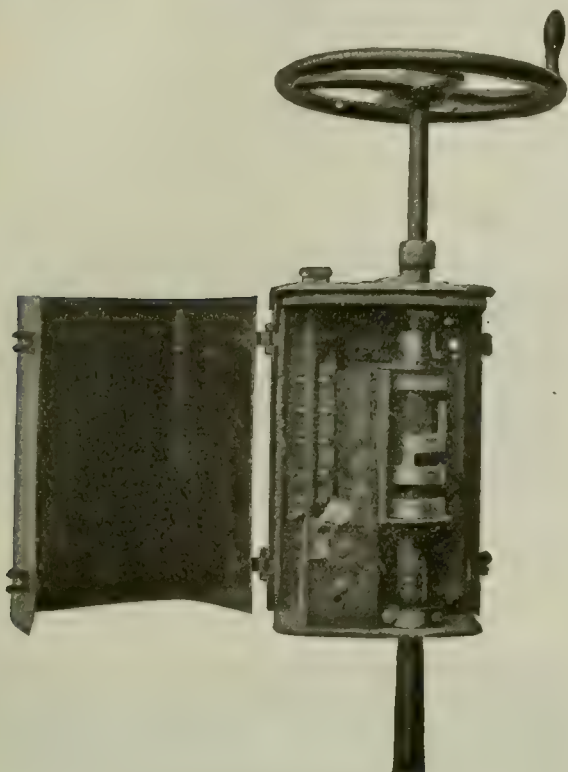
Browning Ditcher at Work.

The larger or inner tread of the track wheels is made standard gauge, and the ditcher can be taken off the cars and run on the regular right-of-way when desired. The flanges of the wide gauge are smaller in diameter than the tread of the standard gauge, so they will clear frogs, etc., when running on surface track.

The ditcher can be converted into a standard No. 7 top loader or locomotive crane by simply slacking the bolts in the saddle block sufficiently to allow the dipper handle to be run out of place and by detaching the sheave from the dipper bail.

THE COMPOUND MAGNET BRAKE.

A short time ago, before the organization of the Public Service Commission, a test was made by the New York State Railroad Commission of a number of traction brakes. There were in all fourteen kinds, including power, hand and track brakes, and tests were made on wet and dry rail, with



Compound Magnet Brake.

and without sand, when the car was operating at 8, 12 and 16 miles per hour. Stops were required to be made in three to nine seconds at from 40 to 70 feet, according to the speed

3. Ease of operation by a motorman of ordinary skill.

4. Cost of equipment and maintenance.

The marking given the compound magnet brake, which is controlled by the Compound Magnet Brake Company, 100 Broadway, New York City, after deducting for skidding of wheels, was 98.26 per cent.

The compound magnet brake, as its name implies, is a magnetically operated brake, two specially constructed electro-magnets being used for each car. The arrangement of the magnets and the manner in which a pull on the equalizing bar is obtained is shown in an accompanying engraving. That the braking effort may be applied and released gradually a controller similar to that for the operation of an electric car is applied to the regular brake staff. This controller is also shown in an accompanying engraving, from which it can be seen that the arrangement of the operating mechanism is such, that in case the current upon which the brake depends for the pull upon the equalizing bar under ordinary conditions should be cut off, the brake may be operated as an ordinary hand brake.

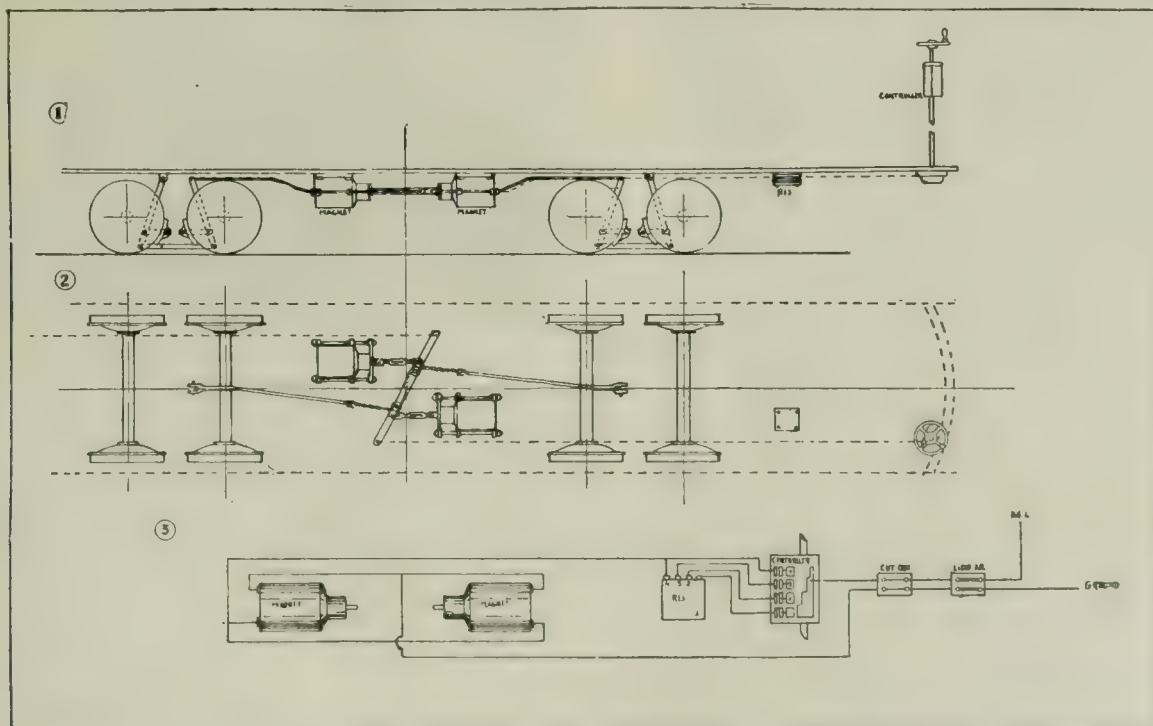
The brake weighs complete about 400 pounds, and has a pull of about 1,500 pounds on the equalizing bar. It is stated that six amperes at 550 volts is all the current which is required for its operation, which is direct from the trolley through the resistance coils and the controller already referred to.

A number of merits are claimed for the brake. Among these it is stated that the initial cost and the cost for installation and maintenance is low; little current is required for operation; it is not affected by damp, heat or cold; it will stop the car easily, steadily and effectually without the tendency to slip or skid the wheels, and there is an entire absence of any delicate mechanism.

THE DOSSERT JOINT.

Among the varied and extensive exhibits on the Steel Pier is that of Dossert & Company, Inc., manufacturer of the well-known Dossert joints and solderless connectors and terminals for electric wires and cables. Although the advent of Dossert & Company in the field of manufacturing electrical equipment is of comparatively recent date, the remarkable increase of this company's business during the past three years has attracted not a little attention.

The Dossert joint is a mechanical device designed to splice wires securely, and to make a perfect electrical connection without the use of solder. This, of course, is a



Compound Magnet Brake—Diagram Showing Operation.

at which the car was running. The various points of merit of the different brakes were taken into consideration and a marking made, upon:

1. Reliability and simplicity.
2. Liability of action when the brake was not operated.

revolutionary method of splicing wires and when Dossert & Company asked for the approval of the National Board of Fire Underwriters in 1905 the new joint was examined with great interest. It was then decided, however, that as the practice in vogue afforded nothing on which to base judg-

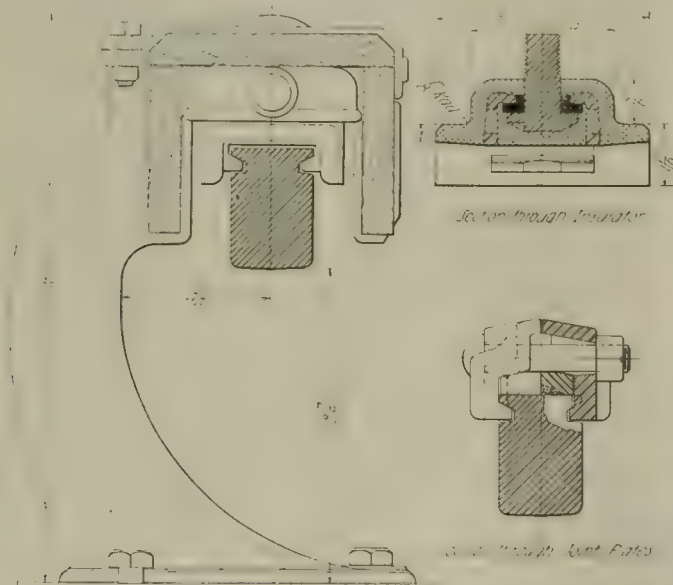
ment as to how the device would meet the varied requirements and contingencies of usage, field experience was necessary. Provisional approval was accordingly granted, subject to the assent of local inspectors. After field experience and laboratory tests covering a period of over two years, the National Board of Fire Underwriters at its meeting in New York in March, 1907, unanimously adopted an amendment to the rules allowing the use of an approved mechanical joint without solder. Two months later the Dossert joints were placed on the list of approved fittings and it is the only approved mechanical joint.

In the electric railway field and in the electrification of steam railroads the Dossert joints have indeed met the proverbial "long felt want." The list of users is a long one, headed by such names as the Pennsylvania, New York Central, Delaware & Hudson, Interborough-Metropolitan, Chicago City Railway, Metropolitan (Chicago) West Side Elevated, and Philadelphia Rapid Transit.

Dossert & Company were prominent exhibitors at the recent convention of the Canadian electrical interests at Montreal. Visitors will find much to interest them at the Dossert booth, which is located about the center of the Steel Pier, at spaces 317 to 321. H. B. Logan, president, and E. A. Dossert, sales manager, are in attendance. Dossert & Company's factory and office is at 242-244 West 41st street,

THE FARNHAM THIRD RAIL.

In the "Electric Railway Review" for June 15, 1907, page 770, appeared an extended illustrated description of the Philadelphia & Western Railroad Company's new suburban line. It is noted that this description included the details of the "Farnham" protected third rail which is the main working



Details of Farnham Third Rail and Support.

conductor for that 25-mile suburban road. Since the Philadelphia & Western has been completed several improvements have been made in the type of third-rail support supplied by The Farnham Company, 140 Dearborn street, Chicago, Ill. The construction of the latest type of support is illustrated herewith.

It will be noted that the rail comprises a rectangular section with grooves along the upper part of its sides into which bosses on the hanger extend to give support to the rail. These projecting supports are a part of a malleable casting which is insulated from the vertical hanger bolted by a mica bushing and a fibre bell, as shown in one of the detail illustrations.

The rail sections recommended range from 40 to 75 pounds per yard, any of which can be supported by this bracket. The insulating bell is supported from the under side of the large third-rail bracket and the castings are so detailed that by the use of three plain boards a complete protection and waterproofing may be afforded for the rail.

The method of bonding comprises the use of a cast copper plate, which is clamped inside of the third-rail joint plates and which together with the top of the third rail, is recessed to receive a quantity of plastic amalgam compound as manufactured by Harold P. Brown, 120 Liberty street, New York City. It is stated that this method of electrically connecting the rails is cheaper than the ordinary type of soldered bond and has

shown itself to be of permanent character. The Farnham Company, which owns the patents on the third rail as described, is now interested in the construction of a 130-mile single-track road connecting Minneapolis and Duluth, of which road 20 miles have been graded. The type of rail illustrated and described herewith, will be used for furnishing current to the cars on this road.

SINGLE TRUCK CARS FOR KENOSHA.

The Kenosha Electric Railway, which is owned and operated by the Chicago & Milwaukee Electric Railroad Company, is enlarging its system to the extent of doubling its mileage for the purpose of taking care of the outlying districts which are rapidly building up. Kenosha, Wis., has a



New Kenosha Car—Exterior.

population of about 17,000 inhabitants, and its situation on Lake Michigan and proximity to both Milwaukee and Chicago, accounts for its increasing popularity. The recent improvements to the railway system have necessitated a correspond-



New Kenosha Car—Interior.

ing improvement in the service, to meet which, six cars, similar to the one illustrated, have been placed on the lines.

These cars were built by the G. C. Kuhlman Car Company and are of the longitudinal seat drop-sash type. The inside finish is of Honduras mahogany; ceilings of poplar, tinted a Nile green. The Brill No. 21-E trucks used have a wheel base of eight feet. There are noted several specialties furnished by The J. G. Brill Company, which include angle iron bumpers, ratchet brake handles, gongs, signal bells, etc. The chief dimensions of these cars are as follows: Length over end panels, 20 feet; over crown pieces, 30 feet; width over sills, 6 feet 4 inches; over posts at belt, 7 feet 5 inches; size of side sills, 4 3/4 by 7 3/4 inches; end sills, 5 1/4 by 7 3/4 inches; sill plates, 7 by 1/2 inches.

Recently a certain railroad before adopting a particular make of jack for general use on the road held competitive contests and gave consideration to the character of the work, the ease of operation of the jack in both horizontal and upright position, cost of repairs, length of time and skill required in making repairs. The tests were very thorough and at their conclusion the Justice reliance jack, which is made by Philip S. Justice & Co., 421 Chestnut street, Philadelphia, was specified.

LIST OF EXHIBITS.

- Acme Supply Company, Chicago, Ill.—Car shade rollers and curtains. Represented by R. E. Slagle.
- Adams & Westlake Company, The, Chicago, Ill. Street car hardware; gravity ratchet brake handles; street and interurban railway signal lamps for all purposes; arc and incandescent headlights, etc. Represented by A. S. Anderson, B. L. Compton, J. A. Foster, F. N. Grigg, E. L. Langworthy.
- Addressograph Company, Chicago, Ill.—The Addressograph, a printing machine designed for office use. Represented by E. D. Dorsey.
- Allis Chalmers Company, Milwaukee, Wis.—Air brake exhibit of a three-car train, consisting of two motor cars with a trailer between, equipped with the new Allis Chalmers "O B" governor and type J emergency valve; a single car equipment is also shown. Represented by J. H. Denton, F. C. Randall, W. W. Power, W. S. Heger, W. G. Clayton, St. John Chilton, J. F. Dixon, H. W. Rowley, A. E. Peck, J. B. Nicholson.
- American Blower Company, Detroit, Mich.—One No. 5 type "P" blower with nozzle connected to outlet for the purpose of holding ball in suspension; one 5 x 5 type "A" vertical, self-oiling, automatic engine, mounted on sub-base, direct-connected to and driven by Westinghouse generator used as motor; one 80-inch full-housed, right-hand, bottom horizontal discharge steel plate pulley fan; one heater consisting of two No. 18 sections having a total capacity of 800 feet; one 24-inch "ABC" disc ventilating fan; one model dry kiln outfit. Represented by C. W. Old.
- American Brake Shoe & Foundry Company, Mahwah, N. J.—Brake shoes and brake heads for electric railway equipment, illustrating proposed standards of sub-committee of American Street and Interurban Railway Association for wheels with 3-inch treads and over, and interchangeability of these with M. C. B. Christie head and shoe of steam railway practice; also proposed brake head and shoe for narrow tread wheels. Represented by Otis H. Cutler, W. S. McGowan, Frank L. Gordon, F. W. Sargent, James S. Thompson, E. L. Janes, E. B. Smith, E. J. Searles.
- American Ferrofix Brazing Company, Philadelphia.—Process for restoration of broken and cracked machinery to full working strength, also apparatus for doing the work. Represented by G. H. Taylor, F. A. Saylor.
- American Locomotive Company, New York, N. Y.—Trucks for medium and high speed electric service. Represented by W. E. Woodard, Wm. Dalton, H. A. Fritz, Wm. Wampler, R. H. Baker, A. Haller.
- American Mason Safety Tread Company, Boston, Mass.—American Mason safety tread, steel base, lead-filled and carborundum-filled; delta metal (hard brass) base, lead and carborundum filled; running board of Mason safety tread carborundum filled, safety edge; car step with Mason safety tread; car platform with lead and carborundum-filled Mason safety tread; carborundum plugs for safety tread; combination Mason safety tread and cork composition; car Karbolith flooring. Represented by William S. Lamson, Henry C. King, L. H. Myrick.
- American Multigraph Sales Company, The, Cleveland, O.—Gammeter multigraph. Represented by J. F. Howison and staff; H. M. Horr.
- American Railway Supply Company, New York City.—Metal cap and coat badges for electric railway employees. Represented by Charles Lounsbury, Walter Chur.
- American Steel Foundries, Chicago, Ill.—Davis cast steel wheel shown in connection with truck exhibit of the American Locomotive Company. Represented by J. Saule Smith.
- American Sewer Pipe Company, Pittsburgh, Pa.—Vitrified clay conduits in single and all multiple ducts, for electrical underground wiring. Represented by F. N. Kondolf, Al. S. McCome, W. R. Adams.
- American Steel & Wire Co., Chicago, Ill.—Rail bonds and bonding tools, American railway fencing, electrical wires and cables, trolley wire, galvanized strands, trolley springs and concrete reinforcement. Represented by F. A. Keys, L. A. Dietrich, J. M. Holloway, C. R. Sturdevant, J. D. Sutherland, C. S. Marshall, G. A. Cragin, W. A. Greenberg.
- Anderson, Albert & J. M., Manufacturing Company, Boston, Mass.—Line material and switches. Represented by John M. Anderson, Ernst Woltmann, William W. Hinchey.
- Atha Steel Casting Company, Newark, N. J.—Titan steel motor gears (made of manganese steel) for interurban high speed service as well as ordinary electric railway service; cast steel body and truck bolsters for electric railway cars. Represented by George T. Paraschos, C. W. Ows-ton, Jr., C. W. Gennett, Jr., L. A. Shepard.
- Atlas Anchor Company, Cleveland, O.
- Atlas Railway Supply Company, Chicago.—Atlas rail joints, including straight, compromise and insulated; Atlas special joint; plain braces, tie plate braces and tie plates; Atlas switch stand; Atlas primer and surfacer for cars. Represented by J. G. McMichael, G. M. Huber.
- Automatic Trolley Guard Company, Buffalo, N. Y.
- Bache, Semon & Co., New York, N. Y.—S. B. & Co.'s glass No. 532 and No. 316; a blown glass in extra heavy weight for carbuilding purposes. Represented by F. J. Goertner, M. D. Traup, J. P. Sjoberg.
- Ball & Wood Company, Elizabethport, N. J.—"Ballwood" welded flanges for steam, air, gas and hydraulic piping, and superheated steam. Represented by O. M. Jones, G. H. Jewell.
- Bayonet Trolley Harp Company, Springfield, O.—Bayonet detachable trolley harps; Bayonet trolley base with anti-friction bearings and detachable pole clamp; Butterfly sleet cutters; Bayonet self-lubricating trolley wheels. Represented by J. M. Olinger, R. A. Garlough, G. W. Olinger.
- Berry Bros. Detroit, Mich.
- Blake Signal and Manufacturing Company, Boston, Mass.—An operating exhibit of standard Blake dispatchers' signals with various types of despatching telephones all under control of and being operated by a train dispatcher; Blake insulated staples and compressed cleats for telephone, telegraph and annunciator wiring; tube flux for soldering. Represented by E. J. Burke, C. C. Blake.
- Booth, L. M., Company, New York, N. Y.—Drawings, photographs, reports and literature descriptive of Kennicott water softeners, and results being obtained therefrom. Represented by L. M. Booth, H. H. Sutro.
- Brill, The J. G. Company, Philadelphia, Pa.—Brill convertible "Narragansett" and Brill semi-convertible car sections; seats; 27-E3, 27-GE1, 21-E and 27-FE2, trucks; 21-E, 22-E, 27-GE1, 27-E3 and 27-FE2, truck side bars; "Noiseless" brake hanger; "Dedenda" gong; "Dumpit" sand box; brake handle; Brill springs; platform with end of car showing "Pay-As-You-Enter" system. Represented by Geo. M. Haskell, F. L. Markham, D. B. Dean, A. N. Hargrove, Fred Brill, J. Ellwood Brill, Byron O. Brill.
- Brown, Harold P., New York, N. Y.—Various types of rail joint bonded with standard plastic bonds, plastic plug bonds and semi-plastic plug bonds, showing them under test with a current of 3,000 amperes; special electric drill and magnetic clamp for use in rebounding rails without removing angle plates or disturbing pavement; demonstration of efficiency of his contact alloys on switches, bus-bars, trolley wheels, controllers, contactors, etc. Represented by James Hollowood, G. A. Kroener, J. Maxwell Coote, Daniel A. Kelley, William Temple, John Roche.
- Buckeye Engine Company, Salem, O.—Photographs of different types of Buckeye steam engines, horizontal and vertical, simple and compound; small steam engine model; wash drawings of Buckeye four cycle tandem gas engines. Represented by C. H. Weeks, Paul Bigelow, C. E. Machold, A. H. Ridell.
- Buhne Metal Packing Company, New York, N. Y.—Steam packing (fibrous babbitt). Represented by T. M. Remington.
- Burdett-Rowntree Manufacturing Company, Chicago, Ill.—Air operated car door device. Represented by J. B. Burdett, Bernard Rowntree.
- Burroughs Adding Machine Company, Detroit, Mich.—Burroughs adding and listing machines and Burroughs book-keeping machines. Represented by F. A. Willard, Ward Gavette, Frank Spiekerman, I. L. Berk.
- Calman, Emil, & Co., New York, N. Y.—Ohmlac solid coil compound field coils and sections of field coils impregnated in vacuum apparatus with this compound; armature coils insulated with Ohmlac 17. Represented by H. Lee Bragg, Walter A. Conway.

- Canadian Westinghouse Company, Ltd., Montreal, Can.—See Westinghouse companies.
- Carnegie Steel Company, Pittsburg, Pa.—Steel and concrete track, steel cross ties, Duquesne rail joints, Friedstedt interlocking channel bar piling, United States steel sheet piling, steel mine timbers and ties. Represented by W. P. Siebert, John W. Dix, N. M. Hench, R. B. Woodworth, W. I. Jenks, James B. Bonner, George Summers, Frank W. Jones, A. M. Conneen, L. P. Lincoln, F. T. Llewellyn.
- Car Ventilating and Heating Company, Boston, Mass.—Apparatus for heating and ventilating cars by electricity. Represented by J. E. Dozier, E. F. Porter.
- Carey, Philip, The, Manufacturing Company, Cincinnati, O.—85 per cent. magnesia pipe and boiler coverings, magnesia flexible cement roofing, roofing paints and cements, water and weather proof pipe coverings, air cell pipe covering and boards, cork coverings for brine and ammonia pipes, asbestos tape, ribbon, cloth, paper, board, tubes, gaskets, fibre, asbestos wick, rope and cloth packings, asbestos metallic sheet packing, gaskets, etc.; electrical compound, mineral wool, hair felt, asbestos cold water paints. Represented by N. S. Kenney, H. C. Hutchison, F. H. Shipe, W. I. Kelley, J. H. Howley and F. C. Collins.
- Chicago Pneumatic Tool Company, Chicago, Ill.—Duntley electric drills and grinders for direct and alternating current, including 550 volts, direct current; Duntley electric hoist for direct current; pneumatic chipping and riveting hammers; pneumatic drills; portable pneumatic cleaning outfit. Represented by J. W. Duntley, W. O. Duntley, Thos. Aldcorn, Geo. Barden, C. B. Coates, Howard Small, B. H. Tripp and Paul Severin.
- Chicago Varnish Company, Chicago, Ill.—Sample panels of different stains and varnishes. Represented by H. J. Green, George S. Bigelow, O. H. Ford, F. S. Olds.
- Climax Stock Guard Company, Chicago, Ill.—Climax clay cattle guards, Climax expanded metal cattle guards, Climax farm crossing gates, Eureka farm crossing gates, Manufacturer's cattle guards and farm crossing gates for all conditions. Represented by F. W. Stewart and F. V. Stewart.
- Coin Counting Machine Company, Chicago.—Coin counting machines. Represented by C. H. Birdsall and W. P. Butler.
- Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y.—Banding machines, axle straightener, coil winding machine, car pit jack, babbitt moulds, coil winding and taping machines, armature buggy and stand, pinion puller, gear cases, fuse box, brake and controller handles, target switch, commutators and coils, Columbia anchor, broom filling machine and broom, rattan, armature and axle bearings complete, controller and brush holder parts, trolley wheels and parts, contact shoes. Represented by J. G. Buehler, James Grady, W. R. Kerschner.
- Columbia Nut and Bolt Company, Inc., Bridgeport, Conn.—Columbia lock nuts. Represented by Fred Atwater.
- Compound Magnet Brake Company, New York, N. Y.—Compound magnet brake. Represented by T. J. Nicholl, Thomas Sturgis, Anton Duppler.
- Consolidated Car Fender Company, Providence, R. I.—Electric car fenders and wheel guards. Represented by Albert J. Thornley, Elwood C. Hall and George H. Hollingsworth.
- Consolidated Car-Heating Company, New York, N. Y.—Electric car heaters, both cross-seat and panel types; portable vestibule heater; car heater and headlight switches; automatic cab heater switch; signal system to enable passengers to signal motorman or conductor, and an air motor system for operating doors of electric cars. Represented by Cornell S. Hawley, W. S. Hammond, Jr., S. Butler Keys and T. M. May.
- Cook's Standard Tool Company, Kalamazoo, Michigan.—Standard track tool grinder, Climax track drill, Standard track drill, Standard track jack, Standard car jack, Cook combination flat and twist drill chuck. Represented by Eugene Cook and Chas. D. Richardson.
- Cooper Heater Company, The, Dayton, Ohio.—Cooper hot water street and interurban car heaters. Represented by J. D. Hunter, W. L. Blackwell and J. B. Cooper.
- Cosper, W. P., Chicago, Ill.—Exhibit with Lord Electric Company: Hot water heater in operation and controller regulator. Represented by W. P. Cosper.
- Crocker-Wheeler Company, Ampere, N. J.—Large photographs of generating installations, photographs of the California Gas & Electric Corporation, 4,000-kw. generators. Represented by Julian Roe, S. Russell, Jr., R. N. C. Barnes, L. S. Horner, R. J. Randolph, Jr., Rodman Gilder.
- Crouse-Hinds Company, Syracuse, N. Y.—Imperial arc headlights, Syracuse changeable and stationary incandescent headlights, condulets (the modern line of conduit outlet boxes and fittings), and harpoon guy anchors. Represented by H. B. Crouse, A. F. Hills, F. M. Hawkins, Frank Buchanan, D. C. Gidley.
- Curtain Supply Company, The, Chicago.—Forsyth N. 86 roller tip fixture, No. 88 ring fixture, Keeler eccentric fixture, Acme and Climax open car cable fixtures, Forsyth open car cable fixture, and open car ring fixture, complete curtains and curtain materials of all kinds. Represented by W. H. Forsyth, A. L. Whipple and Ross F. Hayes.
- D & W Fuse Company, Providence, R. I.—Large sample board of D & W fuses and cut-outs for lighting and power circuits, also railway cut-out boxes, service switches and transformer cut-outs and deltabeston magnet wire. Represented by Willard S. Sisson.
- Danville Car Company, Danville, Ill.—Section of semi-convertible car; a model truck. Represented by E. J. Lawless, Henry Vogel, Elmer P. Morris.
- Darby, E. A., Company.
- Dearborn Drug & Chemical Company, Chicago, Ill.
- Device Improvement Company, Hanover, Pa.—Field winding and armature winding machines; armature truck; armature stand; reel stand and brake; tension machine; fuse box. Represented by R. E. Manley, W. F. Semmill, O. E. Trone, Mr. Wolfe.
- Dixon, Joseph, Crucible Company, Jersey City, N. J.—Dixon's silica-graphite paint, American graphite pencils, plumbago crucibles and retorts, Ticonderoga flake graphite lubricants, graphite gear grease, pipe joint compound, graphite motor brushes and other graphite products for street railways and manufacturers. Represented by J. A. Condit, L. H. Snyder, C. H. Spotts and J. J. Tucker.
- Doldt Coin Handling Machine Company, Portland, Me.—Two Doldt coin handling machines, one for sorting, counting and wrapping nickels, dimes, quarters, and half-dollars; and the other for counting and wrapping pennies. Represented by H. J. Holdt and J. E. Doldt.
- Dossert & Co., Inc., New York, N. Y.—Dossert joints of various designs; types A and B including 2-ways, 3-ways, cable taps, terminal lugs, rail bonds, emergency third rail clamp connectors, special railway signal service clamp connectors, motor leads for car wiring, etc. Represented by H. B. Logan, J. J. Dossert and E. A. Dossert.
- Dressel Railway Lamp Works, The, New York, N. Y.—Electric headlights for street and interurban cars, oil burning headlights for same; signal lamps for railways; electric route signal lamps; tail marker lamps. Represented by F. W. Dressel, Robert Black, H. S. Hoskinson and F. W. Edmunds.
- Duff Manufacturing Company, The, Allegheny, Pa.—Barrett automatic lowering jacks, Barrett trip jacks, Duff ball bearing and cone bearing jacks, Barrett motor armature lifts. Represented by George A. Edgin.
- Durkin Controller Handle Company, Philadelphia, Pa.—Controller regulators. Represented by Edgar W. Baird, W. S. Taylor, John P. Durkin and Patrick Loughery.
- Earll, Charles I., New York, N. Y.—Trolley retrievers and catchers. Represented by Charles I. Earll, C. A. Coutan, Ernest Miller.
- Eclipse Railway Supply Co., Cleveland, O.—Eclipse life guard and moving pictures showing the guard in actual operation. Represented by Benjamin Lev.
- Edwards, The O. M., Company, Syracuse, N. Y.—Models showing 20 designs window fixtures and 4 designs extension platform trap door fixtures; samples of car hardware; tin barrel spring rollers of both the pawl and ratchet designs with plain roller brackets and worm gear roller brackets. Represented by Edward F. Chaffee, Franklyn M. Nicholl, O. M. Edwards, Edward Laterman, George G. Norris.
- Egry Register Company, The, General Systems Dept., Dayton, O.—Egry system of train despatching, railway way billing,

- refill sales, purchasing and car reports. Represented by Milton C. Stern.
- Electric Railway Improvement Company, The, Cleveland, O.—Rail bonds, electric braze bonds, copper weld bonds, bonding apparatus; electric car for installing rail bonds by the electric braze and copper welding processes. Represented by W. B. Cleveland, J. M. Gallagher, Geo. Long, W. E. Huber, J. L. Cadle.
- Electric Service Supplies Company, Philadelphia, Pa.—Protected rail bonds, Keystone overhead insulation, Lyon sheet steel gear cases automotoneers, Garton-Daniels lighting arresters, International cash registers, Locke high tension insulators, Keystone vestibule shades, Nuttall trolley bases, Keystone telephones, Philadelphia fenders, Knutson trolley retrievers, Helios arc lamps, Imperial headlights, National trolley guard. Represented by Chas. J. Mayer, J. W. Porter, A. H. Englund, J. V. E. Titus, M. A. Berg, E. R. Mason, Ernst Boehme, H. G. Lewis, Jno. McSorley, F. C. Peck, T. F. McKenna, W. A. Armstrong, F. B. Massey, Edw. Hammett, Vincent Rhea, Geo. Watts, H. R. Swartley, E. B. Ross, C. B. Harvey, G. C. Hart, C. H. Bristol, W. D. Hamer.
- Electric Railway Review, Chicago, Ill.—Daily editions of Electric Railway Review issued each morning, Monday to Saturday inclusive; new edition of "Motorman and His Duties". Represented by Hugh M. Wilson, Daniel Royse, L. E. Gould, John B. Bennett, C. R. Mills, E. J. Hunt, W. P. Padget, John N. Nind, Jr., Harold F. Lane, F. Nicholas, B. M. Kimball, Miss Jennie Boyd, Joseph A. Kucera.
- Electric Storage Battery Company, The, Philadelphia, Pa.—One element type 71-R in tank, 12-pole carbon regulator, recording hydrometer, recording and signaling hydrometer, automatic cell filler and compensating hydrometer, positive and negative plates of the different types. Represented by Charles Blizard, Albert Taylor, G. H. Atkin, E. L. Reynolds, H. B. Gay, Robert C. Hull.
- Electric Traction Supply Company, St. Louis, Mo.—Overhead trolley line material, including flexible brackets, etc., and high tension insulators for voltages up to 100,000 volts. Car equipment material, including ordinary and recording registers, arc and incandescent headlights, trolley catchers, trolley poles, wheels, harps, roller bearing bases, gears and pinions. Represented by O. W. Uthoff, A. Cook, H. G. Paro.
- Electrical Review, New York.
- Electric Traction Weekly, Cleveland.—H. J. Kenfield, C. B. Fairchild, Jr., R. Myles Standish, George S. Davis.
- Etter, Charles F., Harrisburg, Pa.—Rapid ready change carrier for street railway conductors. Represented by Charles F. Etter.
- Eureka Automatic Electric Signal Company, Tamaqua, Pa.—Lantern and semaphore car counting signals, and track-operated crossing bell. Represented by H. W. Souder, Frank P. Boas, W. D. Zehner, R. J. Gerhard.
- Eureka Tempered Copper Works, North East, Pa.—Commutators, commutator segments, controller parts, brush holders, trolley wheels and ears. Represented by Fred Rundell, O. C. Hertzell.
- Evans, Almirall & Co., New York, N. Y.—Photographs of installations of the Evans-Almirall system of hot water heating by forced circulation for central stations, manufacturing plants, etc. Represented by Douglas Sprague, Benjamin Kauffman.
- Flexible Compound Company.
- France Packing Company.
- Franklin Car-Heating Company, Syracuse, N. Y.—No. 2 Franklin heater constructed of steel for city and interurban cars; No. 3 Franklin heater for largest interurban cars and steam coaches; No. 4 and No. 5 air jacket coil heater for city and interurban cars. Represented by Kenneth D. Hequembourg, Garrett H. Brown.
- Franklin Electric Manufacturing Company, The, Hartford, Conn.—Tantalum and high efficiency units with Holophane reflectors; Femco and Novi incandescent lamps; two test rooms showing new Holophane Novi railway reflectors, and vibrating machine illustrating conditions under which railway lamps are operated. Represented by P. S. Klees, G. O. Curtis, C. N. Thorpe, C. Leonard.
- Galena-Signal Oil Company, Franklin, Pa.—Compounded oils for power house and rolling stock lubrication; also for steam railway lubrication. Represented by Geo. A. Barnes, E. V. Sedgwick, Alf. Greene, Geo. J. Smith, J. E. Southwell, L. J. Drake, Jr., W. P. Wescott, W. A. Trubee, Wm. Walsh, C. E. Schaffner, J. V. Smith, W. C. Stier, C. H. Thomas.
- Garlock Packing Company, The, Philadelphia.—Fibrous and metal packings and mill supplies. Represented by L. E. Adams, W. R. Haggart, D. Newhall, B. J. Miller.
- General Electric Company, Schenectady, N. Y.—Railway materials of all kinds and Curtis turbines.
- General Fireproofing Company, The, Youngstown, Ohio.—Trussit for roofing, cold twisted lug bars and expanded metal for reinforced concrete, all united steel studding and herringbone expanded steel lath for interior partitions and cement siding construction. Represented by M. E. Murray, E. N. Hunting, F. C. Fowler, J. L. Sharkey, F. P. Kafka.
- Gibson Iron Works Company, Jersey City, N. J.—Gibson common-sense pumping grate, non-warpable shaking grate, spiral steam blower. Represented by Edward Gibson and Ralph Conrad.
- Globe Ticket Company, Philadelphia.—Improved form of mileage book, special package tickets, ticket destroyer, forms of patent transfers, patent ticket holder for carrying commutation tickets by passengers, interurban and city tickets, books, transfers, etc. Represented by W. C. Pope, P. C. Snow, R. G. Osman, W. P. Snow, James Elliott.
- Gold Car Heating Company, New York, N. Y.—Two-rod and one-rod cylinder heaters; two-rod and six-rod panel heaters; truss-plank heaters; cab, house and portable heaters; junction box heater for steel cars; switches, coils, etc. Represented by Edward E. Gold, J. M. Stayman, A. E. Robbins, E. B. Wilson, J. O. Brumbaugh.
- Goldschmidt Thermit Company, New York, N. Y.—Specimens of work done with thermit, including welded motor cases, pipe joints, street car rails, compromise joints; specimens of metals free from carbon, such as metallic manganese, chromium, molybdenum, ferro-vanadium, manganese-zinc, manganese-copper, manganese-tin, ferro-titanium, ferro-boron, etc.; crucibles, mold boxes and other apparatus required in the application of the thermit process. Represented by Geo. E. Pellissier, Henry S. Mann, C. F. Gailor, W. R. Hulbert.
- Gould Storage Battery Company, New York, N. Y.—Represented by W. E. Winship, Charles H. Bradley, Jr., H. N. Powers.
- Grip Nut Company, Chicago, Ill.—Grip nuts from $\frac{3}{8}$ " to $1\frac{3}{4}$ ", hexagon and square. Represented by E. R. Hibbard, J. W. Hibbard, B. F. Stewart.
- Grothwell, A.
- Hale & Kilburn Manufacturing Company, The, Philadelphia.—Car seats and seating for electric, suburban, interurban, subway and elevated railways, upholstered in plush, leather, imitation leather, and rattan, with spring cushions and backs, rattan seat covering, etc. Represented by A. F. Old, H. T. Bigelow, S. A. Walker, B. F. Pilson.
- Harrison, F. P., Electric & Mfg. Co., New York.—Armature and field coils, bells, gongs, commutators, cotton duck curtains, fibre insulating compounds, insulating paper and cloths, insulating tapes, trolley poles, rattan, asbestos slate, motormen's oiled clothing. Represented by F. P. Harrison, W. H. Harrison, E. H. Cook.
- Hayward, S. W.
- Heany Fire Proof Wire Company, York, Pa.—Asbestos covered wire, asbestos tape, cloth and twine. Represented by H. L. Owen, T. A. Shock.
- Heywood Brothers & Wakefield Company, Wakefield, Mass.—Wheeler car seats for city and interurban electric cars, upholstered in plush, leather and rattan; reed parlor car chair. Represented by Bertram Berry, C. W. H. Fredrick.
- Holophane Company, New York City.—Holophane scientific and prismatic reflectors for car lighting; reflectors for general car lighting and reflectors for individual lamps over seats for reading illumination. Represented by H. M. Lauritzen.
- Home Rubber Company, Trenton, N. J.
- Howe Mfg. Company.
- Industrial Magazine.
- International Register Company, The, Chicago, Ill.—International and New Haven fare registers, cord fittings, and round and square rod fittings, International detachable handles, conductors' punches, and trolley and bell cord, cord connectors and pliers, uniform buttons and caps. Heeren enamel badges. Represented by John Benham, Albert L. Tucker, Wm. G. Kirchoff, A. N. Loper.
- Johns-Manville Co., The H. W., New York, N. Y.—Victor combination meters, both portable and switchboard types; overhead line material; "Noark" fuse devices; Transite

- asbestos fireproof lumber; moulded mica weatherproof sockets, arc lamp hangers, high tension insulators, rail bonds, J-M friction tape, Transite doors for transformer stations, controller linings; ears and clips, and several new forms of insulated cross-overs, section insulators, etc.; pipe covering, roofing and packing; samples of asbestos wood showing its various applications in fireproof construction of buildings, cars, etc. Represented by J. W. Perry, H. M. Voorhis, H. M. Frantz, R. R. Braggins, M. H. Crosswell, S. P. Russell, D. T. Dickson, E. D. Sparks, S. G. Meek, H. S. Corey, E. F. Quirke, W. F. Little, E. B. Hatch, C. W. Schultz, G. A. Saylor, F. J. Jewett, W. R. Seigle, A. E. Brown, H. R. Trainor.
- Jones & Laughlin Company, Pittsburg, Pa.—Cold rolled steel axles, two finished and two tested axles, showing drop test. Represented by E. D. Batchelor, George B. Mitchell, F. M. Campbell.
- Justice, Philip S. & Co., Philadelphia, Pa.
- Kalamazoo Railway Supply Company, Kalamazoo, Mich.—Root snow scraper and flanger, and street railway fender, improved Moore track drills, track drill chuck, improved high speed track drill bits and Kalamazoo improved reinforced pressed steel wheels. Represented by John McKinnon, Fred N. Root, David A. Moore.
- Kinnear Manufacturing Company, The, Columbus, O.—Steel rolling doors for car barns operated by hand or motor; steel rolling shutters for fire protection of exposed openings. Represented by F. C. Schmidt, E. H. McCloud, F. B. Billheimer, S. R. Hewitt.
- Lackawanna Steel Company, New York, N. Y.—Abbott rail joint plate, track gauge plate, and composite railroad tie. Represented by D. H. Van Pelt.
- Locke Insulator Manufacturing Company, The, Victor, N. Y.—Steel transmission tower on which will be mounted its new 100,000 volt insulators, underhung type. Represented by W. T. Goddard, A. S. Watts, John S. Lapp.
- Lorain Steel Company, The, Philadelphia.—Girder rails, high tee rails, special track work, and electrically welded joints. Represented by H. C. Evans, S. P. S. Ellis, A. L. Verner, Wm. W. Kingston, A. S. Littlefield, S. P. McGough, F. J. Drake, Jos. MacCarroll, Jr., Carroll Burton, P. M. Boyd, E. B. Entwisle, H. C. Stiff, H. F. A. Kleinschmidt, H. B. Frye, Jr., Jesse B. Heller.
- Lord Electric Company, New York, N. Y.—Non-arcng lightning arresters for station, pole and car service; soldered rail bonds; aerial advertising device consisting of captive balloon and electric sign, retaining cable acting as electrical conductor; automatic car seat heat deflector; rotating type of lightning arrester and abnormal potential discharger. Represented by F. W. Lord, F. W. Erickson, E. M. Hamlin, G. B. Crane.
- Lord, George W. Co.
- Los Angeles Switch & Signal Co., Los Angeles, Cal.—Tower and automatic switch with miniature car and track showing operation of liquid-hydraulic, automatic and tower switches. Represented by W. J. Bell, R. B. Sumner.
- Lumen Bearing Company, Buffalo, N. Y.—Ideal trolley wheels, 6-inch and 4-inch truck and motor bearings, both in lumen and plumbic bronze and Yankee and Lotus babbitt metals; alpha brass check plates; model of a journal box demonstrating the forced lubrication of its new type of truck bearing. Represented by E. P. Sharp, C. W. Stimpson.
- McCardell, J. R., & Co., Trenton, N. J.—One Trenton trolley wagon. Represented by M. J. McDonald, C. H. West.
- McConway & Torley Company, The, Pittsburgh, Pa.—Model cars equipped with the Janney M. C. B. coupler with radial movement, designed especially for interurban and electric cars; Cox rail joint. Represented by Stephen C. Mason, E. M. Grove, I. H. Milliken.
- McGraw Publishing Company, New York.—Jas. H. McGraw, Harold S. Buttenheim, C. A. Babbiste, H. W. Blake, J. M. Wakeman, Geo. W. Elliot, C. J. Doyle, Cale Gough, Walter Jackson, Mr. Onken.
- Macdonald, M., Cleveland, O.—Macdonald cash receipts and hat checks. Represented by M. Macdonald, A. J. Reynolds, T. J. Owen.
- Magann Air Brake Company, Detroit and Toronto.—Magann storage air brake system. Represented by E. C. Rutherford, Frank Harrison.
- Maryland Railway Supply Company, Baltimore, Md.—Spike strut rail fasteners. Represented by Charles Elliott.
- Massachusetts Chemical Company, Walpole, Mass.—Insulating paints, including Armalac, special Armalac, M. C. B. paint, Enamelac, Insullac, also Chattertons, cable compound and waxes, insulating tapes, including field coil, armature, reinsulating and friction tapes, splicing compounds, etc.; moulded car seat bumpers, sash rubbers, rubber springs, car step mats, field coil pads and rubber bushings; samples of cans, boxes, etc., showing style of package in which goods are shipped. Represented by A. T. Baldwin, L. O. Duclos, and A. E. Duclos.
- Masury, John W. & Son, Brooklyn, N. Y.—Represented by T. J. Ronan, T. E. Mulford.
- Moran Flexible Steam Joint Company, Louisville, Ky.—Flexible ball joints for steam, oil, gas, air and liquids; steam couplers; Burdon trolley catcher. Represented by C. N. Jenkins, W. T. Burdon.
- Morris, Elmer P. Company, New York, N. Y.—1800 feet catenary line construction, with 42 poles; full line of low tension material; malleable cross-arms, ornamental Bishop's crooks for arc lamps. Represented by Elmer P. Morris, W. J. Beckett, P. H. Holmes, H. S. Tonks.
- National Brake Company, Buffalo, N. Y.—Peacock brakes and the Benjamin steel tie. Represented by G. S. Ackley, W. D. Brewster, Frank D. Miller, W. W. Miller, John N. Akarman.
- National Brake & Electric Co., Milwaukee, Wisc.
- National Carbon Company, Cleveland, O.—Carbon brushes, dry batteries, arc light carbons, headlight carbons and flashlights. Represented by N. C. Cotabish, A. E. Carrier, F. D. Kathe, O. T. Weaver, A. C. Henry, Frank C. Park.
- National Car Wheel Co., Allegheny, Pa.
- National Fibre & Insulating Company.
- National Lock Washer Company, The, Newark, N. J.—National cam curtain fixture in curtains on full size models; balance protected groove curtain fixture in curtains on full size models; sash lock and sash balance on full sized car window models; samples of different sizes and patterns of lock washers. Represented by F. B. Archibald, W. C. Dodd, Daniel Hoyt and John B. Seymour.
- National Railroad Trolley Guard Company, New York, N. Y.—Trolley guards of various designs and metals for preventing electric cars from becoming stalled at steam railroad grade crossings; a safety appliance insuring continuous power under all conditions. Represented by O. W. Pierce, W. K. Page.
- New Departure Manufacturing Company, The, Bristol, Conn.—Liberty Cushion trolley harps in rigid and flexible head; trolley wheels; push car bells; overhead pull car bells; single tap car bells; sleet cutters. Represented by DeWitt Page, M. J. Horton.
- Newman Clock Co., Chicago, Ill.—Watchmen's Clocks, employees' time recorders and time recording apparatus. Represented by Charles G. E. Renshaw, George F. Baldry, August H. Nanz.
- New York Car & Truck Company, Kingston, N. Y.—14-D-5-X maximum traction truck; No. 24 M. C. B. short wheel base truck; No. 47 M. C. B. high speed interurban truck. Represented by F. W. Curtis, W. L. Boyer.
- Niles Car & Manufacturing Company, Niles, O.—One 60-foot passenger car for Washington, Baltimore & Annapolis Electric Railway. Represented by F. C. Robbins, J. A. Hanna, F. A. Richards, A. W. Schall.
- Nuttall Company, R. D., Pittsburg, Pa.—Gears, pinions and trolleys for modern electric haulage motors, trolley harps and wheels and sleet removing appliances, street railway motor compressor gears and pinions, samples of small special gears and pinions. Represented by F. A. Estep, George W. Provost, T. M. Cluley, R. M. Kirschner, Charles N. Wood, Milton Rupert.
- Norton Grinding Company, Worcester, Mass.—Ground axle and car wheels, revolving on their bearings to show accuracy. Represented by H. C. Cudworth, Hans Wickstrom.
- Ohio Brass Company, The, Mansfield, O.—Tomlinson automatic radial car coupler; Nichols-Lintern pneumatic track sander; Lintern car signal system; Armstrong journal oiler, Genuine bell metal motor bearings; "All Wire" rail bonds; and third rail insulators; porcelain insulators; overhead material of all kinds including catenary; construction tools. Represented by C. K. King, A. L. Wilkinson, C. E. Young, Nathan Shute, P. A. Hinds, C. H. Tomlinson, G. A. Mead, A. L. Price, F. S. Denneen, A. W. Dee, E. F. Wickwire, F. A. Strail, C. E. Delafield, W. H. Bloss, N. M. Garland, R. M. Campbell, S. H. Mattson, E. C. Brown, F. E. Johnson, F. H. Jameson, A. L. Havens, F. V. Cook, G. W. Cooper, J. E. Slimp, S. K. Colby.

- Ohmer Fare Register Company, Dayton, O.—Indicating, recording and printing registers and the Ohmergraph. Represented by John F. Ohmer, Charles W. Ketteman, Hiram Tyler, Walter S. Heaton, Clyde V. Funk, E. B. Grimes.
- Palmetto Metal Company, Chicago, Ill.—Babbitt metals. Represented by John H. Colvin, William E. Ackley, H. C. Igel.
- Pantasote Co., New York, N. Y.—Car seats upholstered with Pantasote, and various styles of Pantasote curtain fabrics. Represented by J. M. High, D. E. Bonner.
- Peerless Rubber Co., New York, N. Y.
- Pennsylvania Steel Company, The, and Maryland Steel Company, Philadelphia, Pa.—Tee and girder rails, special track work for street and interurban railways; switches, frogs, crossings, switch stands. Represented by Richard Peters, R. W. Read, Chas. S. Clark, L. H. Babcock, J. G. Miner, C. E. Irwin, W. C. Cuntz, Drew Allen, R. E. Belknap, N. E. Salsich, H. B. Green, J. A. Davis, R. C. Hoffman, Jr., J. C. Jay, Jr., R. W. Gillespie, J. B. Smiley, Thomas Blagden, C. W. Reinoehl, G. S. Vickery, C. A. Alden, W. M. Henderson, John T. Hill.
- Philadelphia Air Brake & Machine Company, Philadelphia, Pa.—Complete air brake equipment. Represented by William W. Lambert, J. E. R. Lambert, T. F. Kelley.
- Pike Adding Machine Company.
- Pittsburgh Insulating Company, Pittsburg, Pa.—Insulated cloths and papers. Represented by James Todd, Dr. Walther Riddle, Phillip F. Norvell.
- Pittsburgh Pole & Forge Company, Pittsburg, Pa.—Trolley poles, tubular iron poles, span wire poles, electric light poles, signal poles, roller rail benders, eccentric rail bender and pole brackets. Represented by J. P. Biggert, B. D. Foster.
- Plomo Specialty Manufacturing Company, The, Cleveland, O.—Whitmore's Gear Protective Composition in service on gears and pinions of two-G. E. 81 motors; pinions that have been in service lubricated with Whitmore's Gear Protective Composition and with other compounds; blue prints. Represented by W. M. Lawyer, E. G. Fisher, S. W. Whitmore.
- Powell, A. E.
- Pratt & Lambert, Buffalo, N. Y.—Paints and varnishes; samples of California redwood highly polished with products of the company. Represented by J. P. Gowing, Joseph Maycock, M. B. McNulty.
- Rail Joint Company, The, New York, N. Y.—Base supporting rail joints of "Continuous", "Weber" and "Wolhaupter" types. Represented by Benjamin M. Barr, H. C. Hollo-way, William A. Chapman, George W. Smith, G. M. Hager, J. C. Barr.
- Railroad Gazette, New York, N. Y.
- Railway Audit & Inspection Company, (Inc.), Philadelphia, Pa.—Represented by H. N. Brown, C. E. Horney, T. C. Cary, Chas. Goble.
- Railway Gazette, London, Eng.
- Ramapo Iron Works, Hillburn, N. Y.—Represented by Arthur Gemunder, W. B. Lee, J. B. Strong.
- Recording Fare Register Company, The, New Haven, Conn.—Fare registers of various types, register fittings and car trimmings, center ringing device for registers, trolley wheels, trolley harps, trolley cord, and conductors' punches. Represented by M. DeForest Yates, Frank B. Kennedy.
- Ridgway Dynamo & Engine Company, Ridgway, Pa.
- Riverside Metal Company, The, Riverside, N. J.—German silver, phosphor bronze, cupro nickel, brass, in sheets, wire, rods and castings. Represented by W. P. McGlynn, L. J. Kane, R. G. Holtby.
- Rooke Automatic Register Company, Providence, R. I.—Rooke automatic fare collector. Represented by George F. Rooke, W. A. Williamson.
- Rubberset Brush Company.
- Russell Car & Snow-Plow Company, Ridgway, Pa.—Russell electric railway combination car and snow-plow size 6, mounted on trucks and equipped with detachable, adjustable steel noses—one double track and one single track, with air operating device. Represented by M. S. Kline, J. E. Logan.
- St. Louis Car Company, St. Louis, Mo.—One car Forest City Railway type mounted on St. Louis Car Company's Number 47 truck. Represented by A. H. Sisson, Frank McCoy, Abe Cook.
- Samson Cordage Works, Boston, Mass.—Waterproofed trolley cord; bell and register cord in colors; mahogany wire center armature cord; solid braided rope. Represented by F. J. Coakley, R. G. Whiting.
- Schoen Steel Wheel Company, Philadelphia, Pa.
- Security Register & Manufacturing Co, New York, N. Y.—Giles Allison.
- Sherwin-Williams Company, The, Cleveland, O.—Car body color, roof and truck paint, floor paint, rattan seat, headlining color, varnish, dry color, insulating varnish. Represented by E. M. William, F. A. Elmquist, H. E. Billau, R. Clitz, G. A. Jacobs.
- Smith, Peter, The, Heater Company, Detroit, Mich.—One No. 1-B heater, one No. 2-B heater, one No. 3-B heater, one No. 2-A heater, one No. 3-A heater, and special fittings used in connection with the above heaters. Represented by Peter Smith, E. J. Smith, D. W. Smith.
- Southern Exchange Company, New York, N. Y.—Samples of southern cedar poles, octagonal long leaf pine poles and Georgia long leaf pine crossarms; photographs of mills, stock yards and standing timber. Represented by E. G. Chamberlin, W. E. Mitchell.
- Speer Carbon Company, St. Marys, Pa.—Speer new re-enforced motor and generator brushes. Represented by J. S. Speer, G. P. Fryling.
- Standard Motor Truck Company, Pittsburg, Pa.—Standard 6-50 type short wheel base (4 feet 6 inches), outside hung motor double truck of 50,000 pounds capacity for city and suburban, service mounted with 34 inch rolled steel wheels; standard 0-45 type maximum traction 4-foot 4-inch wheel base double truck of 45,000 pounds capacity for city and suburban service; standard C-50 type inside hung motor 6-foot 6-inch wheel base double truck of 50,000 pounds capacity for city and suburban service; standard C-60 type 6-foot 6-inch wheel base high-speed interurban double truck of 65,000 pounds capacity, mounted on 34-inch rolled steel wheels. Represented by A. W. Field, A. Christianson, W. G. Price, W. C. Cory, E. E. Buschman.
- Standard Paint Company, The, New York, N. Y.—P. & B. baking varnishes, clear and black, finishing varnish, air-drying varnish, core-plate varnishes, electrical compounds, insulating tape, S P C armature and field coil varnish, Ruberoid roofing, colored roofing and flooring. Represented by J. N. Richards, C. E. Smith, J. H. Thomas, F. F. Van de Water.
- Standard Roller Bearing Co., Philadelphia, Pa.
- Standard Steel Works, Philadelphia, Pa.
- Standard Varnish Works, New York, N. Y.—Insulating varnishes, including Voltalac; samples of solid compounds for use in connection with vacuum drying and impregnating apparatus; samples of various types of impregnated field, magnet and armature coils. Represented by John C. Dolph, L. Robinson, E. M. Heckscher.
- Star Brass Works, The, Kalamazoo, Mich.—Kalamazoo trolley wheels and harps. Represented by O. P. Johnson, F. P. Crockett.
- Sterling-Meaker Company, Newark, N. J.
- Sterling Varnish Company, The, Pittsburg, Pa.—Sterling insulating varnishes and protective coatings for metals. Represented by James Todd, S. C. Schenck, C. L. Cool, Walther Riddle, A. S. King, W. V. Whitfield, C. A. Barker.
- Stromberg-Carlson Company, Rochester, N. Y.
- Symington Company, The, T. H., Baltimore, Md.—Symington journal boxes, Baltimore ball bearings, Gilchrist rail chairs. Represented by T. H. Symington, J. F. Symington, C. J. Symington, D. Symington, A. H. Weston, E. John Nichols, W. W. Rosser, Carl Tucker.
- Taylor Electric Truck Company, Troy, N. Y.—One 8-foot wheel-base single truck, one Taylor improved S. B. double truck, one Taylor H. L. B. truck, one Taylor M. C. B. triple spring truck, also a full line of coil and elliptic springs for electric railway service and our T. M. C. steel tired wheels. Represented by John Taylor, C. H. Dodge, Thomas Thorne, W. E. Taylor.

- Traction Railroad Equipment Company, The, New York, N. Y.—Hipwood standard car fender; Hipwood combined fender and wheel guard. Represented by Patrick Egan, George Hipwood, Oscar S. Davis.
- Under-Feed Stoker Co. of America, The, Chicago, Ill.—Jones stoker and auxiliary equipment in operation. Represented by Chas. S. Crowell, W. T. Jordan.
- Underwood & Co., H. B., Philadelphia, Pa.—Portable boring bar in operation reboring a Greene engine cylinder; portable milling machine in operation milling the valve seats on a Greene engine; portable crank pin turning machine; two-cylinder air motor in operation; portable Corliss valve seat boring bar; vacuum dash pots for Corliss engines. Represented by Edwin J. Rooksby, Edwin W. Whitaker.
- Union Electric Company, Pittsburg, Pa.—General line of railway and lighting supplies. Represented by George W. Provost, Thomas M. Cluley, R. M. Kerschener.
- United Copper Foundry Company.
- United States Electric Signal Company, West Newton, Mass.—Electric block signals. Represented by John J. Ruddick, Roland F. Gammons, 2d.
- United States Engineering Company, Philadelphia, Pa.—Nachod automatic signal for electric railways, with plan of single track block, connected up for operation and arranged for a life test with a motor driven contact maker. Represented by Carl P. Nachod.
- United States Graphite Company, Saginaw, Mich.—Greases, lubricating graphite, trolley pole and car paint in paste and liquid form, also roof paints. Represented by H. C. Woodruff, Gordon Douglas, G. S. Richardson, T. H. Williams.
- United Uniform Company, Brooklyn, N. Y.
- Universal Adding Machine Company, St. Louis, Mo.
- Van Dorn, W. T., Company, Chicago, Ill.—One No. 17 drawbar, New York subway style; two No. 27 drawbars; one No. 11½ drawbar; one No. 21 drawbar; one emergency knuckle to couple to the M. C. B. coupler. Represented by W. T. Van Dorn.
- Van Dorn & Dutton Company and Van Dorn Electric and Manufacturing Company, Cleveland, O.—Portable electric drills and reamers, armature coils, cable connectors, street railway gears and motor pinions. Represented by W. A. Dutton, H. L. Schneider, C. I. Cartwright.
- Wallace Supply Company, Chicago, Ill.—Stanwood steel steps, Wallace door fixtures, car trimmings, Wallace sign holders, Wallace deck sash ventilator openers, Wallace parcel racks, Wallace anti-rattler door rollers, signal bells, car trimmings, steel gongs. Represented by Emil Metterhausen, Wesley Meeteer.
- Walworth Manufacturing Company, Boston, Mass.—Standard weight and high pressure steam piping specialties, valves, engineers' supplies and tools. Represented by H. L. Rideout, L. V. Joyce.
- Washburn Steel Castings & Coupler Company, The, Minneapolis, Minn.—Complete line of M. C. B. traction couplers, electric interurban couplers, and mine, plantation and lumber railroad couplers. Represented by J. L. Hopper, E. C. Washburn.
- Wendell & MacDuffie, New York, N. Y.
- Western Electric Company, Chicago, Ill.—Electrose line insulation, Shelby trolley poles, Kalamazoo wheels and harps, deltabeston wire, Amazon and Dryfield tapes, linen tapes and cotton sleeving, bronze and malleable iron ears, wood strain insulators, commutators, controller parts, axle bearings, insulating paper, insulating cloth, varnishes, registers, register fittings, mica, trolley catchers, trolley rope, foot gongs, pole brackets, bells, incandescent lamps, car wire, etc. Represented by R. H. Harper, F. D. Killion, A. E. Meixell, D. C. Guest, R. L. Lunt, F. C. Jaeger, H. J. Shreve, R. Roth, James R. Stuard, G. F. Livezy, A. L. Hallstrom, H. E. Scott, P. R. Ziegler, W. Harkness.
- Western Tube Company, Kewanee, Ill.—Kewanee unions, flange unions, union ells and tees, union swing check valves, union valves and boiler couplings; high-duty metal regrinding valves, medium pressure globe and angle valves, extra heavy globe and angle valves, gate valves and cocks; HDM Eurema Y valves; swing check, globe check and angle check valves; quality cast iron fittings; malleable fittings, couplings and a full line of fittings and valves for power plant equipment. Represented by Frank E. Olin, N. J. Higinbotham, L. F. Hamilton.
- Westinghouse Air Brake Company, Pittsburg, Pa.—See Westinghouse companies.
- Westinghouse companies, Pittsburg, Pa.—The Westinghouse Electric & Manufacturing Company exhibits a full line of single-phase and direct current motors for electric traction; span of catenary construction with pantagraph trolley in operation; arc lamps; 500-kilowatt Westinghouse-Parsons steam turbine open for inspection (joint exhibit with Westinghouse Machine Company); Union switch system of multiple control; single-phase electric locomotive (on track space); photographic studio for production of souvenir postal cards. The Westinghouse Traction Brake Company exhibits AML equipment, electro-pneumatic brake system, portable blowing outfit, AMM and SME equipments, EL electric locomotive equipment, Westinghouse automatic car and air coupler. Represented by A. L. Humphrey, J. F. Miller, S. C. McConahey, E. A. Craig, S. D. Hutchins, W. V. Turner, Robt. Burgess, P. H. Donovan, T. L. Burton, E. L. Adreon, C. P. Cass, J. R. Ellicott, C. R. Ellicott, F. M. Nellis, W. G. Clark, F. V. Green, E. H. Dusen, Geo. H. Martin, W. S. Bartholomew, E. J. Olmstead, H. S. Clark, L. A. Osborne, W. M. McFarland, C. S. Cook, H. A. Coles, L. N. Reed, G. C. Ewing, Thos. Cooper, H. H. Van Staagen, J. C. Kyle, J. A. Brett, H. C. Stier, C. P. Billings, Q. W. Hershey, J. W. Busch, O. T. Smith, J. N. Dubarry, E. H. Sniffin, L. C. Bullington, H. Van Blarcom, L. A. Phillips, H. P. Childs, S. M. Broman, E. L. Clark, H. D. Bayne, J. C. McQuiston.
- Westinghouse Machine Company, Pittsburg, Pa.—See Westinghouse companies.
- Westinghouse Traction Brake Company, Pittsburg, Pa.—See Westinghouse companies.
- Weston Electrical Instrument Company, Newark, N. J.
- Wharton, Wm., Jr., & Co., Incorporated, Philadelphia, Pa.—Manganese steel special track work including a switch, mate and frog of each of the following constructions: standard easily renewable centre work, solid manganese steel girder rail work, including also solid manganese steel crossing, T-rail work, and new insert manganese steel T-rail work, standard heel-less type switch, manganese steel housed point split switch, steam over-electric crossing with manganese steel on the steam run. Spring switch throws, anti-kickers, tongue locks, various models and illustrations of track work. Represented by V. Angerer, L. R. Ashhurst, R. C. McCloy, W. McLain, A. S. Partridge, J. C. Robinson, J. W. Stringfellow, G. R. Lyman, H. F. McDermott.
- Wheel Truing Brake Shoe Company, Detroit, Mich.—Various styles of abrasive brake shoes for grinding car wheels. Represented by J. M. Griffin.
- White, J. G. & Company, New York, N. Y.
- Wilson Company, The, Chicago, Ill.—Daily editions of Electric Railway Review; The Railway Age; "Motorman and His Duties". Represented as shown under Electric Railway Review.
- Wilson, Jas. G., Manufacturing Company, New York.—Rolling doors for closing car barns and freight sheds. Represented by A. H. Dodge, W. P. Waugh.
- Wilson Trolley Catcher Company, Boston, Mass.—Wilson trolley catcher. Represented by Charles N. Wood, Bert C. Wilson.
- Yale & Towne Manufacturing Company, New York, N. Y.—Electric hoists, chain blocks, overhead trolleys, model shop jib crane, shop pictures. Represented by C. W. Beaver, William Hazelton, F. J. Ford, F. A. Hall.
- D. Harrington, of Colorado Springs, Colo., is exhibiting the Harrington anti-straddling and safety device for both channel and split switches of both steam and electric railways. Mr. Harrington, its inventor, is demonstrating with models for steam and electric service how it is impossible for a city or interurban car to split a tongue at switches protected with the device. He also explains how the device keeps the switch set when added to the split point, even though the stand and connecting rods have been removed. Mr. Harrington is superintendent of construction of track and overhead for the Colorado Springs & Interurban Railway, and has had all switches on the line of the road protected with his device for the past nine months. The device has also been placed in service on the Colorado Midland, a steam road.

Electric Railway Review

DAILY EDITION

PUBLISHED BY THE WILSON COMPANY

IN HONOR OF THE ANNUAL CONVENTIONS OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AND OF ITS ALLIED ASSOCIATIONS OF ACCOUNTANTS, ENGINEERS, CLAIM AGENTS AND MANUFACTURERS, AT ATLANTIC CITY, N. J.

Subscription in advance, including regular weekly issues and daily editions published from time to time in places other than Chicago, postage free; one year, \$2.00; foreign, \$5.00; Canada, \$3.50; single numbers, 10 cents.

PUBLICATION OFFICES: 147-151 North 10th Street, PHILADELPHIA

BUSINESS OFFICES: 160 Harrison Street, CHICAGO; 150 Nassau Street, NEW YORK; 1529 Williamson Building, CLEVELAND.

EDITORIAL OFFICES: The Steel Pier, ATLANTIC CITY, N. J.

VOL. XVIII

PHILADELPHIA, PA., OCTOBER 16, 1907

No. 15c

The past and the present of the claim agent were presented before the Claim Agents' Association in the paper of H. K. Bennett, of Fitchburg, Mass. Referring to the remark of a manager that he could remember one year when the total amount expended for claims did not exceed \$20, Mr. Bennett went on to show

Claim Agents and the Public.

how the attitude of the public had changed from the days when the first railways were welcomed in communities. With the building of extensions discontent was created in the minds of those who were not suited by the routes chosen. In the early days trifling accidents were regarded by people as of little consequence; and if a woman accidentally fell down her cellar stairs she had no thought of suing a railway for damages "just because one ran within speaking distance of her home." Mr. Bennett spoke of the part which dishonest lawyers have had in the changes that have taken place. Their machinations have created conditions in some communities which endanger the profitable operation of railways. The claim agent of the present day, Mr. Bennett said, stands closer to the general public than any other official of the street railway. While the public and some boards of directors fail to appreciate the true worth of the claim agent, Mr. Bennett showed that valuable service can be performed by an energetic man who does not abide in his office, but who works quietly and effectively among people, striving to overcome the almost insane prejudice that exists against corporations. Scrap book records, cameras and the inspection of cars for minor defects were among suggestions made by Mr. Bennett, that would assist in increasing the efficiency of the department.

==

In his carefully prepared paper presented before the Engineering association George L. Wilson, engineer Twin City Rapid

The Right of Way De Luxe.

Transit Company, made a strong argument for attractive roadways. It was cited that the removal of rubbish, weeds and unsightly objects of all kinds, including advertising signs from the vicinity of the passenger track, is a proper part of the duties of the roadway engineer. As a means toward this end all the company's property stored along the right of way should be arranged neatly and every effort made to assure that the view from the windows of the passenger cars will be of a pleasing nature. It is noted that the steam railroad systems have for some years recognized the beneficial effects to be derived from this policy of neatness and in many instances have retained landscape artists whose sole work is to see that the grounds about the station buildings present an attractive appearance. The making attractive of an interurban roadway is a task that can be spread over some years, and in fact it is even more practical to do such work at odd times as the section gangs may have the opportunity. When definite plans for such improvements have been laid out in the form of a campaign the results to be gained should be impressed upon the working organization so the various departments will appreciate that if their efforts expended at odd times are unified toward the beautifying of the roadway, some day the right of way will become a boulevard or parkway and patrons will be

so attracted and interested that the ride will seem short and pleasant and the trip considered as one to be repeated.

It is eminently fitting that steam railways which are interested in electrification should be represented at this convention. On account of investments in electric railways and the adoption of electricity as a motive power for terminals and for branch lines of important steam railway systems, it is now desirable that the en-

Steam Roads to be Represented.

gineers and operating officials of the steam roads acquaint themselves with the problems of the electric roads and learn how these problems are being solved by the electric railway men, and we understand that the Pennsylvania Railroad, the New York Central and the New York, New Haven & Hartford are among the steel railway companies which are planning to have commissions or members of the engineering staff at Atlantic City this week. The electric and the steam roads have several common interests. Many of the manufacturers' exhibits appeal with equal force to the mechanical and operating staffs of both classes of roads. Because of the longer experience of steam lines, the electric interurbans can with profit follow them in many matters. On the other hand the electric railways have been experimenting for years with some problems which are necessarily new to steam roads, and the results of the experience of street and interurban railways must furnish some valuable suggestions for the steam railway companies now operating or contemplating the installation of electric lines.

==

One of the most important and far reaching subjects to be considered by the American Street and Interurban Railway Association at the convention, is that of

Co-operative Fire Insurance.

"Co-operative Fire Insurance." During the past three years important steps have been taken by leading electric railway and lighting companies for establishing an insurance fund from which to pay their own losses and thus reduce insurance to actual cost. Under this plan the railway and lighting companies are relieved from the heavy tax of helping to pay for the conflagration losses of the entire country. The American Railway Insurance Company of Cleveland, Ohio, has been organized and made the depository for the fund. This fund will be under the control of trustees, and invested for the benefit of the subscribers. This plan of insurance has received the endorsement of the American Street and Interurban Railway Association and of the Central Electric Railway Association; it was given favorable consideration by the Association of Edison Illuminating Companies at its convention recently held at Hot Springs, Va. The hearty approval of the plan has also been given by W. H. Blood, insurance expert of the National Electric Light Association. Through the co-operation of these four great associations an insurance fund can be created that will in time enable the company's members to carry their entire insurance at actual cost and in their own organization. The so called old line insurance or stock companies have been making strenuous efforts to prevent the completion of the American Railway Insurance Company, but it is understood that the organization

has been completed and the company will commence operations on, or about, January 1, 1908.

MEDICAL EXPERTS IN PERSONAL INJURY CASES.

One of the questions which perennially confronts the railway official who has the handling of personal injury cases when they arrive at the point of litigation is as to the value of expert medical testimony. Perhaps the most obvious objection to the employment of such assistance is the fact that it is purchasable by either side and that it thus not only becomes an expensive luxury but also is responsible for some degree of confusion in the minds of the jury which may nullify the effect of an otherwise clear and practically conclusive presentation of the case. In addition it is alleged that such testimony is ordinarily too technical for the comprehension of the average jury and there is always present the possibility that, knowing whence the expert witness derives his compensation, too much allowance may be made, in the case of the conscientious and otherwise competent expert, for the bias which he is expected to feel toward the interest of his employer.

On the other hand, such testimony has an undoubted educational value both for the jury and as a guide to the attorney who is conducting the case. For the latter it is of assistance in enabling an intelligent examination of other witnesses and as to the determination of whether the injury alleged was actually caused by the accident upon which the claim is based or is the result of a previous disability. For the jury, testimony of this character should tend to correct over-statements as to the disabling effects of the injury and it also appears to be the only satisfactory way of assisting to a determination of its probable permanence and thus has a material value as an aid to the assessment of the damages if a verdict is rendered in favor of the claimant.

This educational value on the one hand, and the purchasable character (with all that the latter implies, in fact as well as in the minds of the jury) on the other, seem, fairly to balance each other on the opposite sides of the scales. It is not necessary to consider the cases in which the defendant company is forced to the employment of such assistance as an offset to its introduction by the other side. Self-defense is a first law of nature here as elsewhere. But in case of an action in which there is little controversy as to the facts such testimony may well afford a basis for the determination of the extent to which they are applicable in the matter of the assessment of damages and for the argument of the attorney whose function it is to maintain this assessment within reasonable bounds. In the case of "fake" claims there is ordinarily no other means by which the actual groundlessness of a claim may be brought out, and in a similar position must be placed those claims which, although not "fakes" in the sense of implying dishonesty on the part of the claimant, actually are so to the extent to which he has absorbed the officious suggestion of ambulance-chasing attorneys or of over-zealous friends. It has been remarked that "suggestive therapeutics" was never more in evidence than to-day, and that it is easy to manufacture a case of traumatic neurasthenia as a sequel to an insignificant shock. It is equally true that the maintenance of such a case before a jury is attended with as little difficulty.

Exaggeration of the disabling consequences of an injury is doubtless the most common feature in claims of this class. In such circumstances it is probably good policy to introduce the testimony of expert medical witnesses. This should show the extent of the injury, whether the disability is in any manner complicated with previously existing physical defects, and the probable degree of permanence. Admitting that in certain classes of cases expert medical testimony is calculated to develop the exact physical condition of the claimant and to indicate at least partially the amount that may reasonably be assessed as compensation therefor, by the expression of an

opinion as to its permanence, it is suggested that satisfactory results for both parties would be more certainly secured if a practice in vogue in certain localities were more generally followed. This is the appointment by the court of some physician to examine the claimant. Under this method of procedure it is presumable that most of the valuable results of the introduction of expert testimony may be developed by the examination of such a witness who is, for the purposes of the matter in question, virtually an officer of the court and whose position is one of disinterestedness.

Presumably the greatest and certainly the most apparent objection to the employment of expert witnesses in any class of cases arises from the fact that the examination of such witnesses is frequently carried to a ridiculous length. Sometimes this is due to the desire of the witness himself to show the extent of his knowledge and sometimes it is due to the examining attorney, who desires to show to the company by which he is employed that he has gone so far into the study of the case as to be familiar with the medical terminology of the disability under consideration. Frequently it is due to a desire upon the one hand to "darken wisdom with words" or upon the other to conceal ignorance with much speaking. On the supposition that a reputable railway company will pay just claims with as little demur as possible and carry its litigation only to the extent of self-defense it appears that the ideal expert is one whose appearance in the case is from an impartial source, whose testimony will be given in a manner comprehensible to the average jury, and whose standing is such as to insure credibility for his statements of fact and respect for those statements that are matters of opinion. Under such conditions the existing objections to expert medical testimony would largely disappear.

SAFETY IN STANDARDIZATION.

There is one aspect of the matter of standardization which comes only incidentally within the field of the engineering association but which is of some importance in its relation to the conduct of the affairs of a road as a whole. This is the tendency of standard equipment toward a reduction of accidents. The influence appears to be derived from several sources. Among these may be mentioned familiarity with the operation of equipment, enabling an almost mechanical action in times of danger or when action must be more rapid than thought; the greater convenience of keeping equipment in repair and hence the greater certainty that repairs will be made before the necessity of such repair is emphasized by an accident; from the standpoint of the public a reduced liability to mistakes in entering and leaving cars with the construction of which they have become familiar through long acquaintance.

It is evident that each of these heads may be amplified to such an extent as to indicate that a greater degree of safety as well as efficiency of operation should result from the use of standard equipment. The motorman who knows that his brake is to be operated by hand, air or electric current will be able to make a better stop whether service or emergency, if he knows his equipment, than if a mental operation to determine the type of brake is a pre-requisite. The efficient and economical operation of the controller should be a natural consequence of familiarity with what the apparatus will do.

The handling of trains more expeditiously and hence with less danger of the results of hurry would necessarily follow as a result of the adoption of standard equipment, and though in the service of many companies any attempts at repair on the part of a train crew are discouraged, it is obvious that there are certain minor defects the remedying of which is within the range of knowledge of any employee who is entrusted with the handling of a car, and a knowledge born of familiarity would enable such remedy to be safely applied.

In the so-called safety appliance law and in the decisions rendered and regulations promulgated under it by the interstate commerce commission with reference to the equip-

ment of steam-operated roads, the matter of safety to employes and the public has been made to assume as much importance as if not greater than has been given to those standards of the Master Car Builders' Association which have been adopted from motives of economy and efficiency of service. There is therefore apparently no reason why the principle should not be followed out along the same lines by street and inter-urban railways to the same extent and for the same reasons. Among these safety to employes and to the public is not one of the least considerations.

PROGRESS IN WHEEL SECTIONS.

It is an easy matter to say that standardization concerns the work of one road only, but it is narrow-minded to do so. If the interests concerned with the development of street and interurban railways were to be satisfied with what they have done in the past and were not minded to think of the future, this position might be tenable. But the industry long since passed that stage. It is a question now which system of operation—which kind of power—shall hold certain fields. Financial support must come in as a support to academic theories. In order to secure this support it is necessary to adopt the principles that have been recognized as good and the practices that have been recognized as worth trying, by those who have gone before.

The standardization committee in its recommendations concerning wheel sections gives two sections: One, known as A, has a tread three inches wide and a flange $\frac{3}{8}$ -inch high and $1\frac{3}{16}$ inches thick at the throat, and is recommended for street and interurban railways so far as it can be applied. This section with the width of tread increased to $3\frac{1}{2}$ inches is recommended for interurban work and for city work where it can be used, the committee expressly stating that it is desirable to work towards the general adoption of wheels having this tread. To meet the conditions of some of the companies which are members of the association and which would find it difficult to operate a wheel having these dimensions, a section known as B, which has a $2\frac{1}{2}$ -inch tread and a flange $\frac{3}{4}$ -inch high, is recommended. Reference to the M. C. B. wheel section was made by the chairman in submitting his report, but it seems to us a matter of regret that this recommendation was not included in the report proper, although bearing in mind the theory upon which the committee proceeded, the explanation of the reason for this omission as given by Mr. Evans is satisfactory. In view of the fact that the M. C. B. wheel section has been developed after long experience by the steam railways and that it has not yet been demonstrated that this section is not equally desirable for use on electric railways where the conditions are such as to permit of its use, it is to be regretted that the committee did not recognize this section specifically in its report and place on record the drawing so that it and the sections recommended by the Engineering Association could be conveniently consulted at the same time.

Locomotive driving wheels on high speed engines are much larger than the driving wheels on electric cars. Assuming the same flange on both a horizontal plane tangent to the top of the rail would intersect a longer segment on the larger wheel and considering the far shorter wheel base of the electric driven truck it would seem desirable to increase rather than diminish the length of the segment of the wheel tread which lies below the horizontal plane through the top of the rail. The sections recommended by the committee on standardization have been designed with a view to meeting existing conditions, but would it not have been preferable to have discussed the ideal condition as well as those which now obtain, and while specifying the dimensions for sections adapted to existing conditions, point out also the standard which might well have been recommended for use where conditions will permit it?

Conventionalities

ANNOUNCEMENTS OF THE ENTERTAINMENT COMMITTEE.

The theater parties which were originally scheduled for Thursday evening have been changed to this evening. Tickets, which will be required for admission, will be distributed from the box office at the entrance to the Steel Pier from 11 A. M. to 1 P. M. to-day. One badge will be required for each ticket, so that if tickets for friends or lady guests are desired their badges must be presented. The attraction at the Savoy theater will be Mary Mannering in "Glorious Betsy" and at Young's Pier theater "The Top o' th' World," an extravaganza. Seats for either performance may be had as long as there is a supply of both.

Roller Chairs.

The entertainment committee is doing all in its power to make things run smoothly, but this cannot be done unless the sub-committees having in charge the details of the several affairs are given the co-operation of those in attendance at the conventions. The roller chair committee in particular requires the aid of every one if the roller chair service is to be all that it should. The chair pushers are not allowed, even on the occasion of a convention, by ordinances of Atlantic City, to pick up passengers along the Boardwalk except from a station. An unpleasant incident occurred yesterday, when some passengers picked up along the walk were obliged to release their chairs. When roller chairs are desired it is requested that they be obtained in the regular way from one of the two stations which are located at the Steel Pier and the Marlborough-Blenheim hotel.

Ladies' Afternoon at the Country Club.

The entertainment committee extends a cordial invitation to the convention ladies to enjoy the social afternoon at the Country Club of Atlantic City this afternoon. Automobiles will leave the Marlborough-Blenheim and Chalfonte hotels at 2 o'clock sharp.

The feature of the afternoon will be the Clock golf contest, for which two handsome loving cups have been provided as prizes and which are on exhibition at the office of the Street Railway Journal on the Steel Pier. A number of ladies have already signified their intention of entering the contest, but additional entries are desired. Putters and all the other necessary paraphernalia will be provided for the contestants, and the committee desires to state that the contest is such that the novice will have equal chance with those of experience to win one of the handsome prizes.

For those who do not care for the sports the automobile ride will prove an attraction. The route is along one of the famous New Jersey meadow roads to the grounds of the Country Club, at which one of the handsomest golf courses in the country is located. Afternoon tea will be served and about an hour and a half spent at the club, returning at 5:00 p. m. Ladies are requested to wear their official badges.

Get one of those barometers from the Duff Manufacturing Company of Pittsburg, the jack manufacturers.

The headlights in the booth of the Union Electric Company answer the purpose of a stove these sharp mornings.

That silver stick pin given out by the Ohmer Fare Register Company of Dayton, O., is a very serviceable souvenir.

E. H. Sniffen, vice-president of the Westinghouse Machine Company of Pittsburg, ran down to the convention on Tuesday to stay two days.

It has been suggested that C. S. Hawley be appointed a special agent to see that no one breaks up the supply men's Vaudeville and Theatrical Performance.

W. M. McFarland, acting vice-president of the Westinghouse Electric & Manufacturing Company, arrived at Atlantic City on Monday and will remain throughout the week.

H. F. Vogel, president of the Danville Car Company, Danville, Ill., telegraphs that it will be impossible for him to be present, which will be a disappointment to his many friends.

M. T. Rider, chief engineer of the Consolidated Railway Company, New Haven, Conn., was one of the Monday evening arrivals at the Dennis. He will remain here for the rest of the convention.

F. F. Vandewater, of the Standard Paint Company, New York, after spending a couple of days at the Convention was obliged by pressure of business in his department to return to New York.

John F. Ohmer, president of the Ohmer Fare Register Company of Dayton, O., sails Saturday next on the Lucitain and will spend some weeks in Europe combining business and pleasure.

Robert I. Todd, general manager of the Indianapolis Traction & Terminal Company, will reach here Wednesday morning. J. J. Manoney, superintendent of this company, arrived in the city Tuesday.

Col. W. Worth Bean, formerly of St. Jo, Mich., now on Millionaires' row, Benton Harbor, was at the Marlborough last evening meeting old friends. The Colonel is a charter member and has never missed a meeting.

E. E. Potter, superintendent of the Dartmouth & Westport Street Railway Company, New Bedford, Mass., arrived from the East Monday. E. S. Wilde, treasurer of the company, is also spending a few days on the Steel pier.

The photographic studio which is maintained by the Westinghouse Companies at their booth for the members of the American and Engineering associations, is being kept busy and is proving quite a feature of the convention.

E. H. Nethercutt is representing the Buda Foundry & Machine Company of Chicago. Mr. Nethercutt's first introduction to the clan was at the Atlanta Convention. Speaking of Atlanta, what a lot of pleasant memories come to mind.

The Colorado Southern & Interurban Railway Company of Colorado Springs, Colo., is represented at the convention by Dr. D. H. Rice, president; B. M. Lathrop, superintendent, and D. Harrington, roadmaster and chief lineman of the company.

The Samson Cordage Works of Boston seems to be on the list of "Les Miserables," judging by the sign in its space, which states:

"We have ten cases of goods on the way.
Lost on the Railroad.

We are looking forward to the time when
Electricity replaces steam."

The striking trade mark of the Crocker-Wheeler Company, Ampere, N.J., calls attention to its exhibit, where by photograph and description the merits of its generator are well shown. The brush holders are of excellent design and strengthen a point often very poorly provided for in generator construction.

Charles H. Biglow, formerly superintendent of motive power and machinery of the Boston Elevated Railway Company, arrived Monday evening to attend the convention. He is now associated with L. B. Stillwell, of New York, and is devoting his attention to the installation of the equipment of the new power house of the Hudson companies at Jersey City, N. J.

John J. Lane, editor of the Street Railway Bulletin, Boston, Mass., accompanied by Mrs. Lane is spending the week in the exhibit halls. Mr. Lane who has not missed a convention states that the number of delegates in attendance from the New England States is greater this year than ever before. Among the New England delegates are Paul Winsor, Boston Elevated, E. E. Potter, Dartmouth & Westport, and H. C. Page,

Springfield Street Railway. Mr. Page is president of the New England Street Railway Club and Mr. Winsor and Mr. Potter are past-presidents of the same club.

Three of the guests present at the meeting of the Accountants' association were C. F. Balch, representing the division of statistics and accounts of the interstate commerce commission; William J. Meyers, of the division of statistics and accounts of the New York public service commission, second district, and W. M. Steuart, chief statistician of the division of manufactures of the census bureau.

The Westinghouse Companies maintain headquarters at the Chalfonte Hotel. A gathering of their representatives on Tuesday morning numbered over fifty. W. M. McFarland, acting vice-president of the Westinghouse Electric & Manufacturing Company; A. L. Humphrey, general manager of The Westinghouse Air Brake Company, and Mr. E. H. Sniffin, vice-president of the Westinghouse Machine Company, spoke at the meeting.

In addition to the sub-committees appointed at the organization meeting of the entertainment committee, a committee has been appointed to have charge of the men's golf tournament which is being held during the convention week. The committee consists of L. M. Garland, chairman; C. R. Ellicott, R. F. Hayes, Charles C. Castle and Douglas Bonner. Considerable interest is being shown in the tournament and a number of qualifying scores have already been turned in.

Delegates have an unusual opportunity for the examination of probably the best example of the complete electrical equipment operating a former steam road. The West Jersey & Seashore railroad (Pennsylvania Railroad), which was electrically equipped by the General Electric Company, is available for inspection of delegates as guests of the General Electric Company. J. E. Hughes, representing the company, will receive delegates at the electric terminal, Pennsylvania railroad station, at 11 o'clock A. M., and 3 o'clock P. M. The inspection trip occupies about three hours.

E. C. Folsom, general superintendent of the Saginaw Valley Traction Company, Saginaw Mich., and of the Bay City Traction Company, Bay City, Mich., is attending the convention. Mr. Folsom previous to last February, when he accepted his present position, was general manager of the Atlantic City & Suburban Traction Company, the Walkill Transit Company, Middletown, N. Y., and the Pottstown, Reading & Reading Street Railway Company, Pottstown, Pa. Before returning to Michigan Mr. Folsom will visit old friends in and around Atlantic City.

While a party of representatives of the Westinghouse Air Brake Company and some representatives of the St. Louis Car Company were sitting quite a distance apart in the American dining room of the Marlborough-Blenheim they each suddenly discovered that all their conversation was overheard by the other party. Investigation showed that each party was just under the outer edge of the dome in this room and the voices were transmitted by this dome. Many good roasts were soon flying through this circuit and presently the Westinghouse party sent a waiter across to ask what the other party would have.

The delegation which is here to represent the Stone & Webster interests includes the heads of departments from the Boston offices and widely scattered properties as follows: Representing Stone & Webster are C. D. Wyman of Boston, W. G. Dimmock of Tacoma, J. B. Lukes of Seattle, and Charles F. Wallace of the Florida properties. The engineering department of the Stone & Webster Engineering Corporation is represented by D. P. Robinson, president and general manager, and Lee H. Parker, railway engineer. Mr. Parker has recently had in charge the preliminary engineering for the proposed Galveston-Houston electric line and the Boston-Providence line, both of which properties will undoubtedly be operated by single phase, and each of which is approximately 50 miles long.

ACCOUNTANTS' ASSOCIATION—ADDRESS OF PRESIDENT TINGLEY.

It is with great diffidence that I arise to address you at this our 11th annual convention. A wise man has said that there is nothing new under the sun, and when I look back over the list of my predecessors in office, I realize to the full the force of that saying. Yet, as your president, I have a few things to say to you, and I beg your forbearance if they are not new. The first duty of an executive in his annual communication is to give an account of his stewardship. I therefore submit a brief resume of the events of the past year.

At the Columbus convention the sale of our Standard classification of accounts to the general public was authorized, and the price suggested by the Executive committee was \$1.00 per copy. Acting upon this authority, I have instructed the secretary to sell the Standard classification at that price, and a number of copies have been so sold. The question as to whether a reduced price shall be made on these in quantities will be brought before you in the report of the Executive committee. At the close of the Columbus convention the president of the American association handed me a letter from Professor H. C. Adams, statistician of the Interstate commerce commission, asking that the American association appoint a committee to confer with him, looking to the preparation of a form of report to be used by roads electrically operated, which, under the provisions of the Hepburn Act, would come under the jurisdiction of the Interstate commerce commission. The president of the American association requested me as president of this association, to confer with Professor Adams as to the appointment of such a committee. During the course of my correspondence on the subject with Professor Adams, the scope of the question was broadened by him so that our co-operation was asked with the representatives of the association of American railway accounting officers in an effort to harmonize the standard classifications of accounts used by steam and electric railways. This correspondence resulted in the appointment of a special committee consisting of Messrs. W. F. Ham, F. E. Smith, and your president, which met in Washington, consulted with Professor Adams, and met the "Standing Committee on Disbursements" of the "Railway Accounting Officers' Association." This conference developed the subject and recognizing its importance, and also its difficulties, the committee summoned to their aid the Standard classification committee. After thoroughly going over the whole question, and a further conference between your special committee and the committee of seven of the railway accounting officers' association, your committee finding that there were fundamental differences between them and the steam men, which did not seem to be adjustable, withdrew from the conference, notifying Professor Adams of their action, with the reasons therefor, and that we would proceed at once to the preparation of a scheme of accounting and form of report to be submitted to him.

As for some time past there has been criticism from some of the Interurban roads that our standard classification did not make proper provisions for their accounting, it seemed wise to the chairman of the special committee and your president that a committee of interurban accountants be appointed to suggest to the standing committee on classification of accounts such changes and amplifications of our standard as would cover their needs. Your president accordingly appointed Messrs. W. H. Forse, Jr., A. C. Henry and A. B. Bierk such committee. The matter received careful consideration at their hands and their report was submitted to the committee on standard classification at a joint meeting of the two committees, and the results of their deliberations will be submitted to you in the report of your standing committee on classification of accounts. This is one of the most important and far reaching questions that has ever come before this association, as it not only affects those roads which come directly

under the jurisdiction of the interstate commerce commission, but also indirectly all roads, as the various states will undoubtedly be guided largely by the action of that body. As an indication of what the commission is doing in this direction I would call your attention to an article which appeared in the *Railway World* on August 9th, which says, "Under the direction of Prof. Henry Adams, the statistician of the commission, an expert of the accounting division of the commission, S. L. Lupton, has been sent out to confer with the various state railroad commissions. His purpose is to ascertain the views of state commissions in regard to harmonizing the accounting systems for the railroads required by the general government and by the states. The National Association of State Railroad Commissioners has already given this subject some attention, and has committees at work upon it. They will report at the next meeting of the association in October. Mr. Lupton is expected to be through with his investigations by that time, and to have some interesting views to present to the association. Probably the most important matter in this connection relates to the division of the revenues and the expenses of the roads by states. Professor Adams hopes to bring about an understanding between the state commissions and the interstate commerce commission on this subject, whereby the same system of computation will be used throughout. The subject is one of great moment in reference to railroad taxation. Professor Adams and his aides have already worked out what they consider is a fair and equitable method of dividing the expenses of railroads as between states. They have not as yet worked out the method of dividing the revenues. This is a more difficult matter. It is something in which the state railroad commissioners are much interested, and Mr. Lupton, among other things, is getting the ideas of the state commissions upon it. If a scientific system of dividing the receipts and expenditures of roads as between states is reached and enforced, the labor of state assessment and state taxing bodies will be made much more easy, and comparative figures as to what railroads are doing by states will be of much more value. It will also be of great assistance to the interstate commerce commission and the various State commissions to have the accounts of intrastate roads made up on the same basis as the interstate commerce commission requires of interstate roads." This of course applies primarily to the steam roads, but in the logic of events will also apply to those electrically operated. Your president therefore bespeaks your most careful attention to the report of the classification committee and is sure that you will meet this question in a broad, enlightened spirit.

Closely related to the above is the question of Interurban accounting. And, as has been stated, some of the Interurban members have expressed the feeling that their special line of accounts have not received due attention at the hands of the association, and suggested the consideration of such topics as interline billing, interline tickets, station accounts, etc. at this Convention. This suggestion was received some months after the programme had been completed, and could not be acted upon at this time and is referred to the incoming executive committee. In reply to the implied criticism, I would call the association's attention to some history, namely that at Columbus last year all of the papers were applicable to both urban and interurban companies, that at Philadelphia in 1905 two of the four papers were purely interurban, that at St. Louis in 1904, the entire programme was applicable to both, and that in 1903 and 1902 one exclusively interurban paper was present each year, so this phase of our work has not been entirely neglected.

At the Columbus convention last year we resumed the discussion of a most important question, depreciation. Some of you will remember that at the meeting in 1897, Mr. H. C. McJilton of Baltimore, read a paper on this subject, and several of your presidents have adverted to it in their annual addresses, but no consecutive work has been done on the question. Your executive committee, believing that the time was

opportune and the subject worthy of a fuller discussion has again placed it upon your programme. I have heard some questioning of the propriety of this association discussing this question on the ground that it is one of policy to be determined by the directors of the several companies and not by accountants. It is quite true that there is a question of policy here, and that it lies in the province of the board of directors to say whether or not depreciation shall be accounted for and at what rate. This association does not assume to say to any board of directors that they must account for depreciation, but they can with propriety say to the electric railway fraternity that depreciation is a fact and that it should be accounted for, and in my humble judgment this association and the individual members thereof will be derelict in their duty to their board of directors, their stockholders and the public if they evade this question. It is as much an accounting question as it has been treated as is the question of what should be charged to construction and what to maintenance. Furthermore it is a question that will not down; it demands an answer, sooner or later it will be forced upon us by governmental authority and it behooves us to be ready with our answer when the time comes. The only way a proper answer can be given is by discussion, such as was had last year at Columbus, and such as I hope we will have in this room on Thursday.

There is a new feature on our programme this year, the lunch and social afternoon. At the close of this session we will adjourn to the Hotel Marlborough-Blenheim to meet around the social board. One of the best things about our association and its conventions is the friendships it breeds. The lapse of time, the increase in membership due to the consolidation of the associations, has brought among us many new faces, and it seemed wise to the executive committee to bring all the delegates together in this manner, that we may know each other, believing that it will increase the interest in our meetings and promote freedom of discussion. There will be no speech-making, but it is hoped that the delegates will group themselves in congenial parties and over their steins and cigars, fall into a familiar discussion of the various problems of interest to each particular group. May we all have a pleasant and profitable afternoon, and may we each receive a fresh inspiration of loyalty to our association and of true friendship for each other.

As your representative your president attended the Convention of the National Electric Light Association held in Washington, June 4 to 7 last, being invited by the president of that association to discuss the report of a special committee on a standard classification of accounts for electric lighting companies. A very voluminous report was submitted, giving evidence of much hard work on the part of that committee, but the form and grouping of accounts as suggested by them diverged widely from our form of accounting, so that as your president I suggested that it would be unwise for that association to adopt such a classification for the reason that many companies, particularly among the smaller ones, were engaged in both classes of business, that it would be annoying and tend to confusion to be dealing with classifications diverse in form and grouping. The National Electric Light Association referred the report of its committee back to it for further consideration. As an outcome of this meeting there was sent out a circular letter to all members of this association, asking for information as to the number of companies that were engaged in both electric railway and lighting business, also as to what companies were engaged in business other than electric railway and lighting. Replies were received from 92 companies, 53 of whom did both railway and electric lighting; 37 did railway only; one railway and gas; seven did a heating business in addition to railway and lighting; 20 did a gas business in addition to railway and lighting; one operates a ferry; two operate water companies; two operate ice plants; two are preparing to do a lighting business and one operates railway, gas and water. From the above figures and from the interest displayed by a number of the

companies, it would seem to your president to be the part of wisdom to ask for a conference with the National Electric Light Association on this most important subject. Mr. Edwards, chairman of the National Electric Light Association's committee, is here to-day as our guest, and will be asked to speak to us on this question.

Our relations with the affiliated associations have been most cordial and as your representative on the executive committee of the American Association your president has attended all the meetings of that body and also assisted in the selection of the place of holding the convention.

The question of standardizing shop reports has not yet been settled. Your president took up the matter with the president of the Engineering association, but that body was not prepared to take up the work in time to report to this convention. I would therefore recommend that the incoming executive committee confer with the Engineering association looking to this most important question being considered during the coming year and reported on at the next convention.

Mr. C. F. Bryant, elected as second vice-president of this association at Columbus, severed his connection with the Connecticut Railway & Light Company last winter and tendered his resignation, which was accepted with regret. Mr. Frank R. Henry, auditor of the United Railways Company of St. Louis was elected his successor.

I regret that our finances are not in a more flourishing condition. We have received from the American Association during the past year the sum of \$1,250, being \$250 less than received during the previous year, although the same amount was appropriated for our work by that association. We have kept within our means but only by again intrenching upon our surplus from previous years. The details will be given you in the report of your treasurer, to which I ask your careful attention.

It is only fitting that I should express my great appreciation of the loyalty and co-operation of the executive and other committees of this association, without which little would have been accomplished during the year.

And now gentlemen, I thank you for your attention and also for the great honor which you did me in electing me to this office. The responsibilities have been great, and the demands upon my time many, but it has been a pleasure to serve you and the friendships formed have been an ample reward.

CLAIM AGENTS' ASSOCIATION, TUESDAY SESSIONS.

Meeting of the American Street & Interurban Railway Claim Agents' Association was held on Tuesday, October 15, 1907, at 10 a. m.

The morning session was occupied by the reading and discussion of the following papers: "The Policy of the Claim Department to the Injured Employee," by R. H. Schoenen, claim agent, Lehigh Valley Transit Company, Allentown, Pa.; "The Claim Agent of to-day and his work," by H. K. Bennett, claim agent, Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.; "How I Manage Bad Cases," by Harry P. Vories, claim agent, Pueblo & Suburban Traction & Lighting Company, Pueblo, Col. These papers are presented elsewhere.

Mr. Vories's paper was read by Dr. Lemon, in the absence of Mr. Vories, who was prevented by illness from attending the convention.

Mr. Russell A. Sears, claim agent of the Boston Elevated Railway Company, in behalf of the Alliance Against Accident Fraud, discussed the question of the Claim Agents' association becoming a member of the Alliance. This was referred to the executive committee.

The afternoon session of the convention took up first a paper by Ellis C. Carpenter, claim adjuster, Indiana Union Traction Company, Anderson, Ind., on "The Selecting and Training of Investigators and Adjusters for the Claim Department" (to be found elsewhere). After the paper was dis-

cussed, the Question Box was opened, and the questions read and commented upon.

The executive committee having in charge the consideration of the nomination of officers for the ensuing year, reported the following nominations:

H. R. Goshorn, general claim agent, Philadelphia Rapid Transit Company, president; A. J. Farrell, claim agent, International Railway, Buffalo, N. Y., first vice-president; W. F. Weh, claim agent, Cleveland Electric Railway Company, Cleveland, O., second vice-president; J. S. Harrison, claim agent, Jacksonville Electric Company, third vice-president; B. B. Davis, claim adjuster, Columbus Railway & Light Company, secretary and treasurer. The convention instructed the secretary to cast a unanimous ballot for the officers as nominated.

PROCEEDINGS ACCOUNTANTS' ASSOCIATION.

The eleventh regular annual meeting of the American Street and Interurban Railway Accountants' Association was called to order by President C. L. S. Tingley, at 10.20 o'clock on the morning of Tuesday, October 15. Mr. Tingley stated that it had been decided to omit the address of welcome. The minutes of the last meeting were not read, but were approved as published. As John I. Beggs had not yet arrived, Mr. Tingley then read the annual address of the president.

Mr. Beggs then addressed the meeting in part as follows:

It has always been a source of pleasure to me to meet the accountants when convened for the purpose of advancing the science of the accounting of these properties to which many of us have devoted the best years of our life. I am here today as a duty devolving upon the president of the American Association, but I consider it in a higher sense a privilege to be here as one who spent many years back of the accounting desk, and, as a preliminary to that, in instructing young men in the science of accounting. Consequently I have always taken a very deep interest, first, in the organization of the Accountants' association, and since that time, at nearly every meeting, I have trespassed upon the time of this association for a few minutes. The company that I represent has the honor of having supplied a president to your association. I speak of H. C. Mackay, who I regret was not able to meet with his old time associates here today, having transferred his allegiance, as is known, to the steam railroad business—not an advancement by any means—I think rather a retrogression; but his health would not permit him to continue in the arduous service of the street railway business, so he got something easier.

I have listened with a great deal of pleasure to most of your president's address, and am very glad to see the manner in which some of these matters have been touched upon, particularly that of depreciation; and there might be added to that the word "amortization," which is quite as important, gentlemen. I agree with your president that it is a delicate subject to take up for general discussion, particularly in the Accountants' association, because outside of the executive heads of these companies, I do not think there is any one in their organizations who is so alive to a realization of the importance of this matter of making provision for depreciation and amortization as the accountants, who are brought daily in contact with these questions, and, being thoughtful men, they must of necessity look into the future and begin to cast about for what is to be done with these properties, many of which have been created anew within the last few years, and on which the element of wear does not seem as yet to have made very great impression. Nevertheless, it is going on all the same.

On very few roads of the country, unfortunately, has any provision been made thus far for the replacement or making good of that wear when it shall have gone to such an extent that the rails must be renewed and the equipment rolling over them, as well as the overhead. It is not fair to assume that wear that is going on on the equipment from the first day that the properties. That is not right. One of the proper elements for upkeep, for the maintenance of these properties, is the wear that is going on on the equipment from the first day that it is put into operation.

Many of these roads over the country have been unloaded, and I use the word advisedly, on to unsuspecting investors, upon a showing made that a very large percentage, in some cases I have seen it put as high as 70 per cent, of the gross receipts, was saved as net earnings, over and above operation, when directly the opposite figures were the fact under a proper

system of administration and accounting, and 30 per cent in many cases was not realized when the 70 was made to appear. This is largely the work of promoters, gentlemen, who do not go into it, as some of us have who have spent our lives in studying this business, who have our fortunes in it, not running one line of business and making investments in another, but engaging in a business to which our lives have been devoted. There are many of that class in this industry.

Therefore I agree with your president that it is a matter which must be approached judicially and judiciously; yet many of these properties are struggling through sparsely settled territory—I am speaking now of the outlying suburban and interurban lines that ultimately will build up a good business. I recognize that it is not possible for those roads to adopt this method. I am simply speaking of the principle and not of the theory. It is not possible for all those roads to immediately set aside the amount that we know is necessary to make provision for the wear that will be so evident in twelve or fifteen years from now, that must be made good; but after those roads have been built up in earning capacity, then that which was not set aside in their earlier years should be set aside in greater amount in the after years. Instead of paying large dividends and driving the price of the stock and the securities up, should take hold and set aside these funds that are absolutely needed and are just as much a legitimate operating cost as is the replacement of a pair of wheels that have slid flat or broken a flange, or of an armature that has burnt out. This wear is going on just the same, gentlemen.

But, as your president suggested, these are largely questions of policy, and particularly in these times we approach it with a little more hesitation, even, than we would have twelve months ago. It is not necessary to say to you who are making the entries on our books how difficult it is today to secure the necessary capital to build the additional lines and ends of lines to give a longer ride for a nickel in order to accommodate the public. They did not take into account the capital involved in the building of every new mile of road and of every additional car put onto the line. I do not mean replacement. In these days I do not know where you can turn to any banker or banking community to obtain that capital, and that is a condition brought about by the very people who are clamoring for these additional facilities and the increased length of ride. It is because of the unreasoning, abusive clamor of the public of the localities through which these properties are operated, simply flowing down from a very illustrious example at the head of the office-holding fraternity of this country, coming down through states and through the largest cities, even to the villages. It began with one class. It cannot stop there. It is bound to go on. Therefore, I throw out this suggestion, that you approach this subject carefully, gentlemen. It is a difficult task for those charged with the larger affairs of these companies.

Mr. Beggs then told of the investigation of his books for ten years by accountants employed by the city, and continued:

They took a period of ten years in order to try to show that the company's receipts had been such during that time that we might give a lower rate of fare and still return a fair amount on what they considered the value of the property, taking in simply its replacement value today, nothing allowed for the acquisition of a streak of rust and some franchises for which originally millions of dollars were paid and for which capital had to be issued, that capital still being outstanding, and to continue outstanding until by some means of amortization we may provide out of the earnings a fund to repay the holders of those securities. That is what I mean by an amortization fund, that these companies that have limited franchises must take into account and make provision that at the end of that time those investors, their heirs and successors, the children of some of us who have put our all into these properties, shall be secured. I have had faith enough in these properties to put nearly everything I had in the world into them, because if I had not that faith I could not have acquiesced in seeing others put their money into it. Therefore, as accountants, it is highly important in these days, when some city authorities or some railroad commissions demand that your books and accounts be spread before them, going back for ten years, to see to it that these accounts are kept in such way that you will not shrink upon turning the entire mass of books, records and statements of the company into a room with a corps of expert accountants, as was done with the Milwaukee Electric Railway & Light Company. And I consider it one of the highest compliments that I have ever received in the administration of any business with which I have been connected that the report of these expert accountants, taking the books of that company for a period of ten years, no one ever dreaming that they would be subjected to such an overhauling as was given them, in one of the most voluminous reports that I have ever seen, comprising 100 and odd pages of a folio pos-

sibly 30 inches long and 14 or 15 inches in depth, and then another report of nearly 200 pages of 12 by 14 inches, filled with figures, every figure in connection with that company for the full period of ten years prefaced with a written report of 30 pages, going in and giving very astute analysis of the business—that in one of the first paragraphs of their report they commend the company for the manner in which all these books and accounts have been thrown open to them and the facilities that had been given them to obtain all the information that they desired, and in the next paragraph to commend the skill and accuracy with which those books as a whole had been kept for that entire period of ten years. That I consider one of the highest compliments that that could be conferred.

Now, I do not wish to go back forty years to the time when I was lecturing before some 500 students in the old city of Philadelphia, which we are now so near, and from which I have been so many years gone, when I was a teacher in Bryant & Stratton's Commercial College in what was then the old Temple building at Tenth and Chestnut streets, and which is brought back to my recollection when I get talking before these Accountant Associations; but I urged them, and I have urged in every business since with which I have been connected, and there are some sitting in front of me to-day that know that I laid down the fundamental principle that every accounting room should be run in such manner that if the Angel of Death appeared between sundown and sunrise and translated every one of them to a sphere where they do not run on trolley wheels, but where we are to be given wings, that a new set of accountants coming in to-morrow morning could take up those books, ask no questions, but go ahead with them. That is accounting. That is not running simple columns of figures; that is understanding the principles of debit and credit and of honest, straightforward accounting, and that is the way these companies ought to be done.

We must stand together to a certain extent. The securities of every company of this character in this country must suffer when any one of these prominent companies suffers. We stand together, and that is what I have urged in these associations for all these years that I have been so active in them. We must set an example. They go on furthermore to commend the uncommon capacity of the company, and that leads up to what? Nothing left for the stockholders to desire, or the investors; that notwithstanding good dividends had been paid for many years on a property which, as one of the gentlemen sitting here now knows, eleven years ago was bankrupt; that notwithstanding good dividends had been paid, and the property was better at the end of every year than ever before, that depreciation reserves had been built up, and they in their great wisdom as duly certified public accounts, did not think that these reserve funds were necessary, and that therefore, in their method of accounting and arriving at what we might do and what the city might demand, that these amounts created over a period of ten years, should be carried back to profit and loss in order to show that after the payment of these dividends there was a sufficient amount accumulated that might warrant a reduction in the rate of fare. This, of course, is great wisdom, gentlemen. It is fortunate they are not the court of last resort.

Let me tell you what one of those funds is. I have pursued, as some gentlemen here know, a rule of thumb in many of these things. I usually check my engineers by a rule of thumb, both in the civil and mechanical departments, likewise the accounting department. I have a rule of thumb, as they call it; see through a mass of papers and pick out the flaws. Well, that is possibly a matter of long experience and not any special ability; but the largest amount that that company has ever charged against operation and carried to what I call our "Injuries and Damage Reserve," is four per cent of our gross receipts, and that for possibly the last five or six years prior to which that charge was three per cent, so that it has run somewhere from two per cent up to as high as four per cent, which is the maximum ever charged against operation and carried to this "Injuries and Damages depreciation Reserve." Against that fund every item of expense in connection with taking care of the injuries and damages of that company is charged. All payments for injuries and damages to persons or property, all the legal expenses, all the expenses of physicians and surgeons and hospitals, claim agents, and of every kind and nature, is charged against that month by month and year by year, but in the administration of that one item of the business of the Milwaukee Electric Railway & Light Company we have accumulated and invested in high grade five per cent bonds \$350,000, the interest of which is likewise carried to that fund, and I propose to continue to increase that fund. Now they say that is not necessary, in their great wisdom. We all know, gentlemen, that if that company went into liquidation to-day it would have to be administered very judiciously indeed, and I doubt whether it could be done, that we should settle the injuries and damages which are always hanging over us, even with the best of care and ability, taking years to settle them. These cases are al-

ways pending, as we all know. They may bring a suit for \$20,000. We may defeat it entirely, or they may get \$2,000 or \$3,000 on it, but my belief is that these companies should have created month by month, and day by day, as it were, the amount necessary to enable you, if you went into liquidation to-day, to do so without calling for additional capital to take care of that liability, because that is as certainly a liability as any which is placed against a company. It must be taken care of. And that is one of the things they have attacked, and showed you simply what you may be up against.

Another item they attack—we charge one per cent on gross receipts against operation and carry it to our fire insurance reserve. We have been doing that for a considerable length of time, and are in the fortunate position to-day, and I do not believe the city will take that from us, of having in that fund \$450,000 of high grade five per cent bonds. Against that fund we charge every dollar of insurance premiums paid, and if we have any small losses that are not covered, and no insurance policy ever covers them all, we charge it all against that, and simply have permitted over a period of ten years these accretions. The very fact of that fund today, gentlemen, probably saves us 50 per cent. on our fire insurance premiums, because we are not beggars before the old line fire insurance companies today. I have finally got myself into a position where, if need be, we can carry our own insurance to the extent of \$450,000, which will cover any possible loss we can have, and with our properties spread over a city of a great many miles in area, we can afford to do it, and ultimately that is what we will do, that is what we will do, that is what we have been preparing for. Yet these expert accountants say that that fund is unnecessary, and so with various funds. But this is a character of accounting, gentlemen, which you may be called upon to defend some of these days.

Now, they have attacked our depreciation reserve. That fund I have not deemed it necessary or advisable to invest, because that is a fund we are spending month by month and year by year. There has been a time when on the books of the Milwaukee Electric Light & Railway Company that account was on the wrong side, when we had spent more than had been carried to it, after keeping up our property. And this is a question of policy with many companies, whether they shall do it as we do, or whether it shall be done in some other way. Some managements have deemed that it was more accurate to carefully value every branch of the company's property and carry a certain percentage. I have chosen to apply what I call my rule of thumb and to take a certain percentage of our gross receipts every month for what we call repair renewal of property, which has been for several years past 10 per cent., it began eleven years ago at about 15 per cent., because then we began charging a fixed amount. The property was in a condition of collapse, a great many portions of it, and when we got down to where we were charging \$180,000 a year, it was about 15 per cent. of our gross receipts. When the earnings were about \$1,800,000, I began charging 10 per cent. and carrying it to depreciation reserve fund month by month.

When we had to scrap or sell for junk a lot of old cars, antique or obsolete, and replace them with modern equipment, notwithstanding that modern equipment is sometimes twice the capacity of the old,—the old cost more,—we charge that to depreciation reserve.

When we relay any section of our tracks throughout the city that has already been laid once,—when I went there I think we had something like 76 miles of 56-pound Johnson girder rail on chairs, and that has nearly all been replaced since that time, a great deal of it with 7-inch 97-pound T-rail, we charge that against depreciation reserve.

Consequently that fund is a changing one built up during the winter season and running down during the summer season when we are doing our construction work. We consolidated five or six miles of car lines, a great deal of it after I went there. I took up the old strap rail and used it for guard rails, and replaced it with the other, but it had cost more in the original capitalization and construction, and that is one of the ways in which we avoid the water, and that is what I call rule of thumb. It is not getting scientifically down and charging 2½ per cent on something, and 7 8/9 per cent on something else. It is a rule of thumb, as I say, and it has worked out very closely. These accountants I think figure out that while we have been charging 10 per cent. they think eight per cent is enough. Well, I think if we had had sufficient earnings I would have liked to charge off 12 or 15 per cent.

Now, there is a fund we have not started yet at all, and that is the amortization fund, provision for these securities that are out. The time comes with these companies that have limited franchises when that must be taken care of. You know how much consideration you would receive from a city to-day when a franchise has expired. I think some of the gentlemen before me here are up against that proposition,

that their franchises are about expiring. They receive practically no consideration whatever at the hands of the municipality. They do not consider that there is a mutual obligation there, one of honor at least, if not in law, that ought to be recognized.

I trust that you, gentlemen, will pardon this reference to one property but I only take it as one of a type, and one with which I am familiar. I know that is going on in other cities. One of the other companies which we only came into the administration of some two and half years ago we are administering by putting into effect the same general principles. It is more than a policy; it is a principle of administration and I think it is high time that it was receiving attention. Now, as your president has well said, you gentlemen of the accounting department are powerless in most cases to dictate the policy that shall be pursued but you can make yourselves felt by constantly bringing to the attention of the executive heads of these companies these statements showing month by month the analysis of these accounts in a quiet, unobtrusive way. Of course the bankers see these properties from an entirely different point of view than we do. They go in for a quick turn. They want big dividends which enable them to turn the securities over quickly and get out; then they are ready for something else. But we who are administering these properties have to stay with them. With us it is a matter of principle, our reputations are at stake. Some of us who have given the best years of our lives to building up these properties in an earnest desire to have proper methods of administration and of financing and accounting followed, are very deeply concerned in these questions. Therefore, it is a matter of pride and of honor, and you can do much in your quiet way, not necessarily here in convention but in your accounting offices, when you take your statement month by month before the executive heads who possibly appear before the bankers or board of directors in these various companies that they may have these facts before them, that they may not in the years to come say that this never was presented to them in this way. There is a great deal in the way figures are read. It is an old and trite saying that figures will not lie but that they can be so arranged in juxtaposition as to be very misleading. It is not every one who has the faculty of taking a mass of figures and analyzing the points in them, and that is one of the things that you gentlemen, as trained accountants, can do, and when I use the word "accountant" I use it in the broad general sense.

They are not able today to do what your accountants know ought to be done, but there ought to be a start. I took out a statement from my pocket and I said here were some smaller properties, we could not begin a depreciation reserve fund with those. I took one up in central Wisconsin, for instance, around the Fox River Valley and that district in which I am a very large owner with others, took a lot of old properties, and we have a gas company in connection with that, as well as electric light and street railway. I said this company for several years did not have any surplus, no net earnings, we had to get these properties rehabilitated practically out of themselves, we could not afford to set aside any depreciation reserve fund up until 1907.

In the year 1906 that property showed earnings on the entire capital stock that was out against it of between 6 and 7 per cent, after keeping it up well. We had never paid any dividend. Then, at the beginning of this year we charged against operation 5 per cent of our gross receipts, and we will increase that amount annually to the extent of one per cent at a time until it gets up to at least 10 per cent. That will make the property show somewhat less net earnings during the year 1907 than it did during the year 1906, but it will not be very much, gentlemen, because of the growth of the business. Then I believe that for the next five years we will about keep on the steady keel of practically 6 per cent on the stock, but each year setting aside a larger amount to the depreciation reserve fund, so that when a part of that track that was all new some eight or nine years ago begins to wear out, we will have some funds against which to charge that renewal and replacement, and that is the policy which I believe in pursuing with these companies. I have done that with a number of small companies, did it with our own big traction company outside of the city of Milwaukee. We were not able for several years to set aside any reserve fund for that property, because to have done so would have shown a deficit year by year. Now then, as soon as that company began to make money, before it began to pay dividends, we began creating this depreciation reserve fund, four years ago. This year I think we are charging 9 per cent of our gross receipts to depreciation. Next year it will be up to the 10 per cent. Then it will be up to my standard.

I am a believer in charging a percentage of your gross receipts. Therefore, on an interurban line, for instance, when your summer receipts are two and three times what they are

in the winter season, you are getting two or three times the amount carried to the creation of that fund, when the earnings can stand it, that you get in the winter time, when most of these interurban properties are earning less, and when you are charging a much smaller amount against depreciation, so that you have a much more uniform method of comparison month by month than you would have on a fixed percentage, which on some of these smaller properties would make the deficit seem very large indeed. It is not necessary to say to those running interurban lines here that their net earnings are made in about four or five months of the year, that from about the first of January up to June many of these interurban properties running through sparsely settled territory lose money. Then is the time when you want to ease up as much as you can on the charges to them. That is only general, however, but I mention it because of the points touched upon in your president's very able address here, that it is necessary to bring these two lines of accounting together. We in our properties have done it because we have had the interurban properties all the time, and we have amalgamated our accounts. That is one of the reasons that vary somewhat from the standard system of accounts of the Accountants' association. We likewise have injected into ours the gas business as well as the electric lighting, and that has added a much more difficult problem than either of the other two. We have three or four companies in which we own the gas, the electric light and the railways, all running as one amalgamated property, and we have been working many months trying to get up a consolidated sheet that will show the earnings from all of these earnings and properly apportion the general expenses and capitalization to the various branches of it. I am very glad indeed to know that the Accountants' association is going to lend its experience, its skill, and its great industry to bringing about a standard system of accounts in these matters; will be very glad to see how far we have gone from the point where we should have stopped in trying to bring these accounts together. Now, Mr. President, I desire to convey to you, and through you to the members of the association an expression of appreciation from the American association for the degree of loyalty we have had from this and each of the other affiliated associations. I desire to bear testimony that your president has been at every meeting of the executive committee that has been called. Wherever it has met, he has been there, ably representing the Accountants' association, loyally standing by the American association, which, in its first years of our greatly increased expense it is a somewhat complex problem to keep it going in harmony with all these and to make this matter of finances hold out. As you all know, the expenses of the American association have been very greatly increased indeed, and I think the results abundantly justify the expenditure. It has been located in commodious, well-appointed offices, it has at its head a man able, loyal, industrious, as its secretary and treasurer, who is gathering together a great amount of data that is of inestimable value, not only now but for the future; and therefore it is highly gratifying to be able to say after two years that so much has been accomplished, because there were some misgivings when at Philadelphia, two years ago, this constitution was under discussion, as to how the affiliated associations would amalgamate with the American association. It has worked out much better than even the most sanguine of us could hope to bring about, and it is largely due, gentlemen, to the loyalty, to the earnest conscientious work of the executive committee, which is composed of the presidents of these affiliated associations, along with the officers of the American association.

I beg your pardon for having taken so much of your time, and I thank you for your earnest attention. I hope that the officers that you may be blessed with in the future may be as loyal, and that your president may have as loyal time, and I thank you for your earnest attention. I hope a body of men to meet before him as meets here to-day.

The Secretary then read the annual report of the Executive committee; also of the secretary and treasurer, which showed a total membership of 246 and a gain of 46 since the last convention; total receipts for the year, \$1785.30; disbursements, \$1446.43, and a balance of \$338.67.

C. F. Balch, special examiner of railway accounts for the Interstate commerce commission, briefly addressed the association, and was followed by W. J. Myer, representing the second district of the New York state commission; also by H. M. Edwards, representing the National Electric Light Association.

Frank J. Pryor, Jr., comptroller, American Railways Company, read a paper on "Part Accounting" (presented else-

where), which was discussed by Messrs. C. M. Duffy, C. S. Rogers, A. L. Linn, Jr., W. F. Ham, Frank Dabney, C. L. White and Frank P. Henry, of St. Louis.

W. M. Stewart, of the Division of Statistics and Accounts of the Bureau of Manufactures of the Department of Commerce and Labor, then addressed the convention and was granted the opportunity of presenting at a later session some questions which he desired to discuss in relation to the approaching census.

On motion of F. E. Smith, the president was authorized to appoint a committee pursuant to the suggestion made by H. M. Edwards, to meet with the committee of the National Electric Light Association and of the gas institute to agree upon a standard form of reports applicable to all the interests concerned.

On motion of A. L. Linn, Jr., a similar authorization was made in respect to the committee suggested by Mr. Myer, to act with the New York State commission, that committee to be comprised of members of the Standard Classification committee, at a conference to be held at Albany on Tuesday next, the committee being given power to act. The president appointed the following Committees:

On nominations: W. B. Brockway, D. Dana Bartlett, R. D. Sims, S. C. Rogers, H. C. Walters.

On resolutions: P. S. Young, Frank Dabney, A. H. Kayser, P. J. Balagner, W. G. McDole.

An adjournment was then taken to reconvene at 2 P. M. in the Chevy Chase Room of the Hotel Marlborough for luncheon.

"RAILS AND JOINTS."*

Your sub-committee (the sub-committee comprises Julian Griggs, Scioto Valley Traction Company; Charles H. Clark, International Traction Company; E. O. Ackerman, Columbus Railway & Light Company), as a result of its study, recommends as best practice and as a standard for city construction in paved streets the use of the 7-inch T-rail, known as the Lorain section No. 95-400 and the Pennsylvania Steel Company section No. 272.

This rail is seven inches high with a 6-inch base, head three inches wide, $1\frac{3}{8}$ inches deep with web $17/32$ -inch thick and weighs 95 pounds per yard.

In cities where the use of the T-rail is not approved, your sub-committee recommends four half Trilby 9-inch and 7-inch sections, of which the weights and principal dimensions are as follows:

(1) One hundred and thirty-seven pounds per yard, nine inches high, $6\frac{1}{2}$ -inch base, $9/16$ -inch web; 3-inch head, $1\frac{13}{64}$ inches deep, with a top slope of $1\frac{1}{2}$ degrees, beveled outside edge $\frac{3}{4}$ -inch horizontal by $5/16$ -inch vertical, having a groove of $1\frac{1}{4}$ inches deep by $1\frac{3}{4}$ inches wide, with lip $\frac{3}{4}$ -inch wide, $\frac{1}{2}$ -inch below head and $\frac{7}{8}$ -inch maximum thickness; total top width of head and lip, $5\frac{1}{2}$ inches.

(2) One hundred and twenty-two pounds per yards, sheet 10, nine inches high, 6-inch base, $\frac{1}{2}$ -inch web; $2\frac{3}{4}$ -inch head, $1\frac{3}{32}$ inches deep with top slope of $1\frac{1}{2}$ degrees and beveled outside edge $\frac{1}{2}$ -inch wide, maximum thickness of lip about $\frac{3}{4}$ -inch, with the other dimensions the same as for No. 1.

(3) One hundred and twenty-two pounds per yard, 7-inch rail, 6-inch base, $\frac{1}{2}$ -inch web, with the other dimensions the same as for No. 1.

(4) Ninety-eight pounds per yard, 7-inch rail, $5\frac{1}{2}$ -inch base, $7/16$ -inch web, with the other dimensions as for No. 2.

Sections of proposed tram rails nine inches and seven inches in height, with beveled heads to correspond with the half Trilby sections described, have been designed as follows: 9-inch rail, 137 pounds per yard; 9-inch rail, 1203 pounds per yard; 7-inch rail, 122 pounds per yard; 7-inch rail, 96.4 pounds per yard.

Sections of grooved guard rails for special work have also been designed nine inches and seven inches high with beveled heads, and with grooves $1\frac{3}{8}$ inches high and $1\frac{1}{2}$ inches wide, as follows: 9-inch rail, 155 pounds per yard; 9-inch rail, 138.6 pounds per yard; 7-inch rail, 140 pounds per yard; 7-inch rail, 114.7 pounds per yard. In each pattern of guard rail the lip is $\frac{3}{4}$ -inch above the head.

Four patterns of splice bars would be required for the 16 rail sections proposed, which might be 6 or 12 hole to meet the

views of the user, although best practice would doubtless altogether avoid the use of bolted splices in paved streets.

No recommendation concerning splices is now made by your sub-committee.

Diagrams showing the relation of the proposed rail heads to wheels with flanges of 1-inch, $\frac{7}{8}$ -inch and $\frac{3}{4}$ -inch depth and treads of $3\frac{1}{2}$ -inch, 3-inch, and $2\frac{1}{2}$ -inch width.

The rail sections as proposed were designed in cooperation with J. M. Larned of the "Standardization" committee, who also, by request, kindly prepared the drawings for the illustrations.

In an appendix to the report the sub-committee analyzed the replies received to circular No. 12 of September, 1906, sent out by B. V. Swenson, secretary of the American association. Of 1500 street and interurban railways in the country 81 made replies which were classified as follows:

Urban, 36 companies, 13,184 cars, 3,775 miles of track.

Urban and interurban, 42 companies, 8,958 cars in service, 5,628 miles of track.

Interurban, 3 companies, 68 cars in service, 134 miles of track.

While the replies seldom covered all the questions asked they showed great variety of rail sections, including all that have ever appeared in any rail makers catalogue, with a sprinkling of European sections.

Statistics of the Pennsylvania and Lorain Steel Companies for the years 1903, '04, '05 and '06, show the proportion of different sections other than standard T sections rolled as follows:

Rail.	Pennsylvania Steel Co.	Lorain Steel Co.
High T.....	22.4	23.2
Full groove.....	.9	.8
Half groove.....	8.5	22.9
Trilby	21.2	25.2
Plain tram.....	31.6	17.4
Guard	9.1	10.5
Girder for steam roads.....	6.3	
	100.0	100.0

Twenty-nine companies reported T-rails prohibited in municipalities; 36 reported T-rails permitted in municipalities and 16 did not answer the question. The T-rail is generally prohibited in large cities of the east, in Texas and in the middle west, except in Indianapolis. The T-rail is permitted in cities of the south and west and the smaller cities of New England, where macadam streets are commonly used.

T-rails are suggested for standard by 32 companies, while 9 companies suggest grooved or tram rails.

On August 13, 1907, the sub-committee sent a circular letter, with 13 blue prints illustrating proposed rail standards, to 81 companies having 100 miles or more of track in cities of 100,000 population and upward, and to 40 city engineers of such cities, requesting criticism and suggests.

Of the 15 companies which replied, four use only T-rails; three say the standards proposed are satisfactory; one objects to a base less than $6\frac{1}{2}$ inches for lighter sections; one is using narrow tread wheels which leave a ridge on the outside of wide rail heads; one prefers 9-16 inch as a minimum thickness of web for rails seven inches high and over, to prevent corrugation; one uses rails similar to the tram section recommended by the committee; two merely acknowledged the circular. Of 12 city engineers who replied two object to bevel heads; one (Philadelphia, where the bevel head is most extensively used) reports it as satisfactory and a great improvement over old-fashioned trams; three prefer the Trilby section; five make no comment and one is satisfied with the standards proposed.

In a continuation of the appendix the sub-committee cites data regarding the practice of 22 companies which made replies to inquiries concerning chemical specifications for rails. The sub-committee, however, states that it has given but little attention to the question of rail manufacture and makes no recommendations at this time. The sub-committee also incorporates in its report the standard specifications of the New York, New Haven & Hartford Railroad Company for 1905. The New York New Haven & Hartford specifications are not included in our abstract of the report for the reason that this subject is now under consideration by a committee of the American Railway Association which is expected to submit its final report on October 30, and this report will doubtless represent the consensus of opinion of steam railway engineers.—Eds.

*Abstract of report of sub-committee on "Rail Matters," presented to the American Street and Interurban Railway Association at Atlantic City, N. J., October 15, 1907.

AMUSEMENT PARK ACCOUNTS.*

BY FRANK J. PRYOR, JR., COMPTROLLER, THE AMERICAN RAILWAYS COMPANY, PHILADELPHIA, PA.

The signal progress in the development of summer amusement parks within the past few years requires that attention should be directed toward the codifying of the construction, equipment and operating accounts.

The picnic grounds, depending upon the natural scenic beauties and the single attraction of the horse or man-power merry-go-round, easily within memory, have given way to the combination of an improved, picturesque landscape, dotted with attractive buildings, and the addition of amusement features to meet the constant and increasing demand of the public. The development is in the direction of an extensive scale which involves considerable outlay of capital. The amusement park is a recognized feeder to the street railway system. Properly conducted and keen to popular requirements, the park business is gradually turning, in its ultimate results, to a profitable investment.

The active season covers a period of about fifteen weeks, wherein is tested the foresight of the management, which in the other portion of the year has been engaged in providing future entertainments for park patrons and which, until the test, are more or less of a problematical venture. The expenses of the up-keep of the property during the closed season are none the less worthy of careful consideration, so that in the combination of the two classes of expenditures, analysis is of prime importance in determining quickly the profitable or unprofitable termination and the guarding of a rigorous and prudent economy.

The valuable report is the one which exhibits in requisite detail the records of the financial operation and such can be easily made applicable to park accounts.

After all, the operation of any property is based upon comparative results, and with an acceptable classification of the operating expenses, the accounting task is somewhat simplified.

It was the practice in our company to apply the total expenses in each year to an account entitled "Park Expense," and offset by the income arising from the rent of privileges, admission fees and other miscellaneous receipts. The expenses and income from the theatre were placed to the account "Theatre." As the requirements demanded, the various items of expenses in the two accounts were analyzed and the cost of operating each amusement or attraction was ascertained. The effort was extravagant in time and labor. To keep abreast of the patronage, the expenses grew in each successive year and the necessity for the further sub-divisions of the general accounts was recognized.

As a possible aid to those interested in the subject, the scheme of classification now followed is submitted. (The classifications are printed in another part of this issue.)

The aim in devising the titles was simplicity, and touches upon the essential features only. In classifying disbursements, the title "Park Expense" is noted, and then follows the significant numeral of the sub-account. Upon the general ledger the one account ("Park Expense") is active and the integral items are transferred to an auxiliary distribution book, and from this the monthly report is compiled.

A liberal and judicious issuance of job orders has enabled us to ascertain the cost of all construction and the extraordinary maintenance accounts. When any construction work is authorized, the order number is entered on the ledger, and the recurring charges entered until the completion of the job, then the cost is transferred to the proper construction account.

It has been suggested that it is not within the chartered rights of a street railway company to operate an amusement park. In a number of states a park company obtains its privileges to conduct business under a legislative concession, and if not incorporated, the title to the property cannot be held in the name of the railway company because of the restriction that such real estate is not used in the operation of the road; therefore the net expenses of the park are not properly an operating expense of the railway company, but should be treated as a deduction from income.

An academic discussion will produce arguments for and against the application of parks to "Advertising and Attractions" as provided for in the classification of electric railway accounts, but the fact must be admitted that the intention in the establishment of such parks is for the purpose of inviting traffic. The railway company is benefited to the extent of the increased earnings, and the excluding of a part of the expense which influences its income is destroying the relationship between the gross earnings and the operating

expenses. The expenses in question should not be considered an obligatory payment in the sense of a fixed charge.

The exorbitant and almost prohibitive premium for fire insurance, and in some cases the inability to place the risk, in part due to the situation of the park beyond the city water service; the character and transitory use of the buildings, their exposure to the elements, and loss of popularity from year to year in the amusement features, should be an adequate argument in the setting aside of a depreciation or accrued renewal fund. Such a fund should be maintained by periodical payments, and as the accumulation reaches a sufficient amount it should be converted into interest-bearing securities, so that in the event of a necessity, the company possesses current funds available for replacement.

CLASSIFICATION OF ACCOUNTS FOR AMUSEMENT PARKS.*

Construction and Equipment Accounts.

Account No. 1, Organization.—Includes all expenses in connection with the organization of the company.

Account No. 2, Engineering and Superintendence.—Includes all expenditures for service of engineers and their attendants while engaged upon preliminary work and upon permanent improvements, and the expenses incident to such work.

Account No. 3, Real Estate.—Includes the full consideration for the purchase of real estate and all expenses in connection therewith, such as cost of conveyancing, recorder's fees, commissions, etc.

Account No. 4, Buildings and Grounds.—Includes full cost of all buildings, and the interior electric wiring therein, fences, dams, bridges, culverts, walks, driveways, water and sewer systems, and the original grading of the grounds.

Account No. 5, Landscape Gardening.—Includes the first cost of additional trees, shrubbery and plants, the labor of planting, and the preparation of the lawns.

Account No. 6, Furniture and Fixtures.—Includes total cost of all furniture and fixtures placed in the buildings and of revenue-producing articles, such as boats, bathing suits, moving picture machines, etc.

Account No. 7, Park Furnishings.—Includes cost of benches, swings, waste cans and all other articles from which no revenue is obtained.

Account No. 8, Park Equipment and Tools.—Includes cost of horses, harness, carts, gardening and farming implements and tools of all kinds necessary for the up-keep of the property.

Account No. 9, Electric Plant.—Includes cost of electrical apparatus and materials for the control, registration, transmission and use of current; overhead lines, conduits and electrical devices of every sort, interior wiring of buildings excepted.

Account No. 10, Interest and Discounts.—Includes the payment of interest during the period of construction; the discount or premiums arising from the sale of securities for construction.

Account No. 11, Miscellaneous.—Includes cost of all other expenditures not especially provided for.

Operating Expense Accounts.

Account No. 12, Maintenance of Buildings and Grounds.—Includes expenditures for labor and materials necessary for the repairs and renewals of all buildings, fences, bridges, dams, culverts, walks, driveways, water and sewer systems. (Note.—The cost of materials includes freight and cartage.)

Account No. 13, Maintenance of Landscape Gardening.—Includes cost of preparing the grounds, the setting out and care of or the renewal of, all plants, shrubbery, trees and lawns. The cost of seed, fertilizers, etc., should be charged to this account.

Account No. 14, Maintenance of Furniture and Fixtures.—Includes cost of labor and materials for the repair and renewals of furniture and fixtures in all buildings and of revenue-producing articles, such as boats, bathing suits, etc.

Account No. 15, Maintenance of Park Furnishings.—Includes cost of labor and materials for the repair and renewal of non-revenue producing park furniture, located upon park grounds, such as benches, swings, waste cans, flagpoles, flags, bunting, etc., fire buckets and extinguishers.

*Presented before the American Street and Interurban Railway Accountants' Association, Atlantic City, N. J., October 15, 1907, with address of Frank J. Pryor, Jr., of Philadelphia.

* Presented before the American Street and Interurban Railway Accountants' Association, Atlantic City, N. J., October 15, 1907.

Account No. 16, Maintenance of Park Equipment and Tools.—Includes cost of labor and materials for the repairs and renewals of gardener's tools, hand tools of all kinds, carts, harness, gardening and farming implements.

Account No. 17, Maintenance of Electric Plant.—Includes cost of labor, materials and tools necessary for the repairs and renewals of all electric apparatus, including pole lines and other appurtenances. This account to be charged with all expenses of operation and distribution of the power and light circuits.

Account No. 18, Purchased Power.—This account should be charged with all expenditures for power purchased from the manufacturing plant. This account to be credited with all current sold by the Park Company.

Account No. 19, Policing and Cleaning of Grounds.—This account should be charged with the wages of watchmen, janitors and laborers in the care of the buildings, and the removal of refuse and waste paper from the grounds and paths; also the cost of policing the park.

Account No. 20, Band Concerts.—Includes all payment for the services and the expenses of bands engaged for concerts. Receipts from the sale of seats should be credited to this account.

Account No. 21, Special Attractions.—Includes payments for extraordinary free attractions, such as balloon ascensions, aerial acts, displays of fireworks.

Account No. 22, Wages of Miscellaneous Amusement Employees.—Includes wages of attendants, other than cashiers, engaged in the operation of amusements, such as the carousels, toboggans, scenic railways, etc. In reporting such disbursements the name of the amusement is to follow the classification of the account.

Account No. 23, Miscellaneous Amusement Expenses.—Includes cost of all materials which enter into the operation of all amusements controlled by the company. In reporting these expenses the name of amusement is to follow the classification of the account.

Account No. 24, Park Expense.—Includes expenditures of park operation not otherwise provided for.

Account No. 25.—Theatre Expense.—Expenditures with the general classifications noted are to be reported with the following sub-divisions: (a) Wages of theatre employees. To include wages paid stage hands, ushers, ticket-sellers and doortenders. (b) Wages of musicians. To include salaries paid to the orchestra. (c) Wages of performers. (d) Tickets, programs and music.

Account No. 26, Restaurant.—Expenditures with the general classification noted are to be reported with the following sub-divisions: (a) Wages of employees. To include wages of chef, kitchen help, waiters, etc. (b) Provisions. To include cost of meats, vegetables, provisions, general stores, etc. (c) Supplies. To include cost of cigars, liquors, soft drinks, etc. (d) Music. To include salaries paid to musicians and rental paid musical instruments. (e) Other expenses. To include all other expenses not otherwise provided for.

Account No. 27, Salaries of Manager and Clerks.—Includes salaries paid to the park manager, clerks and cashiers at various amusements which are operated by the company.

Account No. 28, General Office Expense.—To include the cost of office supplies, blank forms, public telephone service, telegrams, newspapers, subscriptions and other miscellaneous administration expenses not provided for.

Account No. 29, Stable Expenses.—Includes the cost of feed, horse-shoeing and care of horses.

Account No. 30, Advertising and Attractions.—To include the salary and expenses of the advertising agent, the cost of dodgers, posters, all printing and advertising matter in connection with park affairs; also the cost of posting and distributing; donations and prizes for the purpose of attracting the general public, lodges, societies, etc. to the use of the park.

Account No. 31, Damages.—To include all payments made in settlement of damage claims, also all expenditures in connection therewith.

Account No. 32, Rent of Lands and Buildings.—To include rentals paid for all park buildings and grounds.

Account No. 33, Insurance.—Includes payments of premiums for fire and casualty insurance.

Income Accounts.

Separate accounts to be opened for each revenue-pro-

ducing building or amusement operated by the company, and credit the gross receipts from the same.

Rentals of Privileges.

Credit the account with all income from concessions.

DISCUSSION ON CONTROL APPARATUS.

Following the presentation of his paper on "Recent Improvements in Control Apparatus for Railway Equipment," (Electric Railway Review, October 15, 1907, page 497) before the Engineering association on Monday F. E. Case added that the K-35 and K-28 controllers were on exhibit, at the space of the General Electric Company. In reply to inquiries he stated that the K-35 weight was about 10 per cent more than the K-28 but was of capacity for four 60-horsepower motors at a 600-volt rating and might be used for 750-volt current, while the K-28 is limited to four 40-horsepower motors at a 500-volt rating.

E. W. Olds (Milwaukee Electric Railway & Light Company) highly commended the design of the K-35 controllers and said the greater weight and the increased space required were unimportant if the fireworks on the front platform could be prevented.

J. W. Corning (Boston Elevated) described some instances of bad setting of resistance connections which that company had found. As an example cars with two G.E.-58 motors and K-10 controller there was peak of 325 amperes when the controller handle was on the last series step, accelerating on a 5 per cent up-grade; there was much trouble from flashing of motors, blowing of fuses and short circuits in the controllers. By readjustment of the resistances the peak was reduced to 185 or 190 amperes and the troubles named were avoided. The company had gone over all of its equipment and worked up standard connections for all motors designed to give the same average current per motor for series and parallel positions. Mr. Corning said that he would be glad to send a blueprint showing the connection to members who were interested in it.

William Roberts (Northern Ohio Traction & Light Company) said he believed the secret of successful operation and maintenance of equipment lay in thorough inspection, both night and day inspection. With the controllers mentioned he believed better results would be had. But we would be working hand in hand with the manufacturers who are now striving so strenuously to perfect their apparatus, if we would give more care to our inspection, and if the superintendents of motive power and the master mechanics would go out to the shops at two or three o'clock in the morning, unexpectedly, and look over the work being done, there would be better operation of equipment.

At the request of the chair N. W. Storer made a brief statement in regard to the development in controllers in the last year by the Westinghouse company, saying it had been carried on in the same line as was shown last year. The electro-pneumatic type of multiple unit control was used, with the same contactors for both alternating current and direct current, the only difference between the contactors being in the blow-out, which is modified slightly for the alternating current. The greatest advantage was found in the heavy pressures they could get on the contactors by the use of compressed air. A considerable number of equipments for the smaller size motors, quadrupled 40 and 60 horse-power motors, had been installed in the last year, with very good results. His company believed in the multiple unit equipment for not only heavy work, but for street car service as well, and expected to see it put in operation in city streets more and more. Mr. Storer believed that train control in cities would do more to increase the capacity of the line than any other one thing. Operating a 3-car train in a city street would give a great deal more capacity than where single cars are operated. The three cars would occupy the street very little longer than a single car, and the delays at crossings would be practically one-third what they are with one car.

ENGINEERING ASSOCIATION—TUESDAY MORNING'S SESSION.

President Adams called the meeting to order at 10 o'clock and announced that the first business was the report of the committee on "Way Matters."

The report of this committee is covered by various papers and reports enumerated on the programme. F. G. Simmons, chairman of the committee, said that the "Way Matters" committee had been assigned by the executive committee two papers for presentation before the convention. One was on the care of urban and interurban roadbed and track, which had been prepared by Mr. George L. Wilson, engineer of the Twin City Rapid Transit Company, of Minneapolis, and will be presented by him. The other paper, on "Rails and Joints as affected by traffic in New York City," through the inability of the sub-committee to have it ready for this meeting, is not presented. The Way Committee had been instructed to send out a circular letter and investigate the matter of rail corrugations. The committee was also requested to investigate any progress which has been made in concrete tie work, and a circular letter on this subject was sent out, but the information secured was no meagre that practically nothing of value has been received. The committee also appointed a sub-committee on "Rail" which was to act in connection with the "Standardization" committee, and a report of progress, with some definite recommendations would be read.

The paper on "Care of Electric Railway Tracks," by Mr. George L. Wilson, engineer of the Twin City Rapid Transit Company, was then presented.

John Ackerman said that the maintenance bills for a long time after the work is put down depended very largely on the original construction. Too many companies had gone through the streets and suburbs and leveled off the ground, whatever it may be, clay, sand, or what not, and put down their construction, and, where the cities require it, put a little foundation under the pavement and laid the pavement and track. The result was low joints, low tracks, the pavement freezes up and the tracks go down. This was likewise true with the suburban tracks, and he had been somewhat startled, in keeping accounts with regard to suburban track, to find that one line which had run into the country about 13 miles requires greater maintenance than did the average city tracks, in paved streets, including the paving; this referred to labor and not to material. He considered the matter of keeping clean the right of way very important. He thought one point not touched upon was important—the use of some sort of preservative on the timber. The personnel of the track force needed attention. Most companies were getting the worst labor in America, and were dependent upon foreign labor largely.

The paper had brought out the matter of maintaining city work very nicely. He thought, however, that there might be still further discussion on the matter of pavement repairs.

There was a large percentage of our maintenance bills caused by the repair of pavements, and this was quite frequently caused by defective foundations as well as the wearing of the surface. Those who used bolted joints had a great deal of trouble in the care of railway tracks. The joints required considerable labor to keep them in repair. He had practiced the plan of replacing the old, worn and out of date joints with a modern style of joint wherever the street is disturbed, but in that manner it takes a long time to entirely re-equip the line with modern joints, but I believe it is policy to do so. He had one line where the joints were in bad shape, and a few years ago was electrically welded and he had found that to be a great advantage in holding old work together.

Mr. C. H. Clark:—We had used two derrick cars, and two big derricks in the yard, stone crushers and labor saving devices. The derrick car took the whole switch out and threw the new one in. With the derricks in the yard they used a hoist grab bucket and the stone was unloaded for about a cent a ton. By hand that could not be done for less than probably 7 or 8 cents. Mr. Kirwin, of Detroit, cut the weeds along the right of way by dragging 25 or 40-foot chains behind a car over his right of way. He sent the car around over the different suburban lines.

F. G. Simmons believed in amplifying even the use of machinery by preparing, through the office and engineering forces, written specifications, blue prints, covering every item of work, and that those be prepared in sufficient number so that every one could be supplied with them.

The whole question again came back to doing the work well, doing it uniformly, and understanding the specifications. He hoped the association would go into the matter of standard specifications very thoroughly; because that was the key to perfection in all lines of work and it was at the present time more particularly applicable to the way department, because those departments had been run in a more haphazard fashion than the other departments of the companies. He found, or had found, a few years ago that a foreman on one class of work was doing his work one way, and the foreman in another direction was doing his work in a very different manner. The result was different lines of work on the same system, the drainage ditches at the side of the right of way were 2 feet from the fence line in one case and 4 feet in another. If standard specifications as to how the ditches should be dug were prepared and sent out to the men results would be uniform. If the specification is prepared by the office force, or in connection with the different roadmasters, his plan was to take the engineers in the office and assemble the ideas of all of them, bring it up to the head of the department for a final passing, and after his suggestion had been gone into the specification was prepared.

The Milwaukee railway encouraged the feeling of interest in the work, which Mr. Wilson suggested, by offering to the section foremen annual or semi-annual prizes for the best showing, and it was found to have a very good effect among the section foremen. The section foremen competed with one another as to the general appearance of their lines, and the general manager participated in the inspection which decides the prizes.

A. M. Schreiber had had occasion to recently investigate the advisability of using water, oil or tar on a particular property. It was found that the cost of water, using ordinary sprinkling tanks, was about half a cent per running foot of single track per season, and for oil was three or four cents per running foot per season. Water gas was quite a fluid material and ran readily, especially when it is distributed in the sunlight, and lent quite an asphaltic finish to a macadam paving, increasing the durability to a considerable extent. Its cost was somewhat less than the oil. He had noticed on several roads a book of rules for maintenance of track that was distributed to the foremen and sub-foremen, and everybody from the roadmasters down. Detroit had such a code of rules. He believed it would be an interesting subject for a special committee to get out such a code of rules.

(Mr. F. G. Simmons in the chair).

A. L. Whipple, chairman of the entertainment committee, announced that tickets would be distributed today from 11 o'clock until 1 for Mary Mannering at the Savoy Theatre and the "Top of the World" at Young's Pier Theatre. The tickets will be distributed from one of the box offices at the end of the steel pier.

President Adams announced that the official photograph would be taken at 12 o'clock Wednesday.

W. Boardman Reed described the handling of snow at a certain rate per inch of snowfall, a plan suggested by Major Woodbury proposed paying for snow removal by inch of fall. This plan had made a big improvement, not only in the running of cars, but they got the streets cleaned so as to be able to get up to the full earnings in a very short time.

M. T. Ryder (Consolidated Railway Company) asked how far ditches deep enough so they are at least below the bottoms of the ties could be replaced by laying tiled drains between the tracks, if it was double track, or alongside with single track. There were a good many kinds of soil which make very poor ballast if left alone; but which make very decent ballast if the water could be taken out rapidly. And sometimes the question was complicated, in eastern cities, by the fact that the sewers were on a separate system; so that it is not permissible to connect these drains directly into the sewers. Where that was done, it was usual to get a connection point every few hundred feet and use the small sizes of ordinary tile drains and by so doing avoid the very expensive ballast which would be necessary to dig out below the ties. He wished an expression of opinion from those who had had experience as to what the position of those drains should be. In double track work he was generally laying them so that the top of the tile was about 6 inches below the bottom of the ties. A certain amount of good ballast material was brought in to lay around the tile in the ditch. In single track work he had generally laid drains alongside the track rather than under the track, with the idea that it would be easier to replace them and look after them; but of course this did not give quite as

good drainage because the water had twice as far to go to the pipe. In some cities where the conditions were the worst, the company had laid concrete foundation and tiling under the track, and the three or four inches of gravel ballast, and the ordinary cross tie and rail construction on top of that. That was in ground which was practically brick clay and extraordinary precautions had to be taken.

E. O. Ackerman, (Columbus Railway & Light Company), said he had sometimes placed the tile two feet below the base of the rail in the space between the two tracks, and then filled over the tile with broken stone, so as to admit the water. He thinks there should be some provision made to take the water away from the track, wherever the cities have objected seriously to putting the water into the sewer, and they always did object to its going into the sewer except through the catch basins, those drains are led to the catch basins and go into the sewer through that basin, the same as the storm water from the street goes into the sewer.

M. J. French, (Oneida Railway Company), said one of his companies under its franchise in renewing a piece of double track was required to place the rail on a level with the curb on the side of the street, and in that way put the ties five inches below the curb and the matter of drainage was going to be very serious one. It was planned to put a line of sewer between the tracks for the whole length of the strip and maintain drainage ditches on the side to take the water, and about every 200 or 300 feet, place small catch basins. Mr. Ackerman asked as to methods for obtaining and keeping accurately the cost of doing work where it was necessary to deal with ignorant foremen who could scarcely write their own names. He also inquired as to cost data. He had found that there can be a great amount of money saved if the old material, especially the old paving blocks and the old concrete, were put to use in the new construction. His experience with the concrete was that it cost from 40 to 45 cents per cubic yard to break up the old concrete. The paving blocks cost 60 cents per yard and he had found he could save money by redressing them for 55 cents per square yard and although the block was lighter, it gave good service for repaving on streets where there was not very much traffic.

G. L. Wilson closed the discussion, referring to the points raised by the different speakers. As to preserving ties, his road had made some practical tests of the creosoting process. He found that this is very good, but too expensive, costing from 40 to 60 cents per tie, depending on the amount of oil used. As to wages ultimately it was necessary to put the men on the same basis that the near-by contractors and cities do. By welding old rail he had been able to secure a very much longer lived rail and the paving had been kept in repair without any expense, and generally the rails had been satisfactory. His company believed in the T-rail, and we also believed that if delegations were brought to the Twin Cities, good missionary work could be done.

The report of the "Way Matters" committee on "Rail Corrugations" was next presented by F. W. Simmons, chairman. The report as read appears elsewhere in this issue and its discussion will be presented in a later issue.

The report of the sub-committee on "Rail and Rail Matters," was next presented by Charles Clark, International Railway of Buffalo. This report is presented in abstract elsewhere in this issue. Mr. Clark stated the desire of the committee to amend its report to make it read as follows:

Your sub-committee on Rails and Joints, as a result of its study, recommends as the best practice, and as standard for city construction in paved streets, the use of a 7-inch T-rail known as the Lorain section No. 95-400 and the Pennsylvania Steel Company's Section, No. 272.

Mr. Simmons said that this was simply a report of progress. The proposed change which Mr. Clark read had the approval of the Way committee.

The chair announced as the Committee on Nominations, C. H. Clark, Buffalo, chairman; George L. Wilson, Minneapolis; Charles Hewitt, Philadelphia; George J. Smith, Kansas City; W. D. Wright, Providence, R. I. (Adjourned until 2 P. M.)

Afternoon Session.

Mr. W. H. Evans, chairman, next presented a synopsis of the report of the Standardization committee, which will be found elsewhere in this issue.

N. W. Storer, Westinghouse Electric & Manufacturing Company, said his company was concerned with two points. These were the distance allowed between the wheel hubs; and the length of the gear fit. The report was satisfactory, although not exactly in accordance with his recommendations. It gave the best compromise for all concerned. It was determined by the committee that the gear face should be in a standard position on the different axles in order that motors of different manufacture could be placed on any axle; the motors would be interchangeable as far as gears and axles are concerned. That was the most important decision arrived

at in connection with the subject. He would like to see the gear flush on the motor side of the gear, and have the 1½ inches overhang on the wheel side. That gear would then be the standard which is in use on a great many Westinghouse motors.

Mr. W. H. Evans thought that since the representatives of both the Westinghouse and the General Electric Companies had been at previous meetings, and did not give their unified support to the proposed changes by Mr. Storer, it was thought well to carry this over until after the convention, and in the meantime possibly harmonize any difference between the two designing engineers.

E. W. Olds, Milwaukee, gave the report of the Committee on Axles his hearty support.

M. Ayers, Boston & Worcester, did not feel that for high-speed work keyways ought to be used.

John Dickey (Baldwin Locomotive Works) said in regard to the two form of gears, that it was absolutely necessary to have the enlarged gear seat. A manganese gear rim with a cast iron centre, if forced over the wheel seat, would not hold the pressure at all. The only gear that could be forced over and hold, was a cast steel gear and even then the pressing was not quite safe. The enlarged gear seat was absolutely necessary for that reason. It relieved your gear of all expansion due to pressing it over the wheel seat.

C. S. Sergeant said that standards could not be adopted in practice until a long time after they had been adopted in theory. But it seemed to him that unless one has standards to work toward, that he would never arrive anywhere, and almost every department of electrical railway work had suffered for years from a lack of standards. He hoped that the report might result in approximating something that would become standards in regard to all work.

E. G. Connette noticed that axles EA and EB provided for a length of hub of 7½ inches, they were the smallest sized axles—while the two large sized axles provided for a hub 6½ inches in length.

Mr. Evans said that it had been rather an accepted standard that the length of the wheel-fit should not be less than the diameter, but the wheel makers assured us that there was absolutely no question but what a wheel could be fitted to the larger diameter axles and be absolutely safe. He had the same assurance from the cast wheel makers for the smaller axles. The opinion of the committee was that for the present at least, the steel wheels would be used on the larger diameters. The majority of the committee thought that the keyway was not necessary but advisable, since a great many roads were using the keyways. Therefore it gave the dimensions which were, we consider, the very best practice. The axle recommended was not an experiment.

E. D. Priest, General Electric Company, thought it should be definitely decided whether the gear manufacturer or the axle manufacturer should provide for the fit.

Mr. Dickey said it was the usual practice for the axle to be turned of the size for the wheel or gear which is to be pressed on to be bored a certain proportion smaller.

W. S. Adams, J. G. Brill Company, thought the gear manufacturers should allow it, because they knew what kind of metal they were making their gears of, they knew whether it will expand easily, and if so, they could allow a greater variation.

In discussing wheel treads and flanges Mr. Evans had put into service 3-inch treads and ¾-inch flanges, where it was previously thought almost impossible to operate a wheel tread as wide as 3-inch, and if the conditions were such as to permit of a flange ¾-inch deep, he would not advise the use of 2½-inch tread. There had been a prevailing tendency to use a much narrower tread than that the increased weight of the cars in city service required. It was, however, very difficult to estimate the damage that that special work did to the equipment, including broken axles and broken motors, wrecked frames and everything else in connection with the equipment. That was the reason the committee favored the employment of a wider tread wheel. It had been worked out by the representatives of the special work that 3½ would avoid the necessity for the use of floors in the special work.

Where it was possible, and steam road conditions prevailed, the committee rather took it for granted that the regular Master Car Builders' section would be employed, and we did not consider that it was necessary to have intermediate sections between what was recommended and the Master Car Builders' standard.

A motion was carried unanimously that the report be accepted, adopted and recommended, that the American Street and Interurban Railway Association might approve it.

Martin Schrieber, Public Service Corporation of New Jersey, next presented the report of committee on "Open versus Closed Terminals for Car Storage." This will be found elsewhere. After a brief discussion the meeting adjourned to convene at 2 p. m. to-day.

CARE OF ELECTRIC RAILWAY TRACK.*

BY GEORGE L. WILSON, ENGINEER, TWIN CITY RAPID TRANSIT COMPANY.

Interurban Track.

The conditions of the interurban roads located, as all such roads should be, on a private right-of-way, approach closely those of steam roads. Many of the methods used in steam road practice as the result of years of experience are required for electric roads.

Grading, ballasting, construction of bridges, culverts and crossings, care of roadbed and track follow the same lines. The standard works of reference on these subjects apply with slight modifications to the care of electric roads and should be diligently studied by those in charge of permanent way.

The maintenance of the earlier and cheaply built electric roads has demonstrated that it is economy to have electric roads built with well ballasted track; ties and rails put in as perfect condition in regard to surface and alignment as possible. Then the object in view is to preserve them in the same condition.

Following the purpose of keeping the track in perfect condition, which includes drainage, care of switches, crossings and side-tracks, we come to the care of the right-of-way, cleaning from snow in winter, maintaining fences, public crossings and the making of the company's property attractive to the passengers.

It should be remembered that the principal business of electric roads at present, and probably for a long time, is the transportation of passengers, whose comfort and interest are constantly to be kept in mind.

Attractive Roadway.

The removal of rubbish, weeds and unsightly objects of all kinds, including advertising signs, from the vicinity of the tracks is a proper part of the care of the roadway.

Company property should be neatly arranged when stored and the land owned by the company along the line and at stopping places ornamented with grassy slopes, vines and shrubbery.

At terminal or waiting points there should be flower-beds and grass plots, instead of ragged grounds and piles of debris. Otherwise, waste grounds can be so improved that there is something of interest to attract the passenger's attention at every point.

This is looking some distance ahead for new lines, but it is practical to do a little, month by month, and year by year, until the right-of-way becomes a boulevard or parkway.

All passenger transportation lines find it desirable to make their routes as attractive as possible. A sloping hillside cut, may, by the proper planting of shrubs, be made beautiful with their flowers in summer and gorgeous with the autumnal foliage. A rocky bank is not of itself attractive, but partly covered with vines it becomes an interesting feature.

Steam suburban roads have done considerable along this line and the lot of the commuter has been cast in pleasant places thereby. The great trunk lines of the country are working to the same end. Through the Eastern states many of the roads pay a great deal of attention to the making of their station grounds attractive. The annual circular of a transcontinental line offering cash prizes to its station agents for the best station flower-gardens lies before the writer and is attractively illustrated and directed to "Our Fellow Workers Among the Flowers."

The aim of every electric road must be to have its patrons attracted and interested along the way that the route may seem both short and pleasant and the trip one to be repeated.

Employees.

With the care of interurban track, it is proper to consider the men as well as the roadway. The growth of railroads, both steam and electric, has required more men than are to be found in the track crews. It is a fact that track labor has been recruited from the lowest paid classes with the result that ambitious workmen have largely gone into other lines.

Our first railways and public works generally were built by the sturdy Irish immigrant who rose soon to more remunerative employment. In succession we have had Scandinavian, Italian, Austrian and Polish. To-day the mass of employees have no apparent interest in, or regard for, the quality or amount of work they perform. In many cases the foremen and officials can only communicate with them through interpreters, and there is an absolute lack of loyalty to the interest of the employers. This must be changed if the best results are to be obtained.

It is not necessary that a track crew should be skilled mechanics, but if track, switches, frogs and all appliances are to be in the best working order, men of a fair amount of ability and some mechanical skill are required.

To obtain this end the conditions must be such that an intelligent laborer can make a decent living and have a steady income. Work should be planned so as to be distributed through the year as far as possible in order that there may be constant employment for a nucleus of good men.

Let the men from bottom to top have an interest in the results of their work and in the efficiency of the section or division where they are employed. Make them feel that it is their company and that they are a part of the whole machine. The question of keeping skilled laborers who will do good track work is at the bottom of the maintenance of track and the most difficult problem.

All interurban track should be patrolled daily, at least, and this brings us to the track-walker and his duties. This position is above that of laborer and next to that of foreman. A skilled trackman who is sober and industrious and who can be depended upon to see that splices and bolts are in adjustment, drains and culverts open, who will detect any spreading track or broken rails, see that farm gates are kept closed and stock off the track, in fact, be a general inspector and caretaker, is an important person. It is in a great measure to his fidelity that the safety of cars and passengers will be due.

City Tracks.

On city tracks the care of the roadway, besides the keeping of rails, switches and curves in good order, includes more or less of cleaning, sprinkling and snow removal. In order to determine the practice of different companies and for a guide for future operation, inquiries on these subjects were sent to 50 leading companies. From their reports, the following notes have been prepared:

Street Cleaning.

In the matter of cleaning the space occupied by tracks on paved streets, the general practice is that the municipality bears the entire expense, as the theory is that the cars do not bring dirt onto the street and the cleaning of the entire paved roadway would have to be done and the expense borne by the city if there were no tracks.

The fact of the tracks being in the street does not entail additional expense on the city. This view has been upheld in the courts, and it appears that refuse and things left on the streets by pedestrians, teams and by storekeepers, who often dispose of litter by throwing or sweeping it into the roadway, should be taken care of by the city authorities. Inquiries on this subject were made of 50 companies in all parts of the country, and of 46 replying and operating 8,469 miles of track with a tributary population of 13,241,000, it appears that 41 operating 6,706 miles of track, pay no part of the street cleaning expense.

In a few cities the railways bear a part of the street cleaning expense, this being done either voluntarily or by charter requirement. In these cases, it should be considered as a contribution or a part of the amounts paid by way of taxation.

The following are among the prominent companies which assist the cities in this matter:

Chicago Union Traction Co. }	Cost \$123.60 per mile for clean-
Chicago City Railway Co. }	ing and sprinkling in 1906.
South Chicago City Railway Co.	

Columbus:

On 79 miles of single track within city limits partly on unpaved streets, cost for cleaning and sprinkling was \$13,000 in 1906. Cost per mile of single track, \$164.55.

Pittsburg:

Company pays for proportional part of street occupied by tracks.

New Orleans:

Pays for sweeping one street only.

New York City:

Pays for sweeping Broadway only, from Bowling Green to 15th street.

Twin City Rapid Transit Company:

Pays for sweeping its track allowance in St. Paul and Minneapolis. 86.12 miles of single track in 1906 cost \$23,475.55. Cost per mile, \$272.56.

As street sprinkling is found to be carried on satisfactorily by sprinkling cars, it is believed that the cleaning of the track allowance can be done economically and satisfactorily with sweeping machinery which will take up the debris, place it in a receptacle and take it away to proper dumping grounds. This is an important subject for the companies which pay for cleaning their track allowance.

* Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 15, 1907.

Street Sprinkling.

In the large majority of towns the street sprinkling is taken care of by the municipal authorities without reference to the street railways, no part of the expense being paid by the companies. Returns from 24 companies, operating 4,768 miles and having a tributary population of 10,156,000 show this condition:

Companies operating 3,356 miles sprinkle tracks only with tank cars; of these the practice is so mixed that it is difficult to know how much mileage is sprinkled. In general it appears that the more important streets are the only ones sprinkled. This is done under requirement of state law or city ordinances. The cities are required to furnish water without charge, though in some places the company is obliged to pay for the water; in one case, 6 cents per mile of track.

The business of sprinkling the whole of the roadway from tank cars has been developed to quite an extent; one outside company owning cars makes contracts with cities for sprinkling the roadways and has 250 miles of streets covered. The railway companies operate the cars for a price per car-mile. The authorities of the cities report that the service is very satisfactory. The railway officials report that this plan gives good results, and while the returns are small, the conditions on the whole, are satisfactory.

A number of cities pay the railway companies directly for this same kind of service. Prices received by the company for this work vary from 7 cents to 17 cents per car-mile, 10 cents being about an average. The cost to the property owners per season is about 10 cents per foot of street or 5 cents per front foot.

The tank cars used are of a variety of types, from the plain rectangular box to the cylindrical sheet iron tanks, operated either directly by gravity, or as pneumatic sprinklers, having the tank under air pressure. The capacity is from 2,500 to 6,000 gallons.

Four thousand gallons will sprinkle some six miles of tracks or three miles of entire roadway. Any statements of this kind are rather indefinite depending upon so many conditions. A better idea of the work done is to say that in actual practice one car making four trips per day will care for eight miles of street.

While the returns for the service are small, the indirect benefits are of as much or more value. The freedom from dust, not only decreases the expense of repairs to car machinery and gives a better contact between rail and wheel, but also, by more comfortable conditions for passengers, increases the pleasure of riding and other traffic so much that managers consider the expense more than met by increased revenue.

Oil Sprinkling.

The use of oil for laying dust on some streets and for the roadbeds of railways has been extensively advocated. It has been tried by a number of roads. Some consider its use satisfactory, but the greater number have not put it into extensive use. The heavy asphalt oils of California appear to give the best results, while in the Central and Eastern states a so-called "Roadbed" oil prepared by the Standard Oil Company has been used more or less experimentally for ten or twelve years.

Among the steam roads that have used oil are: The Boston & Maine, Boston & Albany, Central Railroad of New Jersey, Long Island Railroad, Delaware & Hudson, Santa Fe, Chicago, Burlington & Quincy, Oregon Short Line, Chicago & Alton and the Southern Pacific; the latter the most extensively, having used it for five or six years on about nine hundred miles of road.

In practice the roadbed is sprinkled with about 2,000 gallons per mile for the first application. After the first dressing, the quantity may be lessened to 600 or 1,000 gallons per mile annually, though some parties claim that two applications annually are needed. The sprinkling appliances used and the process are claimed to be controlled by a Chicago firm, which charges a royalty of \$10 per mile for its use for the first application; no charge being made for subsequent sprinklings.

Few electric roads have used oil. The Los Angeles-Pacific reports its use on unpaved city streets and states that three coats per year are desirable. At 60 cents per barrel, the cost per mile of double track is \$100. San Francisco reports its successful use on macadam streets outside the city limits. The Brooklyn Rapid Transit Company is experimenting with 20 miles of track on its suburban lines on private right-of-way where the pleasure riding is very heavy and the roadbed of sandy material.

From the reports of roads using oil, it appears that managers of the steam roads, at least, do not consider its use profitable and there is no general movement to adopt it. On electric

roads on private right-of-way or on macadam outside of built-up sections of cities, it may prove to be economical where the oil is obtained at a low price, especially on sandy roads leading to pleasure resorts. The accompanying memoranda in regard to the practice and cost may be of interest.

Boston & Maine Railroad.—Has used oil in 1899. Covered about 400 single-track miles. Uses 2,000 to 3,000 gallons per mile. Price of oil, 2.75c per gallon. Average cost, \$100 per mile.

Boston & Albany Railroad.—Made experiments for three years, 1898-1900. Used 2,000 gallons per mile first year, 600 gallons second year, 1,000 gallons third year. Oil per gallon, 3.75c. Cost per mile of track, \$80.

Central Railroad of New Jersey.—Will use oil on Sea Shore Line for dusty season. Use apparatus constructed at its own shops. Pay a royalty for the process.

Long Island Railroad.—Use oil on crossings. Cost, \$125 per mile. Use 600-gallon tank cars. Oil costs, 2.4c. per gallon; 600 gallons used per mile. Results on cinder and gravel ballast satisfactory.

Delaware & Hudson Railroad Co.—From 1896 to 1900 oiled road from Saratoga to Plattsburg, 188 miles. Used roadbed oil prepared by the Standard Oil Company. Price, 2.75c. to 4.75c. per gallon. For 2,000 gallons per mile cost was \$100. Kept dust down, but its use has been given up; 1,000 gallons per mile every other year would be sufficient.

Oregon Short Line.—Reports using a little oil on a branch line which kept down dust till track was ballasted.

Brooklyn Rapid Transit Co.—Reports that some track on private right-of-way has been sprinkled for two years. Will sprinkle twenty miles in 1907. Results satisfactory.

Chicago & Alton Railroad Co.—Use crude oil at 3c. per gallon for sprinkling road crossings only. Stone ballast on rest of road and does not need it.

Southern Pacific Railroad Co.—Has used oil for five or six years; 900 miles of track oiled. May use up to 4,000 gallons per mile. Pays \$10 per mile royalty.

United Railways of San Francisco.—Uses oil on macadam streets, but not inside city limits.

Los Angeles-Pacific Co.—In Los Angeles on unpaved streets an occasional coat of oil is applied. Generally, oiled streets are sprinkled three times per year. Cost \$100 per mile of double track.

Snow Removal.

The universal practice with reference to snow is to keep the tracks open for service by the use of plows and sweepers during and immediately after each snow fall. The snow thus deposited on the rest of the roadway is left, so far as it can be done, without impeding travel. At crossings and congested points in business districts all companies assist in removing snow as promptly as possible by the use of cars and teams.

When it is necessary to remove snow from roadway the companies generally pay the cities one-third or one-half the expense incurred on the whole street. In some cases the cities and railway companies divide the streets, the railways taking care of a sufficient number of them to make up the same area as their total track allowance. One company takes one side of the streets and changes sides annually. This is reported as working well in a city of 60,000 people.

In many cities no separate account of this expense is kept, and owing to the fact that conditions vary so widely between southern and northern locations, no satisfactory comparison of costs is practical.

Figures given show results of: \$17.41 per mile of single track in a city of 175,000 with 140 miles of track in the Central States (Indianapolis) for an average winter. In Chicago, 1906-7, the cost was \$41.13 per mile of single track for the Chicago City Railway Co., while in Milwaukee, 85 miles away, but a very small expense was incurred. Another lake city, Detroit, reports \$35 per mile for an average winter. Duluth gives \$45.45 for an average winter. Toronto reports on 98 miles of single track, in 1904-5, a cost of \$102.04 per mile for one-third of street area. In Montreal where the company pays one-half the cost the average per mile of city streets is given as \$2,618.46.

Providence, R. I., reports a cost of \$148 per mile of single track in 1906 and 1907. Here all snow over four inches in depth is removed.

It is convenient to remember that if the charge taken in by a gas engine be compressed to one-sixth its original volume, that is, if the compression ratio be 6, the compression pressure will be ten times the pressure of the charge before compression. Thus, if the suction pressure be $13\frac{1}{2}$ pounds absolute, and the compression ratio be 6, the compression pressure will be about 135 pounds absolute. This compression pressure is very often used in engines for operation on producer gas.—Power.

QUESTION BOX OF THE CLAIM AGENTS' ASSOCIATION.

Expert Medical Testimony.

1. Is medical expert testimony beneficial in litigation? If so, why? If not, why?

The opinions on this subject were contradictory. While expert testimony may be considered as of slight benefit to the company it is sometimes necessary because specialists are presented as witnesses by claimants. Where the physician who treated the claimant is of doubtful reputation, and an unjust claim has been presented it was felt that the testimony of a specialist of high standing would reveal the situation to fair-minded jurors. The best experts procurable will sometimes present convincing evidence that ailments were not caused by the accident as claimed. It was recognized that expert testimony is so expensive that it adds materially to the cost of conducting a case. Such testimony may be especially beneficial when the expert is appointed by the court as the witness is then presumed to be without bias or prejudice. If of little use before a jury expert testimony may be of advantage when a case is taken on appeal before higher courts; the testimony, although technical and beyond the understanding of many jurors, becomes part of the evidence reviewed by the higher courts.

Private Detectives.

2. Is it advisable to employ so-called private detectives in the investigation of certain classes of accidents?

It was pointed out that when false injuries are alleged and operations have taken place after an accident, detectives who are placed in hospitals can frequently secure evidence which could not easily be obtained in any other way. There was some doubt expressed as to whether any report of a private detective would be as reliable and dependable in injury and damage cases as that of trained detectives or claim department employees of the company. The answers differed materially, but the majority favored the use of private detectives at times.

Publicity Concerning Accidents.

3. What should be the attitude of the company with respect to furnishing the press with particulars concerning accidents?

The majority of opinions seemed to favor furnishing facts if requested. If reporters for daily papers secure some information from the outside and are unable to obtain verification or correction they will frequently draw on their imagination for other details to the detriment of the company. An objection is that publication may suggest to other people a plan of campaign against the company. The information which concerns the public can be given without divulging details which relate to the person injured and the company, and points that are not of special value as part of the news but which safeguard the defense of the company will often be passed over by friendly reporters.

Inducements to Reduce Accidents.

4. Is it advisable to offer inducements, whether in the shape of rewards or otherwise, to conductors and motormen, with a view to reducing both the number and severity of accidents? Give reasons.

The general opinion was opposed to the offering of inducements. It was stated, that a system of this character is that it might keep some employees from reporting accidents. Of course, it is part of the duty of trainmen to avoid accidents, and merit systems were suggested as tending to increase the interest of the men in all their work. Special inducements regarding accidents would not affect the factor of negligence of the public.

Promoting Trainmen to Claim Department.

5. What has been your experience in selecting assistants for the claim department from among the conductors and motormen on the company's cars?

The practice of selecting trainmen was favored by the majority of those who answered. Some of the most useful adjusters and investigators have been selected from trainmen of one company. The men are taken on trial for thirty or sixty days. Their runs are held open and if they fail to develop and fill the new positions acceptably they are returned to cars. Even a brief experience in the claim department makes them better conductors or motormen. Promotions from the ranks encourage other employees. It was felt by some who answered that the practice would create jealousy on the part of men who were not chosen for advancement.

Standardization of Equipment.

6. Does standardization of equipment tend to a reduction in accidents? Give reasons.

In times of danger motormen act mechanically and if equipments are exactly alike they will probably take the action they should. Passengers become familiar with steps, platforms, etc., and are likely to know what to do.

Employees Claims.

7. Is it advisable to stand upon the test of negligence in judging the claims of company employees?

The policy was cited of a number of companies which allow wages and medical expenses to employees who are injured while in the service.

Protection at Grade Railroad Crossings.

8. What precaution has your company adopted for the protection of its cars on grade railroad crossings?

The answers differ for city and interurban companies. In some of the cities track elevation has, with a few exceptions, eliminated grade crossings. In other cities flagmen are used or the directions of the ordinances are followed. Derailing switches, gates and the practice of making a full stop and sending the conductor ahead were mentioned. A cluster of 20 incandescent lights on 30-foot poles is placed by one road on each side of a steam railroad crossing and cars are required to stop within 100 feet of the crossing.

Attorneys As Claim Agents.

9. To secure the best results, should a street railway company place an attorney-at-law at the head of the claim department?

The majority of the answers were in the negative. It was advised that a claim agent keep in close touch with the law department at all times and that he should have some general knowledge of law and be posted concerning current legal decisions affecting claims. The reply of the Montreal Street Railway was as follows: "We do not consider it advisable. Our system is different from that of most railways, inasmuch as the claims are passed upon by a 'Claims' committee, which is composed of the manager, secretary, superintendent and chief medical officer, with the claim agent as secretary. We find that very good results are obtained, in addition to which the executive officials of the company come in touch with one of the most important departments."

Passengers on Front Platforms.

10. From the standpoint of safety of operation, should passengers be allowed to occupy the front platforms of closed cars?

The answers were almost unanimously against allowing passengers to occupy front platforms of closed cars. The danger of interference of motormen in the performance of their duties, particularly in case of an accident where obstruction may be fatal, was mentioned by a number of companies.

Reimbursing for Time of Making Reports.

11. What are your views of the advisability of reimbursing car men for a reasonable amount of time devoted to the making out of accident reports? Would such a course assist in the elimination of the unreported accident, as well as result in an improvement in the essential features of the accident report?

Most of the answers favored reimbursing the men but stress was laid upon the danger of abuse. One of those who responded said that in the majority of cases it is not the time required to make a report, but the fear of discipline, that prevents the employees from reporting accidents.

Superintendent Who Conceals Accidents.

12. How shall we deal with the problem presented by the superintendent who deliberately conceals reports of mishaps upon his division, in order that he may improve his record as a company official?

The opinion was substantially unanimous that any superintendent with this character would be immediately succeeded by another man when the facts were presented to the general officers of the company. One writer had known superintendents who have been so severe in their discipline after accidents that the men were terrorized, the expenses per car mile were increased, and the service injured because motormen feared to approach a team on the track and drivers took advantage of them and deliberately crossed in front of the cars.

Women Assistants.

13. Is it practicable to employ female assistants as investigators and adjusters in claim and accident work?

The employment of women at times was favored by the majority. As investigators they can sometimes secure evidence which it would be difficult for men to obtain.

THE POLICY OF THE CLAIM DEPARTMENT TO THE INJURED EMPLOYEE.*

BY R. H. SCHOENEN, CLAIM AGENT, LEHIGH VALLEY TRANSIT COMPANY.

The laborer, the employe of a street railway if you please, is his own worst enemy. He is the victim of conditions which are, speaking collectively, of his own making. To him is measured out a stated amount of the wealth of the land in exchange for the commodity which he has for sale, his services. He naturally seeks to obtain the highest price. The employer, the capitalist, is the custodian of the accumulated wealth of the land. He, too, seeks to obtain the best bargain he can, and, alas! too often is guilty of gross malfeasance in his trust. Human nature is aspiring. We would not be human if we did not aspire to higher walks of life socially, and depraved indeed is the man who does not aspire to higher ethical ideals. The employe has his aspirations. He seeks to draw more largely upon the accumulated wealth of the land and so often he is led to resort to methods which, if not downright dishonest, are, to say the least, disreputable.

Capital and Labor.

The employer, capital generally, is representative of the highest culture, intelligence and refinement, and means to be and is, usually, honest and fair in dealing with the employe. Now it is no serious indictment against the employe to intimate that the employer is fairer in his dealings with the employe than the employe is with the employer. Reverse the condition of education, culture and training and you doubtless would reverse the positions as to fair dealing. The nearer we approach common ground, which means the employe must be lifted up by education and training toward the level of the employer, the less liability is there that friction will exist, the stronger will be the confidence the one in the other.

Confidence means content, lack of confidence means discontent, and all the resultant evils bred in the minds of the ordinarily discontented employe.

The Injured Employee.

The management of the street railway, as represented by the chiefs of the various departments, should always be such as to inspire confidence. The claim department, probably, of all departments finds it more difficult to inspire confidence and especially when dealing with the injured employe. The policy dare not be too liberal, else the result will be to detract rather than to inspire confidence, and in the end lead to gross imposition upon the company. Let the employe once feel that his remuneration for injury will equal or exceed his regular wages and his indisposition is likely to be extended indefinitely with oftentimes positive injury to himself and a demoralizing effect upon his fellow employes. This does not necessarily mean an effort to defraud the company. Nothing is more real than imaginary injury. On the other hand, it has a very wholesome effect to be brought at times face to face with the hard necessities of life and what at first seems a hardship is afterward looked upon as a gracious act. Cases may be cited where injured employes have been allowed to work along at their regular work when able and when not able paid regular wages upon doctors' certificates, that were really sick, delusional, for months and even years. Yet, when patience was exhausted and it seemed better to risk a possible lawsuit than to continue indefinitely a condition so demoralizing, it was found that the injured employe was soon able to perform his work regularly without any lost time and in a satisfactory manner. It was simply throwing him upon his own resources as to the future and his mental activities started in another direction. This condition may be brought about by the advice and harangue of a friend or relatives, or perchance the injured employe has been sought out by one of those "ambulance chasing lawyers" and is the victim of his intrigues.

Many employes carry accident insurance or belong to beneficial societies or at times both. An injury in itself slight may return them much more than their regular wages, if able to collect benefits from these societies and settle with the claim department for their injuries. It often takes the combined efforts of the claim department of the company and these societies to prevent fraud being practiced. It is well to ascertain to what beneficial societies your injured employe belongs, if any, and see what benefits he may be drawing from them.

Again, too harsh treatment of the injured employe is likely to engender a malicious feeling which tends to destroy confidence in the company and its management generally. This in the end lends energy, especially where you are dealing with organized labor, to certain socialistic ideas which seem to be sweeping like a great wave over the country, until we hear of laws and court decisions from all quarters, always in favor of the employe as against the employer. It would seem that to employ a man to work for you would be to enter into an insurance contract with him in case of his injury by accident no matter where the liability lay, or how much property loss the employe may have caused by his carelessness.

Pennsylvania at the last session of its legislature passed a very liberal law looking at it from the employe's standpoint. It has yet to come before the courts for its proper interpretation before we can judge of its true significance. President Roosevelt, if properly reported, in his Georgia Day speech at Jamestown placed himself far to the front on this line.

Dealing with the Employee.

It is essential first of all before dealing with the injured employe to determine the liability, who was primarily responsible for the accident. If the injured employe has contributed by carelessness or otherwise to the accident this fact should be given consideration in settling and all evidence tending in that direction should be well established, and clearly and explicitly stated. The injured employe should be given to understand, and very clearly, that what he is likely to term an illiberal settlement is illiberal only to the extent that he has himself contributed to the cause of injury. If the injured employe is free from fault and the injury is not the result of the carelessness of some fellow employe, the settlement should be most generous, even to full remuneration for the injury sustained. Where a fellow employe has contributed to, or is wholly to blame for the accident, the treatment should not be so liberal. Probably half remuneration for injury sustained would be liberal enough, unless the fellow employe is one to whom is delegated a certain amount of authority over him, and it was in obedience to this authority exercised, that the injury was sustained. Then, in that event, the injured employe should be given the same consideration as the employer who is wholly faultless. It is very hard at times, and often almost impossible, to determine whether the employe has contributed to his injury. In such cases the employe's record should be examined and if it proves to be good, he should have the benefit of the doubt. If, on the other hand, his record is poor or shows him to have been habitually reckless or careless, though not sufficiently so as to cause his dismissal, the company is entitled to the benefit of the doubt and settlement should be made accordingly.

You can readily see, and no doubt have experienced, the difficulty in establishing an inflexible rule for this class of settlements. One rule, however, should be strictly adhered to; no injured employe should be allowed to return to his regular work until he has given the claim department a release in full. To assist needy employes it often happens they can be given something they can do that will help them along until such time as they will be able to take their regular work, but before they take their regular work they should sign a release. A release thus given eliminates them from the pensioner's pay-roll and places them again on their merits. It is often necessary to assist needy injured employes by advancing them or their families certain amounts on account. These advances should only be made to prevent actual want and should be well within the settling limit.

The Rhyme of the Trolley.

Open cars.
Cheap cigars.

—*Boston Globe.*

End seat hog.
Sits like log.

—*Cleveland Plain Dealer.*

Woman fat.
Jams you flat.

—*Boston Journal.*

Women frown.
As men sit down.

—*Pittsfield Journal.*

Rubberneck.
Right on deck.

—*The Trolley.*

"Here, sir, is your currant pie,
Alternating current pie;
First a currant then a fly,
'Neath the crust alternate lie."

* Presented before the American Street and Interurban Railway Claim Agents' Association, Atlantic City, N. J., October 15, 1907.

THE CLAIM AGENT OF TO-DAY AND HIS WORK.*

BY H. K. BENNETT, CLAIM AGENT, FITCHBURG & LEOMINSTER STREET RAILWAY COMPANY, FITCHBURG, MASS.

The claim agent of the present day is probably the most mistaken individual, from the standpoint of the general public, who exists in the professional world, and in some instances he is almost as much misunderstood by the interests which he represents. By this I mean that many of our railway boards of directors do not fully comprehend what it means to stand between the public of to-day and a flourishing corporation of any size. I mean nothing disparaging by this statement and will endeavor to show just what I mean by this peculiar sense of misunderstanding, as I present the various phases of a claim agent's duties.

In the first place this is a most strenuous era in which we exist, and while this is perhaps a recognized fact, there does not go hand in hand with the recognition the full understanding of what coping with advanced intelligence means. By this I assume that we have for the foundation of a claim agent a man of intelligence backed by a body of officials who realize the responsibilities of such a position, and stand ready to aid and assist in any way they can to bring about desired results in the department which the claim agent represents, or rather is. No one man can overcome single handed the almost insane prejudice that exists against a corporation viewed from the standpoint of the general public, if he is hampered in his work and not given a reasonable latitude to work in without restriction. I contend that if a claim agent cannot work out the many problems that he has to contend with without too much red tape, he has lost just so much from the start; he loses self-control and the power of determination and in the end is a failure, and no man should aspire to a claim agent's position until he knows he has the power of analyzing men's minds, and determining at once the proper remedy to apply. A claim agent's calling is as much like what it is pictured as two extremes can possibly be. To the minds of many his position is one which tends toward dwelling on contentment and peace; his pathway is strewn with roses, and he is one who has only to speak and due attention is given. He is seen walking about with a sort of satisfied manner, fairly well dressed perhaps and with an air of being a little lower than the angels. The reality is a terrible awakening from this picture, as you all well know, but how are we to bring the minds of these deluded individuals to our way of thinking?

A claim agent, I contend, should have all the faculties which go to make up an energetic man; eyes that see veritably everything even through imposition and fraud; ears that listen as well, and a tongue that remains silent until necessity brings it into play, and then it speaks in no uncertain tone. His brain is always revolving case after case which he is trying to make the most out of, thinking all the time if there is not some atom of evidence lurking somewhere that he can get hold of to further the desired ends. He may have on hand a dozen cases in all stages of incompleteness, from the one which is already listed for trial, to the one of a few days or hours ago. All these are in his mind, and as he shuts his eyes, there is the endless procession flitting before his vision with kaleidoscopic effect. When you see him apparently taking life easy, as it is wont to be put, be not deceived, for if he has brains (and that is already assumed) he is thinking out problems the answers to which are always matters of speculation. I apply the foregoing to the claim agent as he should be, but perhaps not always as he really is.

The claim agent of to-day, if he is such in deed as well as in name stands closer to the general public than any other official of the company which he represents; he is the bulwark, the buffer, the go-between between the coffers of his company and the greedy maw of the people; he is in a class by himself, and the head of no other department stands for more than does this same individual. His work may not show on the surface and his coming and going be heralded with a blare of trumpets, but he is there just the same. His office should not be an abiding place, but he should, and I believe is, out among the people working quietly but effectively to tear down the bug-a-boo curtain of prejudice that exists. He is more than the mere cog in the machine which can be replaced at a moment's notice. I contend that he is a machine by himself.

Adaptation to Surroundings.

Go with him to the claimant who was injured yesterday if you please. He finds him perhaps dwelling in squalor

or riches, surrounded by the pleasures or miseries of life, and into each particular case he must fit like a glove and without friction. He must adapt himself to all surroundings and be as much at home in the kitchen of a tenement house with all its disagreeable features, as in the drawing room of the "400." His tact must never give out, and by the gentle but persuasive use of it he must, I contend, be the success that is demanded of him, be able to bring within the fold those who misguidedly persist in ranking all corporations as robbers of the basest sort. He must keep cool, meet flaming argument with good every day common sense, stand abuse without flinching, up to a certain point, agree sometimes even if it does go against the grain a little, but in the main issue be firm and positive. Give and take is a great game, but practiced in claim work is a winner. There is a chance of spoiling a good case by being too stubborn, and the claim agent must be able to see in advance whether or not his giving in even a little is to work to his advantage in the long run, or whether it will establish a precedent that will work the opposite.

You may say this is spreading it on a little too thickly, and placing the claim agent on a pedestal before which all must bow; far from such an idea, and if by chance, I do place too high a standard upon you and your work, remember it is better to aim a little too high than to fall short of the mark. I am not writing of impossibilities, but possibilities; not dealing with fancies but facts; not trying to immortalize but to infuse into you, if there be any who think that a claim agent is not a veritable being and worthy the respect of all with whom he comes in contact, the never dying flame of courage and persistency, and give each and everyone of you something to take away with you, so that your blue days will be filled with a self satisfying thought that life is worth living, and that you are appreciated. I have used the word "professional" without any apology, and do not believe there are any who will take issue that we do not belong to that worthy class, and as time goes on, I think this fact will be universally recognized.

Not long since, when the manager of a large railway corporation was shown the monthly statement of his claim agent, the remark was made by him that he could remember when in one year the total amount expended for claims did not exceed \$20. So right here we have the first reason why a claim agent is misunderstood, the natural greed of the people in general, aided and abetted by shysters who use the cloak of the law to cover their acts. In those days when such a small sum was all that was needed to square accounts with the feelings of some individual, the spirit of "soakism" had not been developed, but surely as the sand running from the hour glass, just as sure was the seed being sown, and the claim agent of to-day reaps the harvest. Only with the rapid advance of both steam and electric railways did the need of a claim agent present itself to thoughtful managers, and with this onward movement, trouble began. With the extension of lines came the inevitable factions; one man wanted the road to run by his house and the other by his property. So the seed of discontent was sown, and the beginning made for future trouble inasmuch as one faction would always be ready to take the part against a railway. The people began to awaken to the fact that the railroads had come to stay and, once given franchises, had a power that could not be broken, and then they began to call themselves easy for giving something away for nothing.

Railways Within Speaking Distance.

So the need of a claim agent to pacify and coddle, if you please. These people and their offspring are the very people that we are called upon to deal with to-day, to placate and leave with a shake of the hand and a friend made for the corporation. Just a little different now from the days of 15 or 20 years ago, when it was a question of give and take, fair prices and a oneness of purpose; a corporation that was willing to provide transportation, and a public that accepted it in the spirit in which it was given. In those days trifling accidents connected with cars were of little consequence and created as such; if a woman accidentally fell down her cellar stairs or tripped over an obstruction in her yard, there was no thought of suing a railway for damages just because one ran within speaking distance of her home. To-day, such a one would appear within 24 hours with a half dozen witnesses to back her up, and claim some conductor started his car while she was getting off and injured her for all time to come. There were no lawyers in those days who laid awake nights and had their runners by day seeking all kinds of cases just for the sole purpose of mulcting a railway corporation.

So if I set our standard just above the average calling in what further I have to offer, do not say that I am placing you on a plane higher than our ambitions should reach.

* Presented before the American Street and Interurban Railway Claim Agents' Association, Atlantic City, N. J., October 15, 1907.

A claim agent of to-day should be a past master of his calling; should have a general knowledge of law and its application; should have an extensive acquaintance with all classes; should be a student of human nature and have a knowledge of how best to approach those who have a grievance. He should maintain a confidential relation with the general public. The witness to an accident of to-day may become the claimant of to-morrow, and much depends upon how he is used when being interviewed as a witness concerning what his disposition will be as a claimant and your success in handling him as such. There is a way to get along with all and leave a sweet taste in their mouths so to speak, and once you have solved the "how," do not let go of it, for you have found, if not the perennial spring of life, an adjunct that will help you out of many tight places. It is just as easy to make a witness fairly hate you and be antagonistic toward the interests you represent, as it is to make him a friend that will prove such in the final issue.

A claim agent can be clever in handling witnesses, but he must not overdo it. He may meet with rebuff when he goes for a statement, but he must tactfully refuse to be put off, using some argument that will fit to bring about the desired ends. For example, you go to Mr. B. and ask him regarding an accident which he personally witnessed and perhaps near his place of business. Mr. B. is found, the state of weather is decided to your mutual understanding, the agent meanwhile keeping his eye open for a chance to get down to business, and when the moment arrives, places the matter before him in a very quiet but forceful way. Mr. B. immediately "freezes" to all outward appearance, and informs you in no uncertain tones that "he will be hanged if he will help the old road out." Continuing he says: "Do you know, young man, it was only last summer that one of your cars smashed up one of my teams and some smarty comes here and offers me \$10 to settle the bill. Did I settle, well I should say not." You immediately run over past events in your mind, remembering of course, as you all do, the incidents that are constantly happening and informs Mr. B. that it was not one of the cars of the company which you represent, but one of another line which crossed your company's track at the place the accident happened. This, of course, has a tendency to smooth his feelings somewhat, but still he refuses to give you any information. Then you go to him somewhat in this fashion: "Do you remember, Mr. Brown, the old saying relative to placing yourself in some other person's place? Just for once I wish you would assume that you occupy the position I do, and let me for the sake of argument imagine a case similar to the one at issue; you are running a store; your driver leaves your horse unhitched one day while he is delivering goods; the horse runs away; a little child in the road is run over and injured; you find on inquiry that some boys started the horse by throwing apples at him, but as this is only a rumor you set out to find an actual eye-witness, and after some delay you find that I am that person; you come to me and I pointedly refuse to have anything to do with the matter. What would you think of me? Our relations now are identical with the position assumed." Nine times out of ten you win, and by nothing but pure simple tact used at the right time.

Seek All Evidence.

In this searching for evidence, do not always be particular as to the quality, for you are supposed to hear anything that is to be offered whether it is to your advantage or not, and should a statement be given detrimental to your case, do not refuse it, for if you do you create the impression that you only want one side, and the chances are your witness will give this information to the other side. On the other hand, if you listen to all he has to say, the chances are he will consider you are perfectly fair and frank in the matter, and will not give the matter further concern. In your eagerness, therefore, to present the best possible case, do not let it be said that you left out any statement because you are prejudiced; better a little adverse testimony than the effect of having it cut and dried. Juries are queer at best, but they tire of repetition and from personal experience, I know that too much sameness of testimony inclines the average jury to consider that the case is bolstered.

So I repeat, get all the statements you can, good, bad, and indifferent; take what is offered, and then let your attorney do the rest. Never resort to trickery in getting statements; be frank and manly; make yourself known. Realize that you are, for the time being, representing a big corporation, and that you must so conduct yourself as to be a credit to it and yourself, without regard to the quality and character of your informants. Make the acquaintance of as many people as possible, both high and low. Learn their individual preferences and tastes, their habits and associates. Some day this fund of information will count for something

A. knows B. and B. knows C, and thus the endless chain, for where you know 10 the door is open to 90 more. A sneak is about the worst creature imaginable, and many a man has been turned down good and hard just because he tried to mislead some well-intentioned person, by claiming to be that which he was not. If you do this, some day it will come back to you from an unexpected source and prove a blow that may lose for you a good case.

When it is settled without dispute (or rather with one) that a case is going to trial, then is the time that you must get down and dig. You must gather a preponderance of undisputed facts, not only from those you know are connected with the accident as witnesses, but from others as well. Show, if possible, negligence wholly or in part on the part of the plaintiff, presenting this evidence in a firm and decided manner. Your witnesses must be unprejudiced, the more non-residents the better. Remember your average jury is composed of every-day men from all walks of life, and they must, like the man from Missouri, "be shown." Doubtless some one of them has at some time or other had trouble with a railroad, and you can safely wager he is going to tell all about it when he gets into the jury room. If not personally interested himself some relatives have had litigation with a railway corporation, "and they haven't done anything since" is the way one jurymen related his experiences. You are up against a hard proposition, and the only way you can expect to win out, is by presenting a clear-cut mass of undisputed evidence from witnesses of a standard calculated to impress a jury. If you cannot do this your labor has been in vain. I find too often that employes are rather inclined to enlarge upon matters, going into explanations, rather than confining themselves to the question, and offering suggestions while testifying under cross-examination. Jurors as a rule, I am convinced, do not give employes' evidence much weight. They say, at the outset that they must be predisposed to give favorable evidence in order to hold their positions. Witnesses of the employe class should be cautioned about saying too much; urged to stick to the question at hand, answering "yes" or "no" whenever possible and letting it drop there. They must not be too insistent that they are absolutely right if there is any doubt in the matter, but on the contrary, ever ready to admit possibilities. You will find, I think, that this prejudice will gradually be wholly eradicated as time goes on if such methods are adopted. There are instances of course, where it would "be easier for a camel to go through the eye of a needle," than for a corporation to win a case, but there are exceptions, and these exceptions are acquired only by educating the people to a realization that a corporation is not an oppressor, but rather that which stands for the best interest of all.

It was but a short time ago that my sensibilities were severely jarred and I have hardly recovered. In a case where eye-witnesses to an accident stated that the claimant was entirely to blame for an accident, I thought it was an act of decency and confidence to go to her counsel and show him what he was up against. Judge of my surprise when after a few minutes conversation and a partial showing of what I had to offer, the aforesaid counsel opened up on me with a masked battery so to speak, and told me in good, old-fashioned English that it was an easy matter for me or any other railway representative to go out and get statements suitable for the company's interests, and that we had people along various parts of the lines in our employ who were paid to make statements favoring the company. This is an example of what we have to deal with in Massachusetts, but let it be said in justice to the rest of the legal fraternity, that this was an exceptional case, and the first time that I have known an attorney of standing, or otherwise, to digress so far into fancy from the trodden paths of truth.

So acute is the desire to obtain all the information that railways may have in regard to their accidents, that an attempt was made in the Massachusetts legislature last winter, and which I am glad to say did not avail, to pass a bill requiring all railway corporations to file with the state railway commissioners a list of all their witnesses to accidents. You can easily see what the result would have been had such a bill become a law, and that the bill was in the interests of the so-called shyster lawyer. If this provision had become operative, a railway might just as well invite lawyers to the scene of every accident and leave all questions of settlement in their hands without argument.

Scrap Books Helpful.

As a newspaper man for many years, I was compelled to keep a scrap book containing all important matters which daily passed through my hands, and I wish to impress upon you the same necessity of doing this as a claim agent. All items concerning your railroad whether or not they are of interest to your particular department, should be carefully

recorded, for sooner or later they will stand you in good stead. All accidents in various parts of the country where names are given I consider invaluable, for you cannot tell whether or not these persons have just claims or not, and the day might not be far distant when you might run up against these very same people; especially is this true of local accidents, and I do not refer to the railroad class entirely, for it is not an unusual occurrence to have injuries received in shop or mine foisted on you as coming directly from a street railway accident. Together with this scrap book should be kept an index of the names as recorded, and it is a simple matter to run over this. If you have your man recorded, the rest is easy.

The use of a camera I have found to be invaluable, both at the time of accidents and after. Word of mouth may fail, but a photograph is undisputed evidence of the first water.

One other duty of a claim agent I believe to be invaluable, is the inspection of cars for defects. While this, of course, comes under another head, as a rule, there are many minor matters overlooked for which the head of that department cannot be responsible. By this I mean such matters as loose screws, absence of rubbers on the backs of seats, leaving screw heads exposed where a passenger can easily catch a ring, and perhaps seriously injure himself; loose running boards, steps and other minor parts with which you are all familiar. Anything that can better the service should not be overlooked. The old saying "An ounce of prevention is worth a pound of cure," is very applicable to our line of work.

It does a great deal of good to ride with the men and watch how they perform their duties, and a word of praise or criticism at times is entirely in line with our work. In fact everything and anything that can lead to the desired end—perfection—should be watched with the closest attention. If it is within your province to prevent accidents, you are more valuable to your employer than simply able to dispose of the claims as they arise.

I have doubtless wearied you with a repetition of facts already well known to yourselves, but I trust there may be some who will feel a little more the responsibility with which they are entrusted, even as I do in writing what I have. Let me urge upon you, in summing up, the absolute necessity of being always on the watch for every straw which blows your way and can be used for good; get to the scene of an accident as soon as possible; assist any and everybody even if the liability is all in your favor, for you lose nothing in the long run; disabuse the minds of the public in general of the idea that a corporation is against instead of for them; play fair and square, say what you mean and mean what you say, no more, no less. Firmness has done more in cleaning up undesirable cases than anything else.

In closing let me say that I have tried to set forth some of the principles of an ideal claim agent, and briefly alluded to some of his daily tasks; that, when putting down these facts for your perusal and consideration, I have not been sitting in front of a mirror. Would that I, myself, were one-half the claim agent I have pictured! But in presenting these few facts, I have tried to depict the ideal without being able to lay my hands on one, helping myself and, at the same time, hoping to aid others to oil up the rusty places and push the standard a little higher, so when we have laid down the reins others may take them up and continue on to more successful careers.

A countryman took a car from New York to Coney Island, and, as he boarded the car, handed the conductor a dollar bill. He then went into the car and found a seat. After riding some time, he was reminded of the fact that the conductor had not given him his change. As the conductor passed him, the farmer grabbed him by the shoulder and said, "Son, how about my change?" The conductor then called his attention to a sign, which was fastened in the front end of the car, reading, "This car goes to Coney Island without change."
—*Keystone Traveler.*

Identity in a Street Car.

The car was crowded, and there being two or three polite men left in Indianapolis, one of the two or three gave her a seat in the forward end of the car. He remained on the platform to finish a cigar. She always lets him do that.

When the conductor came along the smoker presented two tickets.

"Who is this for?"

"The lady up in front."

"Yes, but there are several up there."

"Oh, well, let's see! I'm paying for the one under Eat-'em-Quick Biscuits."—*Exchange.*

RAIL CORRUGATION.*

Among the subjects investigated by your "Maintenance of Way" committee this year is that of "Rail Corrugation." The report on this subject embodies the questions contained in the data sheet and circular letter which were sent to the various member companies, and the answers which were received to these questions.

Out of 48 replies only 13 contained any definite information on the subject of rail corrugation and even these answers seem to be considerably at variance with each other.

Answers to the questions may be summarized as follows:

- (1) Various types of rails are subject to corrugation.
- (2) About one-third of the companies have had different types of rails affected where conditions are similar, while the remaining two-thirds of those which answered the question have had but one type of rail affected in this way.
- (3) The length of rail affected varies from three feet to several hundred feet.
- (4) The length of time the rail is in service before corrugation appears, varies from four months to thirteen years.
- (5) The length of corrugations is from one to fifteen inches.
- (6) The depth of corrugation varies from an inappreciable amount up to 3-16 inch.
- (7) Deep girder rails are most liable to rail corrugation.
- (8) Corrugations occur mostly upon track which is not laid upon a thoroughly rigid base.
- (9) Seven of the 13 companies state that the corrugations occur on the outer rail of slight curves. One company states distinctly that the corrugations are found on the inner rail of curves of large radius. Three companies state that the corrugations occur on straight track. Braking seems to have little effect, although three companies distinctly state that corrugations occur where brakes are most frequently applied.
- (10) Some companies stating that double-truck cars cause corrugations; others that corrugations occur where single-trucks are used. All answers indicate heavy traffic on track affected.

(11) One company answers in some detail describing a machine which it has for grinding out the corrugations. This company has also remedied the defects in certain cases by stiffening the web of the rail either with fish plates, rail braces or other devices. It has been able to take out corrugations which were formed on the rail by the use of these stiffeners of the web. Two other companies have used a grinder for taking out the apexes of the corrugations, which grinder they did not consider satisfactory.

(12) The companies which answer Question No. 12 seem to agree that the cause of the trouble is produced by rails being insufficiently supported, by the web of the rail being weak, that the track construction is faulty, and that the slipping of the wheel on the outer rail of curves produces the corrugation.

The Philadelphia Rapid Transit Company, which company appears to have had the greatest experience with this phenomenon, has given a very interesting account of its dealings with the subject, and this information is unusually instructive. The remedies applied and the expenditures made show that this company is treating the matter thoroughly and its progress will be watched with much interest during the next few years.

The answer to Question No. 12 by the Philadelphia Rapid Transit Company is as follows:

The primary cause of corrugations in street car rails, it is assumed here, is vibration, either in the rails or in the entire track structure; that is, the wheels of motor or other power-driven cars have a tendency to skid or slip because of the rapid vibration of the rails, which, by reason of the inertia of the car, the wheels are unable to follow instantaneously, thereby causing friction between the wheels and rail to vary in accordance with the wave length of vibration.

The corrugations may arise from any one of four different causes: namely, the vibration or lateral bending of the web of the rail itself; the rails being loose on their supports; the ties being loose on their foundations; the vibration or movement of the foundation immediately under the track structure. Which one of these defects or conditions caused the corrugations can be ascertained by inspection of the head of the rail. Each condition produces corrugations of a different character, not only in length and form, but also with certain other peculiarities difficult of explanation without referring to a case in point.

The writer has several times been asked why these corrugations do not appear more frequently on steam roads, if they are, as he believes, due to vibration. The answer is, in

*Abstract of report of Committee on "Maintenance of Way Matters" presented to the American Street and Interurban Railway Engineering Association at Atlantic City, N. J., October 15, 1907: Fred. G. Simmons, Thomas K. Bell, C. A. Alderman, Committee.

his opinion, that the comparatively loose rail is forced ahead by the great weight of the locomotive in the well-known long wave, and that there is very little slipping in the wheels of the trailer cars. The writer has had several letters from engineers of foreign roads, describing their troubles with corrugated rails, and has noted that in the most serious cases the rails were supported by chairs or were provided with some form of a cushion. He thinks a careful inspection would show that there is a slight movement between the rail and its supports.

It has also been called to his attention that on some street car tracks where the rails were extremely loose there were apparently no corrugations. He has found, however, that in many cases the corrugations actually existed, but in such elongated form as not to be apparent from casual inspection. However, a rail flexible enough to produce only these long corrugations would bring other troubles quite as serious, and it would be practically impossible to maintain such a track in any heavily traveled paved street.

The writer has made quite a number of experiments and trials to verify his theory, and would call attention to one case. About five years ago it was proposed to reconstruct a section of double track about 2,000 feet in length using a 90-pound 9-inch girder rail laid on ties on a gravel base. When the excavation was made, however, the earth was found to be very spongy, consisting of clay and water-bearing gravel. For this reason the excavation was carried about seven inches below the ties, and the space filled with concrete to a point one inch below the grade of the bottom of the ties. The ties were then carefully tamped with a mixture of fine concrete and the space between them filled to the base of the rail, which was also tamped. An additional two inches of concrete was then placed as a foundation for the paving.

After a year's service the rails of both tracks were found to be badly corrugated over practically their entire length, the corrugations being 1 inch to 1½ inches apart and extending from the gauge line over about two-thirds the width of the head. In order to ascertain the cause of this trouble, the paving and the concrete were removed above the ties, both in and outside the rails, and a careful inspection was made and measurements taken to ascertain if there were any vertical movement in the roadbed or rails, but none could be detected. It was thus evident that if the writer's theory was correct, there must be a lateral bending or vibration of the rail itself, and in order to ascertain if this were a fact an instrument was constructed. The frame may be rigidly clamped to the base of the rail, and a vertical arm is provided with a piston carrying a nut. The piston may be forced against the head of the rail by a spring behind the nut. The upper end of a hand or pointer engages the nut, the other end resting on a graduated arc. The lengths of the upper and lower arms of the hand or pointer are in the ratio of 10 to 1, each graduation representing 1-64 inch.

In using this machine it is only necessary to clamp it to the base of the rail and set the lower end of the hand at zero, which can be done by turning the piston in the nut. The amount of the lateral motion in the head of the rail, due to bending or buckling of the web, will then be indicated by a marker which is placed against the hand before a car is allowed to run over the rail. In many cases a movement of 3-32 inch has been noted.

In order to further verify the results of this experiment, fish plates 30 feet in length were secured and bolted to the outside of the rail, thus giving a support to the head and greatly stiffening the entire rail. After a few months it was found that on rails equipped with these fish plates corrugations were rapidly disappearing. As strengthening the rail in this matter would be too expensive to be practical, it was decided to stiffen the web of the rails by using a special brace on each alternate tie along the outside of the rails. This work was completed a little over a year ago, and a recent inspection shows that nearly all of the corrugations have disappeared.

It has been noted by some roads that corrugations were appearing on rails laid on a concrete base, but in every case that has come to the notice of the writer the rails had been temporarily supported by wooden ties, concrete being tamped under the base of the rail between the ties with no provision made for taking up the shrinkage, which always takes place during the settling and drying of the concrete.

In many cases where track is constructed in this manner the rails seldom have a continuous or uniform support, by reason of their not having anchorages or holding-down devices other than spikes in the ties, spaced at long intervals. This results in a slight movement of the rail on its foundation, and soon causes corrugations to appear, although quite frequently where light rail is used the trouble comes from the bending or buckling of the web of the rail, as noted above.

The writer believes that in concrete roadbed construction, it is absolutely necessary to provide some means of drawing the rail down on its bed, thereby taking up the shrinkage and preventing any liability of the rail moving on its foundation. In this class of construction, vibration can be prevented only by providing a rail of the proper design and an absolutely uniform and continuous support.

When the trouble in tie construction is found to have been caused by loose rails or ties, the only remedy is to grind or file the head of the rails, and to immediately follow this work by firmly securing the rails to the ties and by tamping, using a coarse gravel wherever the foundation is found to consist of soft or spongy material.

Corrugations in light rails, due to the bending of the thin web, are difficult to remedy without considerable expense, but after the heads have been filed to a comparatively smooth surface, it has been found that setting the track to a slightly wide gage will sometimes prevent a recurrence of the defect.

It is very difficult to grind off the summits of corrugations without a specially constructed machine mounted on a truck and practically impossible with the usually portable grinding equipment, consisting of an emery wheel connected to a motor by a flexible shaft, because when the eye approaches the rail closely enough to permit the operator to manipulate the wheel the corrugations apparently disappear. In nearly all cases filing is probably the best method. The file should be mounted in a heavy cast-iron holder having guiding lugs bearing along the gage line of the rail and equipped with long handles at each end, so as to permit of operation by two men from a standing position. To prevent the possibility of trouble from bending of the webs of the rails, the writer, about two years ago had the web of the heavy rail which his company is using increased to a thickness of 9-16-inch. In support of the theory which he has advanced, he would add that on a system of about 600 miles he has been able to reduce the amount of corrugated rail to a very small percentage. The price of immunity from this trouble, however, is eternal vigilance, and it might also be added, the expenditure of considerable money in maintenance when any form of wooden support is used.

"All-Wire" Rail Bonds.

Those interested in the subject of rail bonding should visit the booth of The Ohio Brass Company, Mansfield, O. This section of the exhibit is in charge of P. A. Hinds, sales agent of the rail bond and third-rail insular division of the company. The "All-Wire" rail bond, which is well known to the trade, is made in both the compressed and soldered terminal forms. The underlying principle of these bonds, for which the company claims superiority, is absolute continuity of structure from terminal to terminal, without a joint of any kind, and without oxidized surfaces anywhere within the bond structure. This continuity is obtained by the formation of the bonds from sections of stranded copper cable or continuous copper strips, as the case may be, the terminals being formed by compressing the ends of the cables or strips under hydraulic pressure to the shape of the terminal, then forging the terminals at a welding temperature in a special die, and finally finishing the terminals to size in an hydraulic press. This process renders the bonds absolutely continuous from tip to tip, and they possess the conductivity of the original soft-drawn copper from which they were formed. In the exhibit are displayed types and sizes of bonds for every conceivable class of service. They are shown applied to the ball of the rail, under the fish plate, around the fish plate, on top and underneath the flange, etc.

There is also shown in this exhibit a very complete line of third-rail insulators for electric railway and industrial railway service. The insulating medium used is "Semi-Porcelain," which is a special composition having high insulating properties, combined with great mechanical strength. All the third-rail insulators for the New York Central electrification, the West Shore electrification and the Central California Traction system are of "Semi-Porcelain" and were furnished by the company.

The Plomo Specialty Manufacturing Company reports that its electric railway trade, both in the United States and foreign countries, is rapidly on the increase. The company claims to have solved one of the greatest of mechanical problems—that of making gears and pinions noiseless, combining with this perfect lubrication, doing away with the annoyance found in hot climates, dripping from the gear cases, and during extreme cold weather requiring no additional power. To demonstrate that it has a superior article the company will forward a sufficient amount, free of expense, freight charges prepaid, to pack the gear cases on one car.

REPORT OF THE COMMITTEE ON STANDARDIZATION.*

Your committee appointed to investigate the subject of standardization as applied to electric traction equipment reports that it has proceeded upon the lines laid down for this committee in the year 1906, and has investigated the same topics, namely:

(a) Standard axles, journals, journal bearings and journal boxes.

(b) Standard brake shoes, brake shoe heads and keys.

(c) Standard section of tread and flange of wheel.

(d) Standard rails.

Considerable work on all of the above subjects was done by the committee during the year 1906, both previous and

stenographic reports of its meetings, blue prints, and other information obtained bearing on the subjects under discussion.

(a) Standard Axles, Journals, Journal Bearings and Journal Boxes.

A consideration of this subject disclosed that it would be very difficult to adopt a standard which would accommodate, to any general extent, the equipments already in service. After a thorough discussion by the representatives of all the interests involved, this committee decided to recommend arbitrary dimensions which conform to what is believed to be the very best recommended practice, at the same time meeting as nearly as possible the requirements of the existing con-

TYPE	Journals, inches.	Motor fit, inches.	Gear fit, inches.	Wheel fit, inches.	Distance between hubs, inches.	Centers of journals, inches.	Maximum capacity, lbs.	Horse-power.	Length of gear seat, inches.	Gear pitch, inches.	Gear face, inches.	Diameter of gear hub and motor bearing flange, inches.	Finished width of gear hubs, inches.	Motor side, inches.
EA	3 3/4 by 7	4 1/2	5 1/2	5 7-16	48	75	15,000	45	6 1/2	3	5	8	1	1 1/2
EB	4 1/4 by 8	5	6	5 15-16	48	75	19,000	45-65	6 1/4	3	5	8	1	1 1/2
EB-1	4 1/4 by 8	5 1/2	6	5 15-16	48	75	22,000	65-100	6 1/4	3	5	8	1	1 1/2
EC	5 by 9	6	7	6 15-16	50	76	27,000	100-150	6 1/2	2 1/2	5 1/4	9 1/2	1 1/4	3/4
EC-1	5 by 9	6 1/2	7	6 15-16	50	76	31,000	150-200	6 1/2	2 1/2	5 1/4	9 1/2	1 1/4	3/4
ED	5 1/2 by 10	7	8	7 15-16	50	77	38,000	200-250	6 1/2	2 1/2	5 1/4	10 1/2	1 1/4	3/4

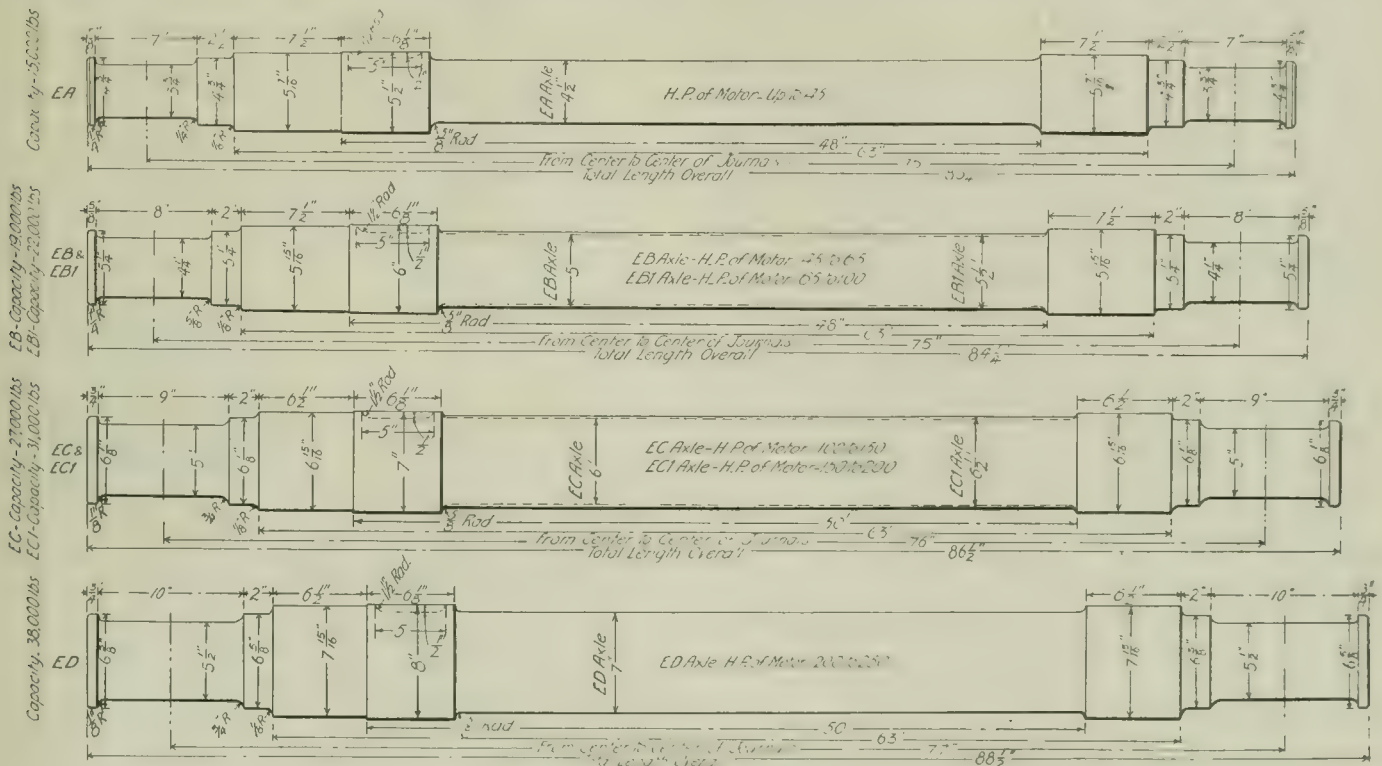
Table 1. Summary of Axle and Gear Data.

subsequent to the convention at Columbus, and all the information given in the data sheets was compiled in tabular form for consideration by the committee.

It was subsequently decided desirable to have the subject of rails considered by the way committee. All the information received on this subject was turned over to that committee

ditions. The dimensions proposed very nearly approach the standards adopted by many of the large electric railway properties of the country.

In this connection the committee has profited very materially by the experience of similar organizations which have developed the axle problem since the beginning of operation



Standardization—Proposed Standards for Axles.

by direction of the president, and that committee will submit a separate report. This committee has considered the subject of rails and special work only as affecting the recommendation of a standard wheel tread and flange.

In order thoroughly to study the conditions affecting the above subjects, the committee held meetings in New York on May 20 and 21, in Cleveland on July 26 and 27, and also in New York on September 12 and 13, 1907. At each of these meetings representatives of the various manufacturers of all the equipment under consideration were present, and materially assisted the committee in arriving at the recommendations which are embodied in this report. Abstracts of the discussions at these meetings have been printed and widely circulated and this has resulted in a favorable sentiment toward the subject of standardization. The committee appends the

of railroads in this country, and this was found to be not only valuable in taking advantage of what experience had taught, but also desirable from a commercial standpoint.

We, therefore, recommend the axles shown in the accompanying engraving and designated as EA, EB, EB-1, EC, EC-1, and ED.

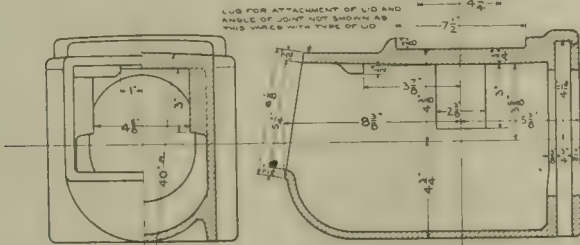
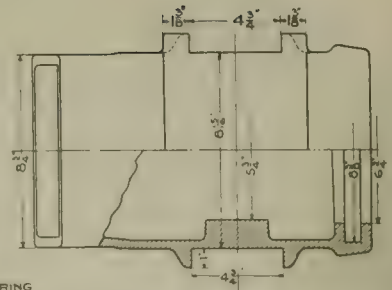
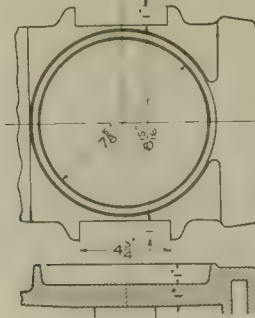
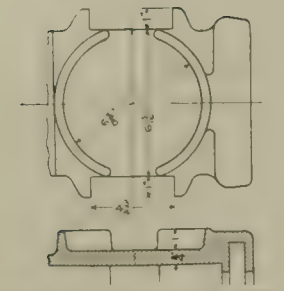
Axle EA has a journal of 3.75 by 7 inches. It is designed to carry a load of 15,000 pounds per axle and for the accommodation of motors not to exceed 45 hp. capacity.

Axle EB has a journal 4.25 by 8 inches and is designed to carry a load of 19,000 pounds per axle and for motors not to exceed 65 hp. capacity.

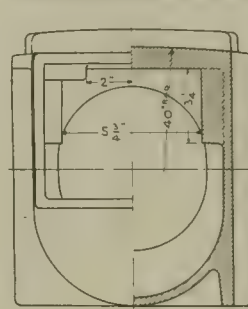
Axle EB-1 has the same general dimensions as axle EB, except that it is 5.5 inches in diameter at the motor-fit. It is designed to carry 22,000 pounds per axle and for motors not exceeding 100 hp. capacity.

Axle EC has a journal 5 by 9 inches. It is designed to

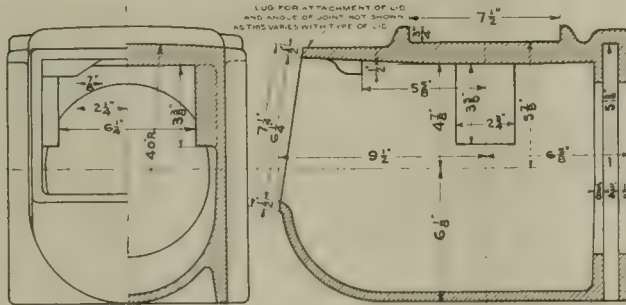
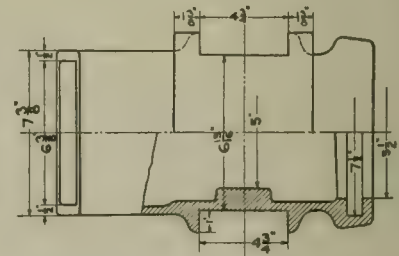
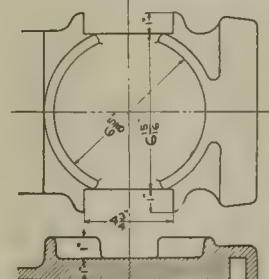
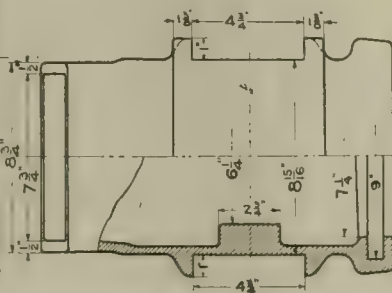
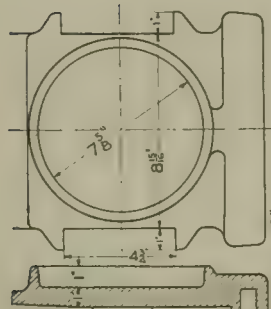
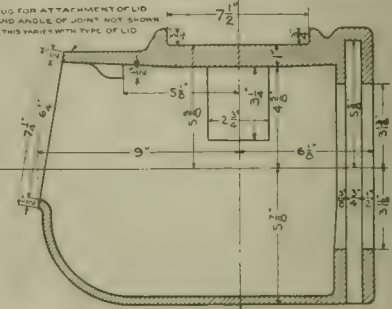
*Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 15, 1907.



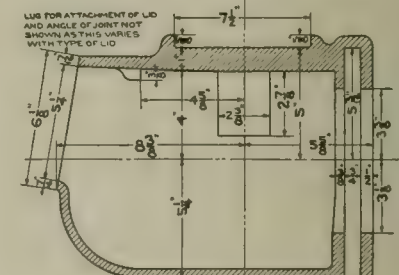
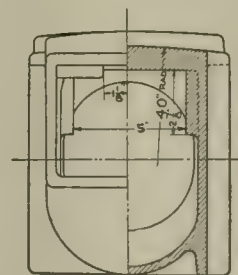
Standardization—Box for 3 3/4 by 7 inch Journal



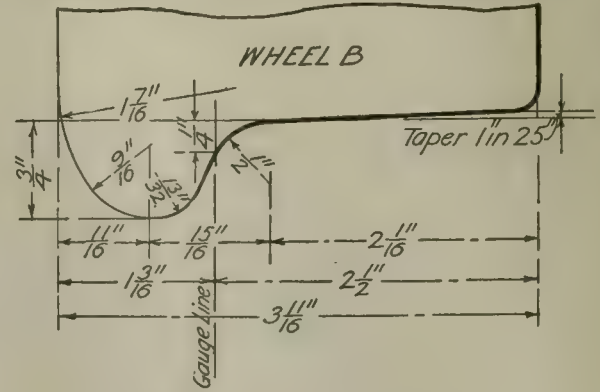
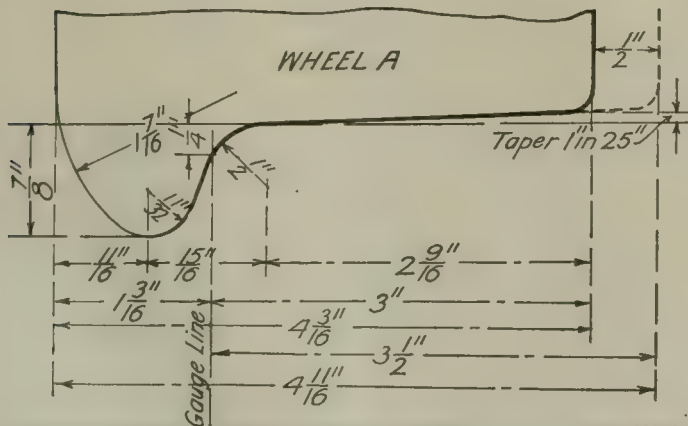
Standardization—Box for 5 by 9 inch Journal



Standardization—Box for 5 1/2 by 10 inch Journal



Standardization—Box for 4 1/4 by 8 inch Journal



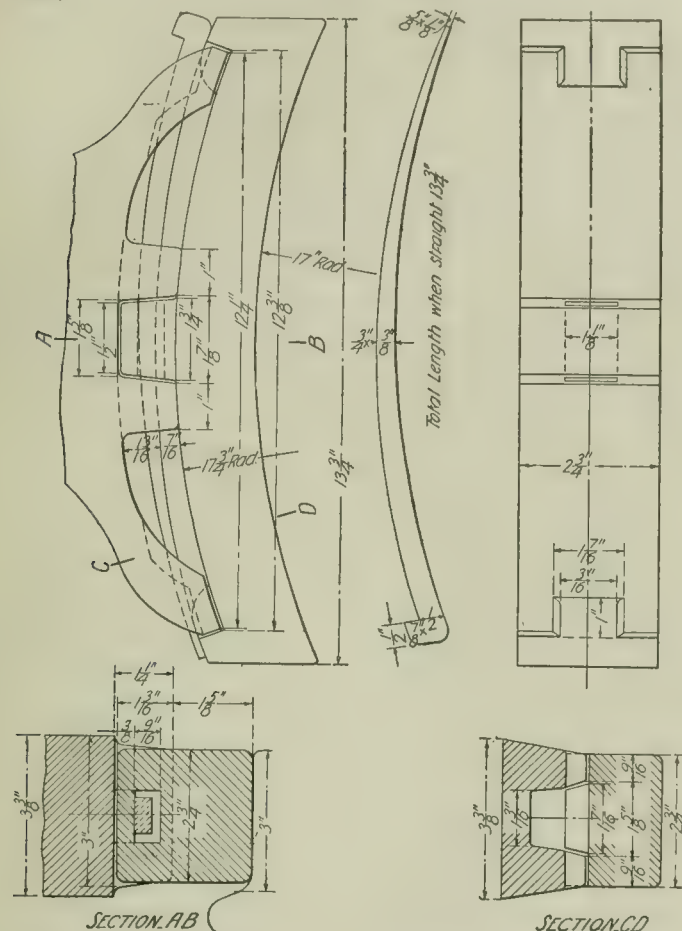
Standardization—Wheel Treads, Showing on the Left Wide Tread for Combined City and Interurban Service and on the Right Narrow Tread for the City Service

carry a load of 27,000 pounds per axle, and it is intended to accommodate motors not to exceed 150 hp. capacity.

Axle EC-1 is of the same general dimensions as axle EC, excepting that the diameter at the motor-fit is 6.5 inches. It is designed to carry 31,000 pounds per axle and to accommodate motors not exceeding 200 hp. capacity.

Axle ED has a journal of 5.5 by 10 inches and a carrying capacity of 38,000 pounds per axle. It is designed to accommodate motors not to exceed 250 hp. capacity.

Axles EA, EB and EB-1 are to accommodate motors that do not require more than 48 inches between the wheel hubs and axles EC and EC-1 and ED are to accommodate motors that do not require more than 50 inches between the wheel hubs.



Standardization—Brake Head, Unflanged Shoe and Key for Wheels With Three-Inch Tread and Over.

Particular attention is directed to the dimensions given on these axles, all of which were worked out with a great deal of care by the committee and were adopted only after a very careful consideration of each and the relation of each to all the others. This applies with particular emphasis to the diameter and length of wheel-fit, diameter and length of gear-fit, the gear keys and the diameter of the motor-fits. The discussion in connection with these subjects developed that the dimensions recommended by the committee are the most desirable and very acceptable to the manufacturers of the different parts of the equipment. Their original adoption will result in eliminating a great variety of dimensions of these parts. This lack of uniformity in the past has worked a particular hardship, not only on the manufacturers, but also upon the companies operating the equipment.

Special attention is directed to the length of gear seat and the key way, as well as to the diameter of the gear hub and the width of gear face, as it was found that by adopting these dimensions, the motor builders would be able to arrive at a uniform gear practice.

It is further recommended that for motors not to exceed 100 hp., a three-pitch gear with 5-inch face be adopted as standard; and that motors exceeding 100 hp. should have a 2.5 pitch-gear with a 5.25-inch face.

Journals and Journal Bearings.

For journals and journal bearing keys we recommend the use of the four sizes known as the Master Car Builders' standards. These are the result of years of experience in equip-

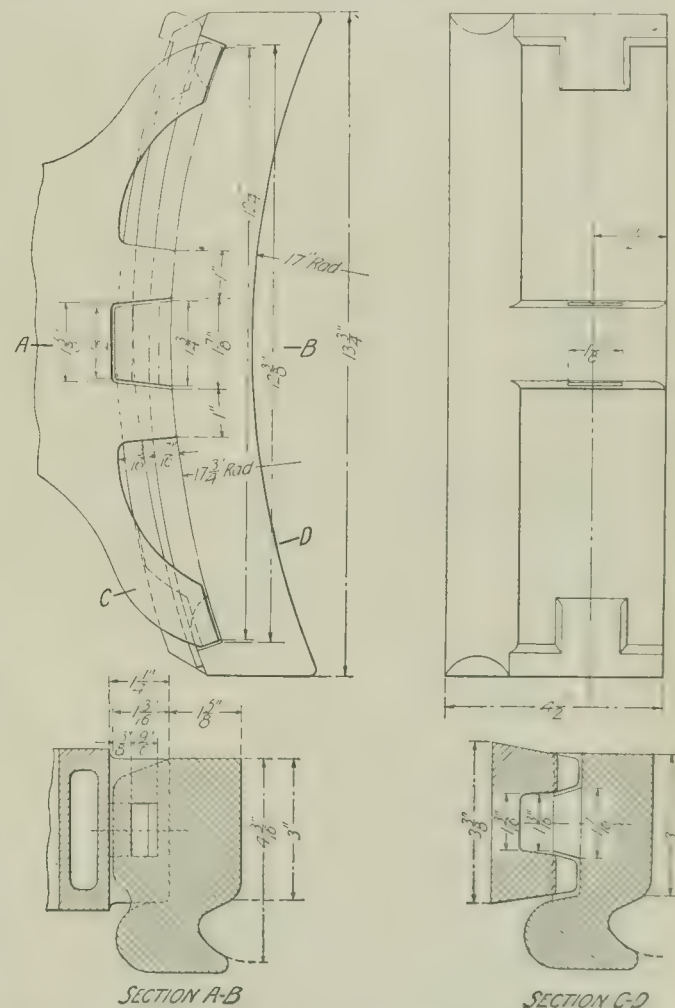
ments of similar character and generally familiar, and are specified in reports of the proceedings of that association.

Journal Box.

In connection with the axles already recommended, we submit herewith drawings of journal boxes for each of the different journals recommended, showing two styles of design for the tops of the boxes to accommodate the two styles of trucks generally used in electric traction equipment. The interiors of these boxes are arranged to accommodate the journal bearing keys referred to above and will be subject to the test gages in common use for journal boxes of this character.

(b) Brake Shoes, Brake Shoe Heads and Keys.

Your committee believes that this feature of the equipment most readily permits of standardization and that the results obtained therefrom, both mechanically and commercially,



Standardization—Brake Head, Flanged Shoe and Key for Wheels With Three-Inch Tread and Over.

will be most desirable.

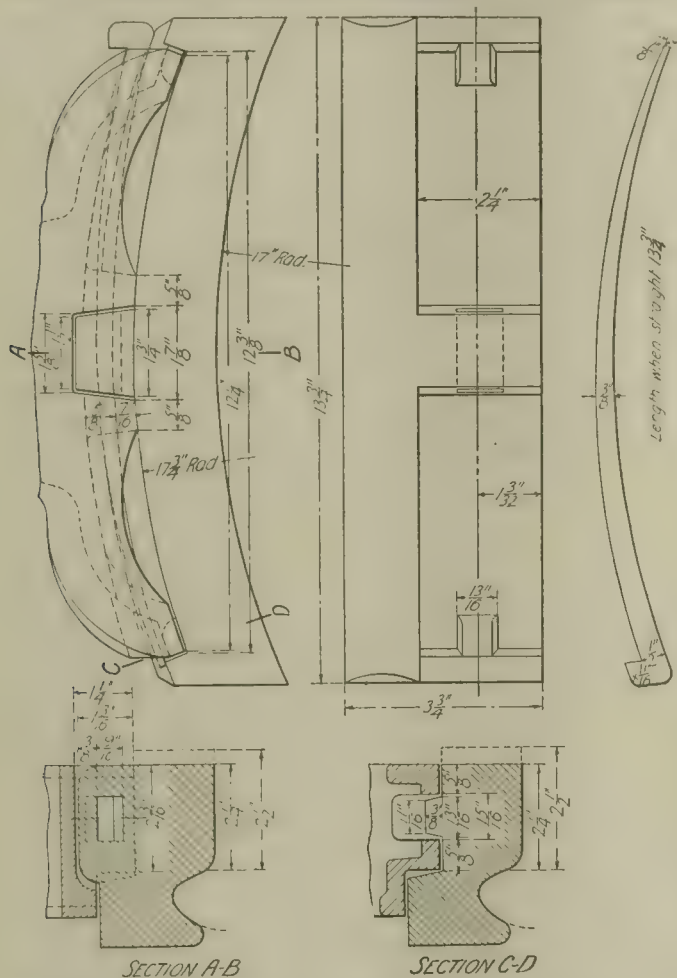
The data sheets compiled by your committee show that at the present time there are innumerable styles and patterns of brake shoes and brake heads in use throughout the country, many of which vary but slightly from the recommendations which your committee herewith submits.

For wheels having a tread of 3 inches wide and over, your committee recommends a design of brake head and shoe both of which are interchangeable with those in general use in steam railroad practice. The brake head recommended is adapted to both the flanged and unflanged shoes. The unflanged shoes to go with this head are reversible on their own wheels, and the flanged shoes may be reversed by changing the shoe from end to end on the brake beam.

To accommodate wheels in service, with threads narrower than 3-inch, the committee deems it advisable to recommend the second brake head and shoe illustrated on sheet B. This head is adapted for use on any of the narrower tread of wheels, viz., those less than 3 inches wide. The brake shoe

can be used either flanged or unflanged, the unflanged shoe being reversible upon the same wheel and the flanged shoe will be reversible by changing it to the other end of the brake beam, thus requiring but one pattern of brake shoe for all equipment which will be standardized with this brake head.

No attempt has been made at this time to suggest a standard for the brake head hanger arrangement, as the patterns



Standardization—Brake Head and Brake Shoe and Key for Narrow-Tread Wheels

submitted are simply for the brake shoe attachment. For the brake head shown in Sheet 'A', it is intended to use the brake shoe key now in general use.

The exhibit of the National Brake & Electric Company consists of the complete line of compressors, including many different types manufactured by it, ranging in capacity from 11 to 50 cubic feet per minute. One of the compressors is a 25-foot A. C.-D. C. compressor. The company is also showing two portable compressor outfits, one of which has a capacity of 11 feet per minute, and the other a capacity of 50 feet. Schedules MSH. and TSH., embodying a new type of emergency and quick release valve, are shown by two racks, which include all the apparatus which would be installed upon a motor and a trailer car. The representatives of the company in attendance at the conventions are: R. P. Tell, vice-president and general manager; S. I. Wailes, manager of sales; W. J. Richards, chief engineer; G. J. Johnstone, superintendent; J. R. Petley, purchasing agent; J. T. Cunningham and G. C. Anthon, New York; W. H. Goble, Philadelphia; C. N. Leet, W. R. Crawford, B. S. Aikman, Chicago; J. M. Bisel, southern representative.

The Kalamazoo Railway Supply Company reports that it has received a large number of orders from the different roads that have had its Root Snow scraper in service for some years, this goes to show that this company has a scraper that is doing its work in a satisfactory manner.

Among the Exhibits

Trucks for heavy interurban cars and trucks for city service are shown by the Standard Motor Truck Company, Frick Building, Pittsburg, Pa. One of the trucks shown is from a lot of 200 being built for the Boston Elevated Railway Company's surface lines. The maximum traction truck is one of an order of 200 for the Transit Development Company, Brooklyn, N. Y.

Berry Brothers, Detroit, Mich., are distributing fac-similes of their celebrated toy wagon. Call at their exhibit and get one for the children.

The single phase Westinghouse electric locomotive reached the convention on Monday. It has been placed on the trolley track on Virginia avenue, by the Boardwalk, just opposite the Steel pier. N. W. Storer, special railway engineer, and G. Bright, are with the exhibit of the locomotive and are glad to show friends through the locomotive at any time.

The Electric Railway Improvement Company, Cleveland, Ohio, reports that it has leased one of its bond welding and brazing cars to the Nashville Railway and Light Company of Nashville, Tenn.

Members of the association before leaving Atlantic City should inspect the new track construction of the Atlantic City Electric Railway on Atlantic avenue. This railway is operated by the Pennsylvania Railroad and the company has been put to considerable expense to give the main business thoroughfare of the convention city a roadbed of as permanent a character as possible as the work of construction included the paving of the entire avenue from curb to curb. For this purpose the company selected the well known bitulithic pavement, the bitulithic forming the wearing surface and is placed on a six inch concrete foundation. The main point claimed for bitulithic paving is its smoothness coupled with a gritty surface and its wonderful wearing quality.

The storage battery department of the Westinghouse Machine Company has an exhibit of storage battery, switch-board and regulator particularly adapted to maintaining constant load on railway power stations and sub-stations. Storage cells and plates shown are capable of unusually high rates of charge and discharge, and are designed to operate in connection with new type of relay regulator, which will maintain an exceedingly constant load on either direct current or alternating current systems. Recording ammeter records are also exhibited which show the degree of regulation obtained. Small cells among the other cells exhibited are elements in glass jars, such as are used for operating oil switches and circuit breakers. Two 14-volt outfits are shown such as are used for furnishing current for the Westinghouse multiple-unit control system.

S. W. Whitmore, president and manager of the Plomo Specialty Manufacturing Company, has severed his connection with that company and withdrawn the rights to the secret formula covering the manufacture of Whitmore's gear protective coating. The gear protective coating will in the future be manufactured and sold exclusively by the Whitmore Manufacturing Company of Cleveland, O.

The Cleveland Frog & Crossing Company of Cleveland, Ohio, does not have an exhibit this year but George Stanton, sales agent, is in attendance at the convention shaking hands with his many friends.

The J. P. Devine Company, Buffalo, N. Y., manufacturers of apparatus for the drying and impregnating of electric coils

under the Passburg system, is not exhibiting at the convention this year. J. P. Warfel, of Buffalo, formerly of Philadelphia, who is well known in electric railway circles, is here looking after the interests of his company.

Pantasote curtains, Pantasote cushions, and Pantasote upholstery of a variety of kinds are to be found in the exhibit of the Pantasote Company, of 707 Fisher building, Chicago, and 11 Broadway, New York. This widely-known and extensively-used curtain and upholstery material possesses the important characteristics of being odorless, sunproof and non-inflammable.

Rail joints of the Continuous Weber and Wolhaupter types are shown by The Rail Joint Company. These joints are shown assembled and in section and well illustrate the advantages of these types of rail joints for electric railway work.

In Section A, spaces 139 and 141, the Franklin Electric Manufacturing Company, of Hartford, Conn., and the Holophane Company, of New York, are showing a new railway reflector in connection with an 8 candlepower Novi incandescent lamp. The test rooms and vibrating machines demonstrate that the eight candlepower Novi lamp when used in connection with a Holophane-Novis reflector produces superior illuminating effect. A saving of 50 per cent. in current consumption and an increase of from 50 to 150 per cent in light is claimed.

A portable vestibule heater is being exhibited by the Consolidated Car-Heating Company. It is designed for use either as a portable or permanent heater and wired across the line voltage. The current consumption is from one to two amperes, as desired. An automatic cab heater switch is also exhibited by the above company. This switch is placed in the line of movement of the car door and when the door is closed over the controller the switch automatically cuts off the heat from the motorman's cab.

The usual trouble experienced when it becomes necessary to rebore engine cylinders, valve seats or true crank can be materially lessened by turning it over to a company making a specialty of this class of work. H. B. Underwood & Co., Philadelphia, Pa., devote a large part of their time and energy to the expeditious handling of engine repair work. Long experience has made it possible for them to do this kind of work in the minimum amount of time. The cylinder of an engine is being bored at the convention, to illustrate the method of handling the work. Power to operate the boring bar which is used can be taken from an electric motor or from an engine that will operate with steam or compressed air.

The General Electric Company's exhibit occupies about 3,000 square feet opposite the main entrance to the pier. It is arranged as usual with a view to permitting easy examination of all the material on exhibition and an attractive reception room is provided at one end. Among the interesting features of the exhibit may be noted a 1,000-kilowatt Curtis steam turbine for developing 12,000 volts at 60 cycles. This machine is entirely dismantled to show the simplicity and rugged construction of this machine. There are many other features about this exhibit of particular interest to street railway men.

A new departure from the ordinary thing in carbon brushes is the re-inforced carbon brush which is now being put on the market by the Speer Carbon Company of St. Marys, Pa. This brush is finished by a secret process which the manufacturer claims makes it close grained, dense, and free from laminations, and further that it will not split or crack under any conditions. This brush is made in three grades. Grade No. 1 is a medium hard, fine close-grained carbon and wears slowly. Grade No. 2 R is high grade, re-

inforced and can be used for current densities greatly in excess of those permissible with ordinary carbon. It presents a very soft frictional surface. Grade 27 R has a dense uniform texture, and a low resistance combined with perfect homogeneity and is especially adapted for single-phase work.

The Western Tube Company has on exhibition in its Booth 918 "Kewanee" Union (as a matter of fact they have lots of them, all kinds of them), but this particular union has been through a unique experience. All "Kewanee" Unions before they leave the factory are tested with compressed air under water, and this union was tested after it left the factory by fire and water (from the fire hose). It was in the bad fire the Plimpton-Hills Corporation (Hartford, Conn.) suffered recently, and was picked out of the debris after it cooled and sent to the Western Tube Company as a curiosity. "Just for fun" it was tested as it came, and it leaked very slightly; then it was taken apart and thoroughly cleaned, and under compressed air test proved itself "a real soldier under fire"—never sweated a drop!

Ask your neighbor at the convention what he knows about the Root snow scraper, then go and see it at Booths 78 and 80. The representatives will explain it more fully to you.

The Pressed Steel Car Company of Pittsburgh, Pa., has been unable to deliver the latest type of its well-known steel passenger cars in Atlantic City in time for the convention, and as a result will not have an exhibit as had been planned. It was intended to exhibit the new cars that are under construction by this company for the Philadelphia Rapid Transit but owing to the fact that the wheel gauge of these cars are five feet two inches instead of the standard gauge it was impossible to send the cars here on their own trucks. To dismount the bodies and ship them to Atlantic City would require too much time to allow a satisfactory exhibit to be made. The firm, however, is represented by W. H. Wilkinson, of the passenger equipment department, who is distributing a very handsome booklet illustrating the modern car for passenger transportation.

The Samson Cordage Works says that it has made a specialty of trolley cord for many years and that the points required for economy are fine strong yarn, smooth braiding and a thorough waterproof finish.

Progress is the motto of The Dressel Railway Lamp Works of New York. They recognize the fact that it is not possible to stand still, but that it is necessary to keep strictly up to date and abreast of the times. The advance that has been made in the manufacture of railway lamps must be seen to be appreciated. It has been but a few years since a tin lamp was considered good enough and a galvanized iron one was thought to be worthy of special mention. To-day, however, the Dressel Lamp works is making a steel lamp which has come to be recognized as standard by many large roads. The exhibit of the Dressel company in Booths 922 to 924 in the Ball Room, should be visited by those interested. A full line of headlights for electric roads, as well as oil burning headlights and signal lamps is manufactured by this company. They show a very attractive lot of samples.

The Dayton Manufacturing Company, of Dayton, Ohio, manufactures a basket designated by the trade name Rex, which is so constructed that it can be secured in place and each section, independent of any other section, can be removed without disturbing the brackets or connecting rods. This feature should commend itself very strongly when it is necessary or desirable to replace or to refinish, broken sections. The rack is made with either bronze rod or wire cord bottom, as may be desired.

HOW I MANAGE BAD CASES.*

BY H. P. VOMES, CLAIM AGENT, PUEBLO & SUBURBAN TRACTION & LIGHTING CO., PUEBLO, COL.

We have taken it that the subject presupposes a case where the injury is severe, the company liable and the claimant disposed to demand more than is just. The case may be one where there is no injury, at least no apparent injury, yet the proof of this fact is hard to establish. There may be a case where the injury is an honest one, yet the claimant is disposed to exaggerate his or her injuries. In any one of these cases, I have the injured party sent to a hospital that will treat the company fairly.

I take the usual precaution of bringing the motorman and conductor before me, and make a thorough investigation of the case. I interrogate them and cross-question them as if they were antagonistic, to the company; in short, I do everything that can possibly throw any light on the question. I take a detailed statement from each of them and file it with the records in the case. I immediately send the company's surgeon to investigate the case, and ask him to make all inquiry as to how the accident happened and to procure a verbal statement from the party. He makes to me a full report of the injury, which is, of course, filed with the case. I use the card system in getting the names of all witnesses that can be obtained. I have my assistant investigate all the circumstances of the case at once. Every witness who saw the accident is carefully interrogated and his statement reduced to writing and sworn to.

It often happens that the witnesses who were close say that they did not see the accident and have no statement to give. I have my assistant tell these people that it will seem that he has not done his duty unless he gets some statement from them, and that if they do not know anything, if they will kindly say so, it will put him right with the company. This prevents them from testifying against the company in case of suit. It often happens that the witness is a workman and is antagonistic to a corporation, but if he is informed that it will assist the motorman and save his job, the information can be obtained. I confer then with the legal department, if in doubt, and by the time I have all this information, the party is ready to see me, and I am ready to see him. I never tell anything but what I believe to be the truth. "Corruption wins not more than honesty."

I try to be fair, and more than that, I try to convince persons that I am their friend and that I am going to treat them fairly. I endeavor to find out as much concerning the life of the claimant as possible. I manage to find out the state where he was born, where he has lived, his religion and politics, his misfortunes and physical health. After I have done these things, I talk about things that are pleasant to him. I try to create a fellow feeling between us. If he is from the South, I tell him I have lived there; I find out if he or his people were in the late war between the states; I find out whom he or they were under, what battles they fought, if he served from Bull Run to Appomattox; I tell him that I had a brother who was a follower of the fortunes of Lee and Jackson. If he is from the North, I tell him my father was a Union man; that the Confederates "borrowed" his horses, and that they no doubt met on many a field. If he is from my state, I talk of things there that will make him know that we have many things in common. If he is from Missouri, I tell him that is not such a bad place; that I had to go there for a wife and ought to be the last man to say anything against the state. Such things may seem trifles, but trifles make perfection and perfection is no trifle. They make the claimant feel that you know him, appreciate him and are willing and anxious to aid him, which I always am. He feels kindly to you, that you are one of his people. He will more easily see things as you do. If he is honest, you are able to reason with him as to what he ought to receive. Ask him what he thinks he would like to pay if he were called upon to pay for a similar accident. I tell him what I have always paid in similar cases that are worse than his. You gradually get his ideas reduced to something that is fair and right. I then tell him that the company is opposed to my settling such claims unless it is upon a fair basis, that personally nothing would give me more pleasure than to pay him a large amount, that it is always a pleasure to help people. This is true, and I make him know it is true, but that I have a duty to perform by the company. I can not aid him at the expense of being unjust to my company. That I have two to satisfy, him and the company. That I can not do my full duty if I am unfair to either.

He is made to understand all this. If he is reasonable, I am generally able to settle with him without threats, which I never employ. If he will not settle at this time, I tell him that

I am sorry he does not see the matter as I do. I suggest to him that if we take the best view of it for him, he will have to give from a third to a half to the lawyer, and by the time that is done he is not as well off as he will be if he accepts my proposition. I tell him there is the "law's delay," that it takes from three to four years to get a decision in the supreme court and if the case is reversed and comes back for trial, it may be that all of us will be dead before the case is finally decided. It is rarely that the honest man will stand out for something he thinks unjust when he considers all these things. It often happens that the claimant comes to the office in a very angry mood. He is determined to have the matter settled at once. A check must be written out for him in some exorbitant amount before he leaves the office. I am told that some judge or former congressman, or senator, or other great legal light is just waiting to be engaged and that the amount sued for will be much larger than he now asks. In such cases I pursue the Fabian tactics, I play for delay. I convince him that I should not be required to pass on the matter instantly, that all he wishes is a "square deal," and while it may be that all he says is true, I should be given time to investigate. I have always made this so reasonable that I have never been denied this request. After the matter has dragged on for some time, I report to him that while he may be entitled to something, I can not pay the amount he demands without consulting with the general manager. I endeavor then to compromise somewhere between the amount I have offered and what he demands, but am never in a hurry to pay more than what is just and fair. Procrastination may be the "thief of time" and it is surely the savior of the company against dishonest claims. If I am still unable to compromise with the claimant, I tell him to think the matter over and come to me again and we will see if there is not some hope of a settlement. It is often true that he comes back before finally commencing suit, and we confer, and he reduces his demand and I increase my offer and the matter is settled. If there is no hope of settlement on a basis that is fair and right, I tell him then to begin suit. After the matter is in suit, it is often true that an adjustment is made on a basis of more than what I had first offered. We have never yet made an effort at compromise and failed, where the jury gave more to the claimant than our offer.

DISCUSSION ON MAINTENANCE AND INSPECTION OF ELECTRICAL EQUIPMENT.

Before presenting the report of the committee on this subject (which appears in the Electric Railway Review, October 15, 1907, page 489), L. L. Smith, who represented the committee said that Mr. Lindall, the chairman, had divided up that work into three parts. Data sheets were prepared for each of these parts, and each of the members of the committee received the replies relating to his part and worked up his report individually. Mr. Wright had to do with the manufacture of coils, impregnating, and shop methods in general. Mr. Munger had the care of wiring, car equipment and inspection. The speaker had the miscellaneous motor equipment, such as commutators, brush holders, etc. After these data sheets had been received and worked over, the committee held a meeting and prepared the report.

C. B. Fairchild (Electric Traction Weekly) asked for a discussion of Time versus Mileage Inspection, and suggested ton mileage as a basis for inspection.

Mr. Smith replied that the matter of ton mileage as a basis of inspection has not been considered by the committee, and, in fact, so far as he was concerned, it has not occurred to the committee.

William Roberts (Northern Ohio Traction and Light Company) said he took about a 200-mile basis for inspection. Cars were inspected every night in the barns, and every day at the terminus for everything. That is, the men at the terminus of the road, on both interurban and city cars, made the inspection every day of the motors on the floor, and made necessary adjustment of brakes. As operation was over heavy grades, including one of 13 per cent, it was necessary to be very careful, especially of brake inspection. There was also a very careful inspection at night in the barn.

E. W. Olds (Milwaukee Electric Railway and Light Company) said that although he was a thorough believer in the mileage inspection idea conditions had prevented him from carrying it out. Also, he believed in frequent inspection. If a car is in perfect condition it will stay out. A city car in reg-

* Read before the American Street and Interurban Railway Claim Agents' Association at Atlantic City, N. J., October 15, 1907.

ular service should have a general and thorough overhauling at least every four months; should come into the shop, the brakes be looked at, the motors opened up, and everything gone over carefully.

J. W. Harper (Capitol Traction Company, Washington, D. C.) said that he overhauled cars frequently, and did not let them remain on the road until they were run down. He always took those in that had made the greatest mileage. A certain number of cars had to come to the shop every week for a general overhauling; and the inspection at night at the barn averaged about every fourth night, this giving the barn inspection time enough to go over the whole car. The general inspection included overhauling and was made about every six weeks.

In reply to a query as to how his company could keep 95 per cent of the equipment ready for service without night inspection, Mr. Olds said he found the usual condition to be like this. That if running 100 regular cars there would be needed 100 extras. Thus about 50 per cent of the cars are in the house during the day time, except for morning and evening rush hour service. By handling the equipment right, the most of the necessary inspection could be done and still have the car go out for the evening service. By so doing he could keep within the 50 laid up for repair. Very often his company had—unless some car has been in a bad wreck or something of that kind—all cars ready for Sundays and busy days.

TODAY'S CONVENTION PROGRAMME.

WEDNESDAY, OCTOBER 16.

American Association.

(Steel Pier.)

9:30 A. M. to 1:00 P. M.

Convention called to order.

Address of welcome—by the Hon. F. P. Stoy, Mayor of Atlantic City.

President's address.

Report of executive committee.

Report of secretary and treasurer.

Addresses by presidents of affiliated and allied associations.

Announcements.

New business.

Reports of Committees—(a) Membership; (b) compensation for carrying mail; (c) subjects; (d) car wiring; (e) standardization of equipment.

Paper—"The Technically Trained Man and the Electric Railway Profession," by Prof. H. H. Norris, Cornell University, Ithaca, N. Y.

Paper—"The National Fire Protection Association," by Ralph Sweetland, Boston, Mass.

Paper—"The Influence of the Design of Railway Structures on Economy of Operation," by H. T. Campion and William McClellan, consulting engineers, New York, N. Y.

Engineering Association.

9:30 A. M. to 1:00 P. M.

Joint meeting with American association and allied associations. (Steel pier.)

2:30 P. M. to 5:30 P. M.

Paper—"A Year's Experience with Gas Engines," by Paul Winsor, chief engineer motive power and rolling stock Boston Elevated Railway Company, Boston, Mass.

Paper—"Some Practical Points in Steam Turbine Construction; with Particular Reference to the Parsons Type," by St. John Chilton, engineer Allis-Chalmers Company, Milwaukee, Wis.

Paper—"Operation of Curtis Turbines in Railway Service," by August H. Kruesi, engineer General Electric Company, Schenectady, N. Y.

Paper—"Recent Developments in Steam Turbine Power Station Work," by J. R. Bibbins, engineer Westinghouse Machine Company, East Pittsburg, Pa.

General business.

Election of officers.

Accountants' Association.

9:30 A. M. to 1:00 P. M.

Joint meeting with American Association. (Steel Pier.)

3:00 P. M. to 6:00 P. M.

Paper—"Mechanical Devices and Other Office Appliances," by F. E. Smith, auditor for receiver Chicago Union Traction Company, Chicago, Ill.

Report of committee on "Standard Classification of Accounts and Form of Report."

Report of committee on "International Standard Form of Report."

Claim Agents' Association.

9:30 A. M. to 1:00 P. M.

Joint meeting with American Association. (Steel Pier).

2:30 P. M. to 5:30 P. M.

Paper—"The Claim Department and What Should be Done to Make it Effective," by C. B. Hardin, claim agent United Railways Company of St. Louis, St. Louis, Mo.

Paper—"Instruction of Employees in Accident Work," by F. W. Johnson, assistant claim agent Philadelphia Rapid Transit Company, Philadelphia, Pa.

General business.

Election of officers.

PRODUCTS OF THE AMERICAN BRAKE SHOE & FOUNDRY COMPANY.

The exhibit of this company shows brakeshoes for electric railway equipment ranging from the flanged and unflanged shoes of the M. C. B. Christie type similar to steam railroad practice, to the narrow tread wheels of street railway equipment. Brakeheads and brakeshoes for wheels with 3-inch tread and over are exhibited, the brakeheads being such as to take M. C. B. Christie type of brakeshoes, and the brake shoes can be applied to any M. C. B. Christie brake head. Thus the shoes and heads are interchangeable with steam railway equipment as regards the attachment of brakeshoes to the head. These shoes are shown with the various types of wearing face in general use on electrical equipment made up with steel backs and wrought lugs for reinforcement, and with the ordinary cast lug without reinforcement.

The narrow tread wheels have a narrow brakehead to apply to the back of the shoe for narrow tread wheels outside of the flange. These shoes are made up with or without steel backs and wrought lugs, as may be desired. The exhibit shows both kinds, with a variety of brake heads for Peckham, Brill and Taylor trucks, all of which take a common shoe and a common brakehead key.

Many of the railroads in the East have taken kindly to the steel back wrought lug shoe for narrow tread wheels, and are said to be changing their brakeheads to take a common shoe wherever possible. The narrow tread shoe and head are coming into use where it is desired to reduce the number of brakeshoe patterns and to use a shoe which can be reversed in the head to reduce the loss from taper wear. The design lends itself to the same method of reinforcement obtained on the shoes in steam railroad practice which permits the minimum scrap weight, at the same time permitting a much lighter new shoe than is possible where the brakehead extends over both flange and tread. It is the idea to abandon this narrow tread head and shoe just as soon as equipment is changed to take the wider tread wheels, which will permit brakeshoes and brakeheads which will interchange with M. C. B. practice. The exhibit fully illustrates the brakeshoes and brakeheads proposed by the subcommittee of the American Street and Interurban Railway Association and the Central Electric Railway Association. The company states that it has over 75 designs of brakeheads for narrow tread wheels, all of which take the same brake-shoe and replace 75 distinct types of combination heads and shoes which are not interchangeable, and is prepared to design brakeheads to take a common shoe for any railroad wishing to reduce the number of patterns and cost of brakeshoe maintenance.

All interested are cordially invited to visit Booths 410-416, where the exhibits of the American Brake Shoe & Foundry Company are on view, and see for themselves how the proposed brakeshoes and brakeheads for wheels with 3-inch tread and over, interchange with the M. C. B. standards.

The question as to the best location for the toilet room in an interurban car has been answered in various manners. Some railway managers prefer the rear corner while others place it against the smoking partition. The Niles Car & Manufacturing Company, Niles, O., seems to have solved the question, however, by placing the toilet room on the rear vestibule, utilizing space which is usually wasted and allowing seats for two more persons within the car. The partition is so arranged that it allows access to all rear vestibule windows and entrance from inside the car. The company has built cars in this manner for the Milwaukee Northern Railway, Hudson Valley Railway and Detroit Monroe & Toledo Short Line Railway.

LIST OF EXHIBITS—ADDITIONS AND CORRECTIONS.

The following additions and corrections make complete to date the list of exhibits published yesterday.

- Atlas Anchor Co., Cleveland, O.—Atlas anchors, diggers and setters. Represented by C. A. Smith, J. H. Turner.
- Berry Brothers, Detroit, Mich.—Showing panels finished with railway varnishes. Represented by F. W. Hormann, T. J. Lawler, Geo. M. Kerr and Geo. F. Klock.
- Dearborn Drug & Chemical Company, Chicago, Ill.—Treatment for boiler feed water; high grade lubricants; hydraulic elevator compound; multiple and triple effect compounds. Represented by Robt. F. Carr, Wm B. McVicker, Grant Spear, G. F. Duemler, H. G. McConnaughy.
- Flexible Compound Co., Philadelphia, Pa.—Flexible compound, a waterproof and acidproof binder for paints and varnishes, and an insulator and rust preventative. Represented by Thos. H. Downward, S. F. Osborn, George Simpson.
- Grothwell, A., New York, N. Y.—Mogul insulating compound, armature varnish, cross-arm paint. Represented by A. Grothwell.
- Holmes & Allen, Wellington, New Zealand.—Flexible under-running trolley head for electric tramway systems; also, non-fouling swivelling trolley head. Represented by Garnet B. Holmes and assistant.
- Justice, Phillip S. & Co., Philadelphia, Pa.—Reliance hydraulic jacks: 10-ton ground lift, 15-ton car box and 30-ton round ground base patterns. Justice spike puller, for pulling spikes straight. Represented by Phillip J. Mitchell, O. L. Wright, E. J. Mitchell, W. F. Siegner.
- National Brake & Electric Company, Milwaukee, Wis.—Various types of air compressors ranging in capacity from 11 to 50 cubic feet. Also a 25-foot alternating current and direct-current compressor; two portable compressing outfits, one having a capacity of 11 feet and the other of 50 cubic feet. Schedules MSH. and TSH., embodying a new type of emergency and quick release valve, with all apparatus included in an installation for a motor and trailer car. Represented by R. P. Tell, A. I. Wailles, J. T. Cunningham, G. C. Anthon, W. H. Goble, C. N. Leet, W. R. Crawford, B. S. Aikman, W. M. Bisel, W. J. Richards, G. J. Johnstone, J. R. Petley.
- National Fibre & Insulating Company, Yorklyn, Del.—Peerless insulation and standard hard fibre. Represented by J. W. Marshall.
- Pike Adding Machine Co., Orange, N. J.—Pike adding machines, 6, 8 and 10 bank styles, hand and electrically operated. Represented by J. T. Langhorne, J. F. Calef, B. C. Alexander, M. H. Sheck.
- Quincy, Manchester, Sargent Company, New York, N. Y.—Bonzano joints for tee rail and girder and high tee rail; Bonzano cast steel compromise or step joints; Q. & C. Stanwood steps, anti-creepers, and malleable iron and pressed steel rail braces; general machinery for electric railway use. Represented by C. F. Quincy, J. H. Allen, E. M. Smith, George T. Briggs.
- Ridgway Dynamo & Engine Company, Ridgway, Pa.—Photographs of products and plants installed. H. A. Otterson, S. Bowman Wheeler.
- Smith Computing Table Company, Jamestown, N. Y.—Computing machine for figuring wages, either time or piece-work. Represented by A. J. Ruttenber.
- Standard Roller Bearing Co., Philadelphia, Pa.—Roller and ball journal, thrust bearings, special exhibition of journal running on Syracuse Rapid Transit Co. for five years, motor in operation equipped with ball-bearings. Represented by William H. Hansell, William C. Weber, T. J. Heller.
- Standard Steel Works, Philadelphia, Pa.—Various types of car wheels, axles and steel springs. Represented by E. Sidney Lewis.
- U. S. Metal & Mfg. Co., New York, N. Y.—Perfect and Victor car replacers, Columbia lock-nut. Represented by B. A. Hegeman, Jr., Edward D. Hillman, Thomas Beaghen, F. C. Dunham.
- Universal Adding Machine Company, St. Louis, Mo.—Universal adding machines, both hand and electric. George A. Henrich, C. H. L. Flintemann, C. H. Hunter, Thomas H. Brown.
- Weston Electrical Instrument Company, Newark, N. J.—Weston voltmeters and ammeters, both alternating and direct current; display of portable wattmeters, bridges, Weston standard cells, multimeters and instruments of

precision for laboratory testing. Special feature is new line of alternating current instruments, volt and ammeters, for switchboard and portable use. Represented by Dr. Edward Weston, Caxton Brown, F. A. Gilbert, Charles P. Fry.

Westinghouse companies, Pittsburg, Pa.—The Westinghouse Electric & Manufacturing Company in addition to the equipment enumerated in our last issue is showing a storage battery switchboard and regulator for maintaining constant load on railway power stations and substations.

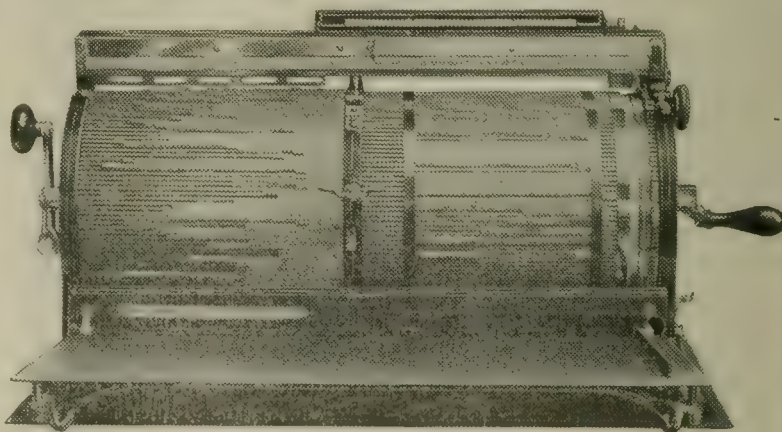
Wendell & MacDuffie, New York, N. Y.—Indestructible service board, Fibrite and imitation tile work; Falk gears and pinions; K. & M. asbestos building lumber and reinforced asbestos corrugated sheathing. Represented by Jacob Wendell, Jr., R. L. MacDuffie, H. E. Oesteriech, O. C. Ferens, C. F. Field, George C. Morse.

THE GAMMETER MULTIGRAPH.

A unique office device of great diversity of use, particularly in connection with railroad work, is the "Multigraph," which is attracting favorable attention on the Steel Pier.

The Gammeter multigraph is a machine of two-fold purpose, adapted for both typewriting and printing. Its extreme simplicity is one of its prominent features. It is readily operated by any office boy or girl at a speed of 2,000 or more complete typewritten letters or printed forms per hour, and requires practically no experience to operate it successfully.

The uses of the machine in connection with railroad work are many and varied. As a multiple typewriter, it is being used in electric railroad offices for producing instructions to division superintendents, car barn foremen, powerhouse and substation employes, and all the similar circular work which every electric railway company sends out almost daily. It is being largely used, also, in public educational work. Multigraph letters, being actually typewritten, command the personal attention of those whom railroad companies desire to interest in any municipal campaign. The



The Gammeter Multigraph.

Cleveland Electric Railway Company, of Cleveland, O., has found the machine valuable in this way during its three-cent fare agitation.

The greatest saving of the Gammeter multigraph, however, probably is due to its capabilities as an office printing press. There are hundreds of forms in railroad work which can be printed on this machine, at a saving of 50 per cent. of the printer's charge. No extra or high-priced experienced help is required for this work, as the type-setting is automatic, and about all the operator must know is his alphabet. The saving in time is as great as the saving in money, because the work is secured when it is wanted, as it is wanted and in unlimited quantity.

The machine will print any form within the dimensions of 8½ by 17 inches, and on any kind of paper from tissue to cardboard. It takes up no more room than an ordinary typewriter, and is operated with just as little inconvenience. The Interstate Commerce Commission is said to have officially approved the machine for tariff purposes.

Officials in attendance at the convention will find it worth while to see the machine in operation at the American Multigraph Sales Company's exhibit on the Steel Pier. The home office of the company is at Cleveland, O., with branch offices in nearly every important commercial center. The Atlantic City exhibit is in charge of Mr. J. F. Howison, manager of the Philadelphia branch. Mr. M. M. Horr, advertising manager, also has been in attendance.

REPORT OF THE COMMITTEE ON OPEN VERSUS CLOSED TERMINALS FOR CAR HOUSES.*

On investigation of the points at issue in the proposed discussion, it appears that there has been some misinterpretation of our subject.

It can be established beyond all reasonable doubt that there is no question about open or closed storage for cars that are not in operation or out of season equipment. It is certain that a car standing idle will depreciate faster in the open than it would if placed under cover—let this cover be a building, canvas or any other protection. Besides, a greater expenditure for maintenance would be required than what is represented in the saving of the first cost of the cover, plus the maintenance of a protected car. So we are presuming that our subject evolves itself into a discussion as to whether or not it is economical and desirable to operate cars out of an entirely closed depot or out of a terminal that only has a shelter for offices, men's quarters, inspection shed, etc., and with the trackage in general or part unprotected.

Then the subject before us deals with live cars and rolling equipment in service. As soon as a car is not fit for the road for any length of time it is to be taken off the premises and put into permanent protected storage or shop. Again, open terminal operation would not be a fair question in climates subject to severe weather conditions, say, where there were long, rainy seasons, or much snowfall. Then an open terminal would have an advantage where a considerable percentage of the rolling equipment was changed each season. Take the case of summer and winter cars, where summer cars are used four or five months and closed cars the remainder of the time. Here the equipment is out of service and placed in a regular storage barn; so in this case a car is protected a considerable portion of its existence, let it be or not be operated from an open yard.

If a railroad company is not able to obtain a large amount of money at one time, an open terminal would seem to have a considerable advantage and be worthy of important consideration. Then the existing conditions are liable to vary on account of consolidation of lines or other causes; and in this modern day of different ideas of different organizations, there is often a question about permanent location, so here we have another point commendable for the small investment.

In order to make the discussion clear and intelligible, several layouts are submitted that represent actual practical examples of car barn operation that are now being carried out on some of the large properties.

Referring to Figure 1, we have a closed operating depot. The general construction is pretty well illustrated in the figure. There are twelve tracks under cover and one track outside. The offices, men's quarters, lockers, toilet rooms, etc., are on the second floor at the front of the structure, while at the west side are provisions for starter, another toilet and bins for sand, coal, salt, coke, a compartment for oil and lamps and a storeroom.

The special work is arranged so that cars may enter the building in the front and leave by the rear. There is a pit 150 long under each track, so that a car entering the barn must necessarily pass over it before being permanently placed. All the floors are 5-in. concrete, cement finish on a sub-base of 12 inches of ashes.

The walls of the building are of brick, 12 inches thick, with 24 by 20-in. pilasters on 16-ft. centers, and there are four bays, each containing three tracks, so that the fire risk will not be excessive in any one compartment. There is a clear space of 16 feet under trusses, and the roof is of heavy mill construction with wire-glass skylights and galvanized iron ventilators. Trolley wire is protected by troughing and light wire is enclosed in metal conduit approved by the underwriters. There are ample provisions for other fire protective apparatus; outside fire hydrants, inside fire hydrants, chemical fire extinguishers, fire pails, auxiliary fire alarm and a sprinkling system.

It is understood that the committee does not submit the details of the depots as a criterion or standard type, but is presenting the layouts as representing permanent modern construction, with all necessary requirements; but at the same time of economical design. It is evident that the cost per square foot will be low as compared with some of our present structures that represent operating depots. Many are long spans, high roofed and elaborate in detail, that would often mean an increase of 50 per cent over the figures that we are about to use. It is noted that the cost of a sprinkling system is included in the terminals, but in using figures for open terminals against closed terminals, no advantage is taken of the cost of the sprinkling equipment.

But it appears that in using an open yard for operating it would not be very practical to install a sprinkling system, as fire hydrants, chemical fire extinguishers, water pails and an auxiliary fire alarm system would be sufficient.

Now the same barn illustrated by Figure 1 may be considered an open operating terminal by simply cutting a portion of the building as designed by line A B on drawing. Then we would have offices, men's quarters, etc., still intact and protection for 100 feet of pits so that repairs and inspections could be comfortably carried on. Similarly any portion of the operating barn outside of line A B may be taken away.

Figure 2 is intended to show another layout, but somewhat on a different plan. In this example the offices, men's quarters, inspecting shed, etc., are separate from the barn proper and do not represent a minimum space design, but have the advantage of convenience. Here it is taken that the barn is located at the end of the division and also is the turning point for cars when in service. We also have pits 150 feet long, as previously figured, but in addition there is an inspection shed with a pit that is protected. So that each trip a car makes in going around the loop it must pass through the inspection shed and over the pit, where it is examined and inspected by the regular housemen. Again, the major portion of the repair work is done in the day time, and night repairing, when cars are supposed to be in storage and out of service, is reduced to a minimum. Considering the layout as a closed terminal, we have four tracks in each bay, and the walls are of brick and the roof made up of steel trusses arranged with louvers of skylights the entire length. Here we also have 16 feet under trusses and a concrete floor. Separate buildings are of substantial brick design and of one-story construction. The fire protection for the entire design would follow on similar lines to those described in the first figure.

Figure 2 may be considered an open terminal by retaining the office building, inspection shed and pits. The cars in the yard under such an arrangement would have no protection. Again, any portion of the barn proper may be retained.

Figure 3 shows still another form of an open car barn terminal, where the scheme of Figures 1 and 2 are consolidated. Like Figure 2, the office building is a separate structure, but similar to Figure 1, part of the trackage is protected for inspections and repairs. However, in this layout we have a terminal that would take care of 50 cars, where in the others suggested 84 cars would be operated. Besides, the design only allows cars to enter from one end of the property, and if single equipment was operated the cars would be required to back into and out of the property; so double-end operation would be more favorable. In this layout it is noted that provision is made for proposed closed barn some time in the future. It seems it would be good practice in building an open operating terminal under any conditions to allow for converting it into a closed terminal, if ever in the future it is considered advisable.

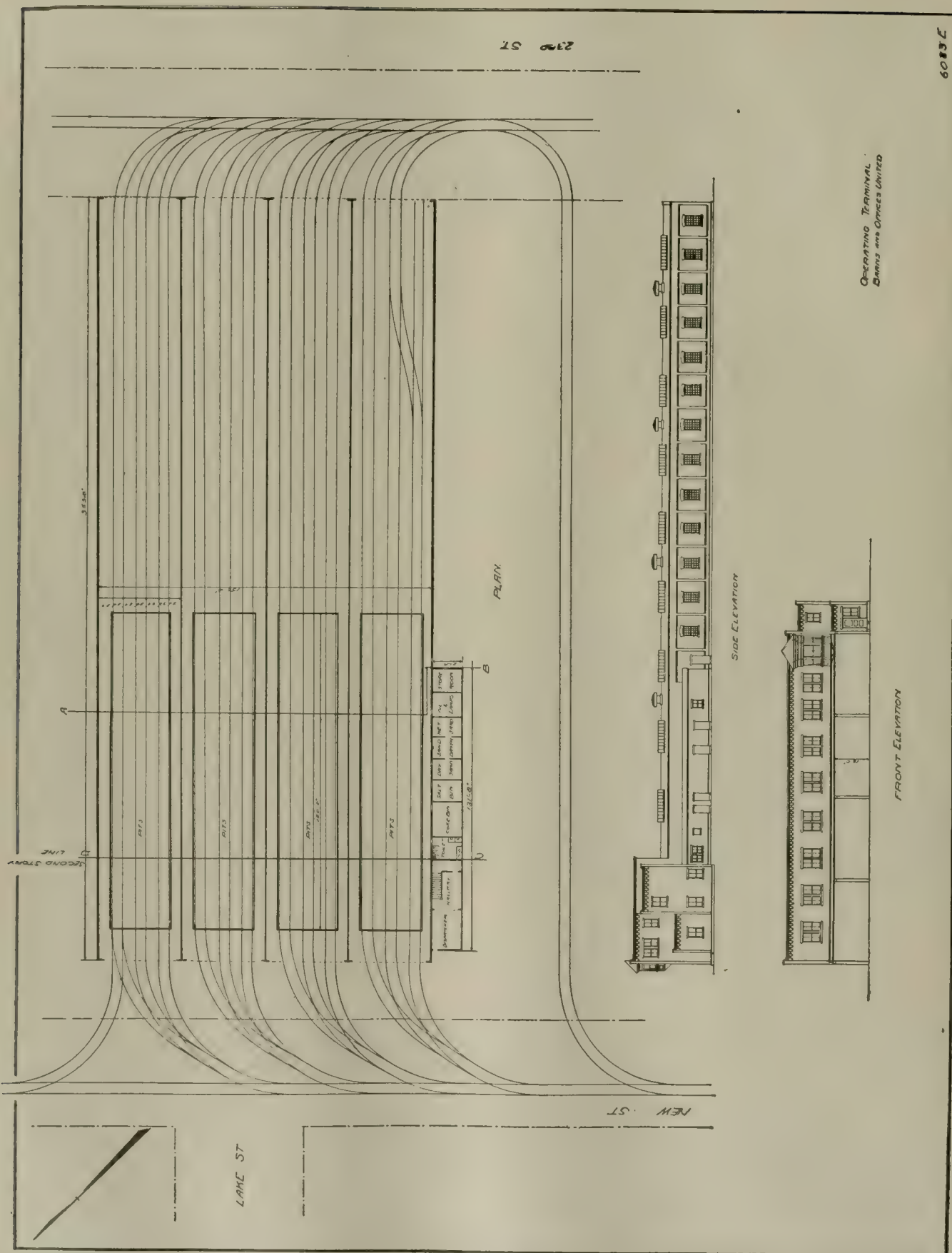
Below is an estimate of the cost of the different depots that have been referred to above. In the estimate submitted only the price of the building has been considered, for it is understood that the track layout, when we are comparing open and closed operating depots at the same location, is practically equal, so that the question of trackage does not enter into the discussion:

Comparison of Costs.

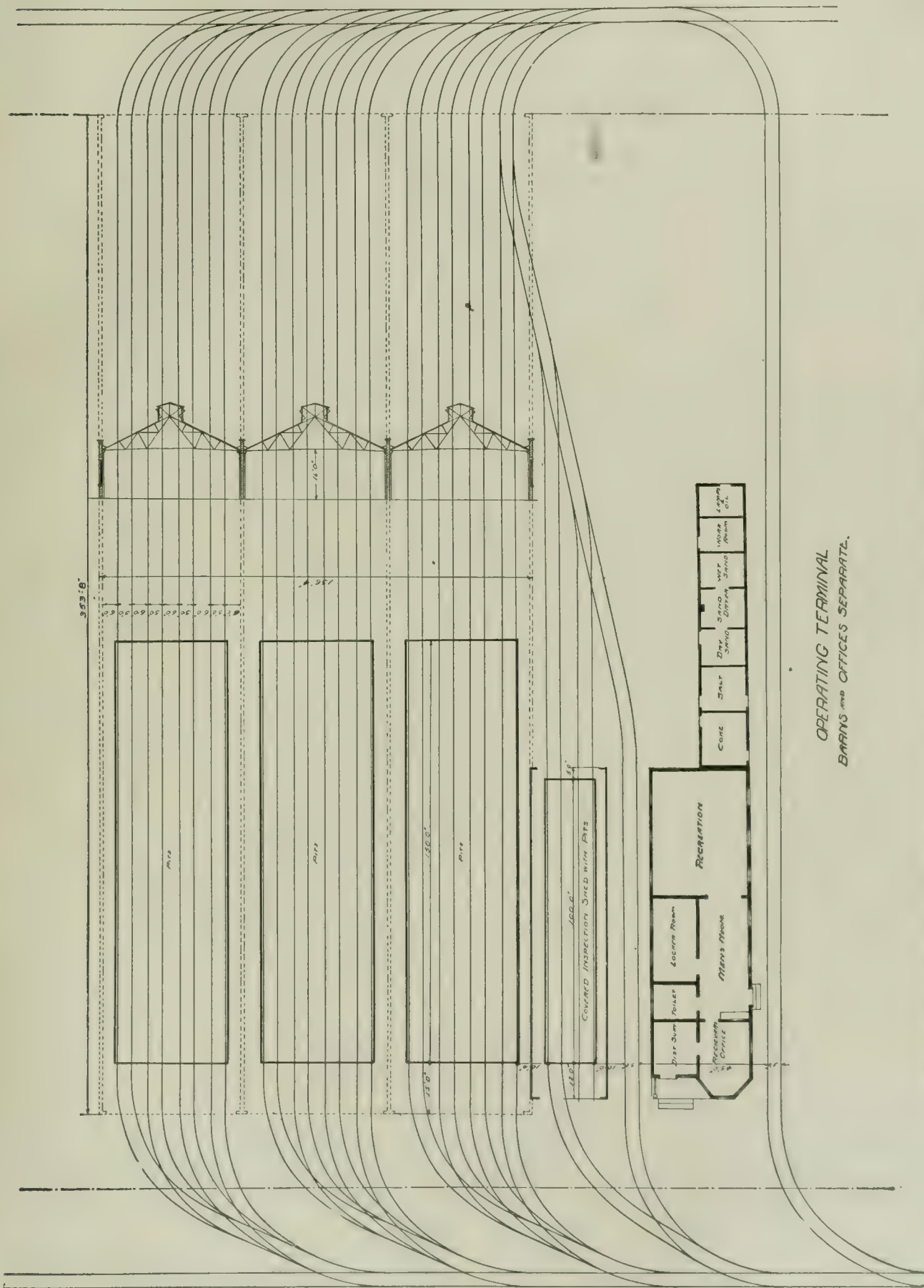
Figure 1, closed terminal.....	\$105,000
(plus \$14,000 sprinkling system)	
Open terminal cut off at line A B.....	45,000
Difference	\$60,000
Figure 2, closed terminal.....	\$108,000
(plus \$14,000 sprinkling system)	
Open terminal trackage unprotected.....	25,000
Difference	\$83,000
Figure 3, closed terminal.....	\$108,000
(plus \$14,000 sprinkling system)	
Open terminal, offices remain and 100 feet of barn....	49,000
Difference	\$59,000

Referring to Figure 1, the open car barn layout, shows a saving in the first cost of \$60,000 over the closed barn; and figuring 5 per cent on investment and 7 per cent on insurance, taxes, maintenance and depreciation, we have a total of 12 per cent, which represents an annual saving of \$7,200. Of course, there may be further variations in the saving by simply changing the area of the protected section of car barn; in other words, when we increase the building covering a

* Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 15, 1907.



Open Versus Closed Car House Terminals—Figure 1—Operating Terminal, Barnes and Offices United.



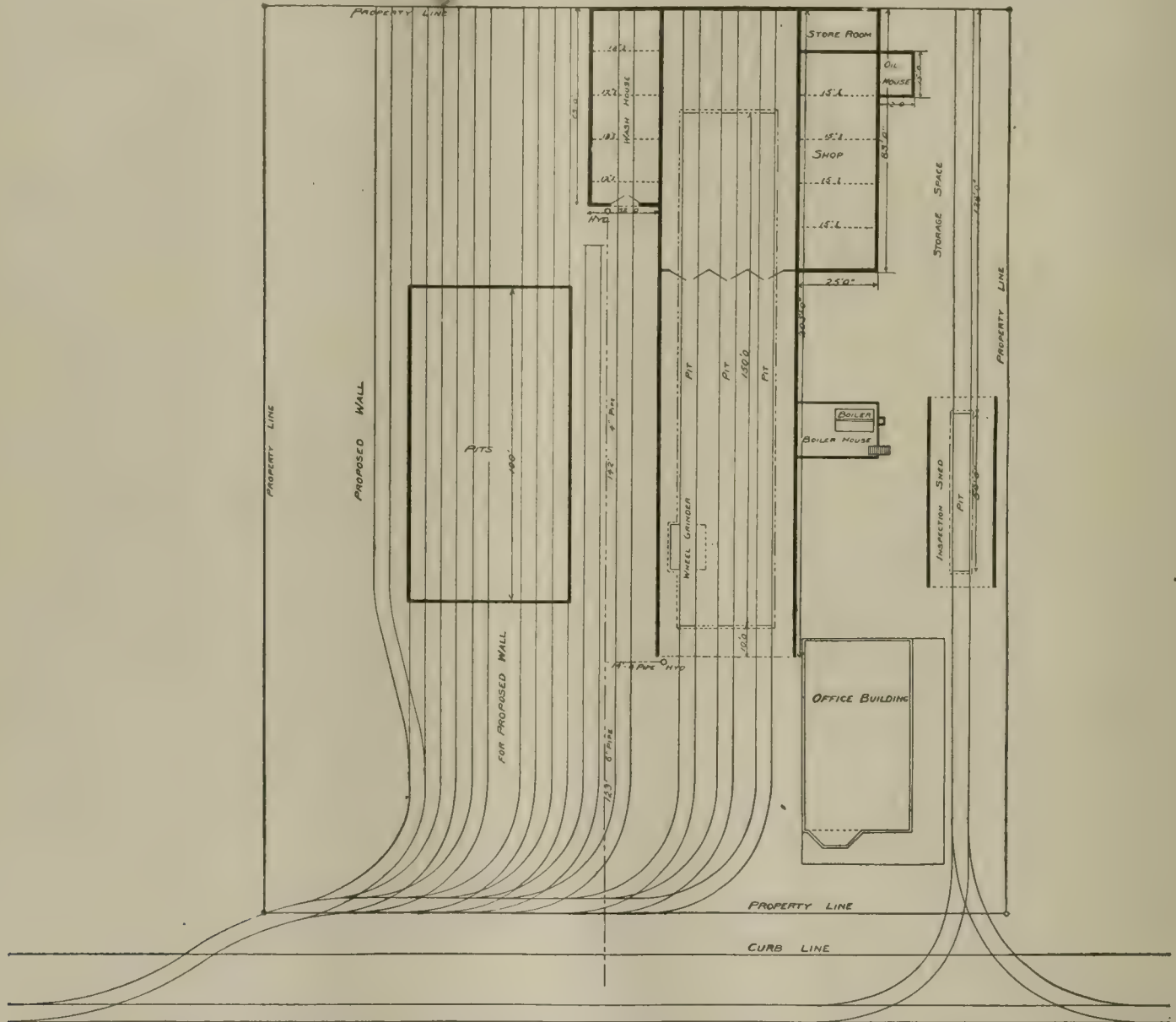
Open Versus Closed Car House Terminals—Figure 2—Operating Terminal, Barns and Offices Separate.

portion of the tracks, the annual saving decreases, and when it becomes nothing we have a closed barn.

Figure 2, open car barn layout, shows a saving in the first cost of \$83,000 and \$59,000 respectively, and an annual saving of \$9,960 and \$7,080.

From the above it is plain that there is good reason for considering an open operating terminal. To take a concrete example, and as afterward will be explained, it is not held that the particular property or condition designated generally applies, but it is necessary to know what are the conditions the property is subjected to, in order to come to any decision for or against an open or closed operating barn. In the layout in Figure 1, figuring the length of a car to be

equipment out of the barn all the time. The terminal designated when considered as an open barn, cut off on line A B, is designed to protect about one-third of the equipment. In other words, all cars standing in the barn from six o'clock in the morning until 12 o'clock at night are protected, and the different cars could be housed on different days. Certainly, those that were disabled would naturally be the ones retained in the barn, so it appears the principal advantage of a closed terminal in this particular instance is the fact that from twelve o'clock at night until six o'clock in the morning two-thirds more cars are under cover, which is not the case with the open arrangement. This means besides the first cost of investment of \$60,000 it is worth \$85 per car



SEMI CLOSED TERMINAL.

Open Versus Closed Car House Terminals—Figure 3—Semi-Closed Terminal.

50 feet, including clearance, the barn would accommodate 84 cars; assuming that two-thirds of the cars are regulars, running from six o'clock in the morning to twelve at night, and one-third are trippers that are on the road six hours out of the twenty-four, and all the cars are in the house from twelve at night until six in the morning, then we have the following figures:

Total hours possible with the equipment.....	84 x 24=2,016
Regulars	56 x 18=1,008
Trippers	28 x 6= 168

Total	1,176
against a possible 2,016, so we have about 50 per cent of the	

per year for every car that is being operated in order to accomplish the result. Figuring that it costs \$400 to maintain a car for a year and the entire maintenance for body, painting and varnishing is 25 per cent, we would have \$100 for these items, which makes it appear favorable for the open yard. In Figure 2 we do not have the advantage of protecting one-third of the equipment between rush hours, but, on the other hand, the difference for an open terminal would be \$83,000 and \$59,000, first cost of investment and \$118 and \$84 per car per annum. A master mechanic of a very large road once made the statement that the life of the paint is 50 per cent less for open yard operation than for closed operation, and the maintenance for modern electric equipment

is the same, while the deterioration of bodies and woodwork is not over 25 per cent in favor of a housed car.

On the other hand, there are considerations backed by important advantages for tracks that are entirely protected, and those advantages go a considerable way in neutralizing the saving we have designated. The bad feature about a car being outside all the time is that the joints in the woodwork do not have an opportunity to dry out, causing a rapid deterioration. Panels become wet and spongy all the way through and their life is shortened, as well as that of the roof. When the rolling equipment is entirely protected by a cover there is ease of inspection, and this has more significance than its literal meaning, because in severe weather it is unfavorable for workmen, who will not do as well when they are forced to work in discomfort and exposure. Experience has proven that attention and proper repairs to cars in the open are neglected and encourages carelessness on the part of the housemen. Naturally, the little necessities will be let go for another time, which is sure to have a serious effect on the economical maintenance of the equipment and increasing depreciation. In fact, it is very difficult for any one to anticipate how much open inspection or storage of cars does affect the entire cost of maintenance, on account of the reasons referred to. It is not only the direct results of the paint, varnish, woodwork and wiring that are affected but how much does the rest of the equipment suffer? Of course, this argument is very materially reduced when cars are taken care of in an open barn, as in Figure 2, and where they are inspected every trip. There is no doubt that considerable inconvenience, as well as cost, is caused in open terminal operation during severe weather. Brakes are set when a car is run in and the motors are more or less heated, and then snow drifts in so that as soon as the equipment cools off sufficiently to freeze, the brake shoes hold fast to the wheel. Also, it is necessary to send out the cars in severe weather on the road unclean, which is more or less unsatisfactory.

Another consideration for the closed terminal is the increase in the number of extras that are run on most systems, especially in large cities. With many companies practically the same number of extras are handled as regulars. This increases the number of cars to keep in storage between rush hours. Then, when the terminal is large, there is the advantage of dividing it into separate compartments for better fire protection.

Summing up the situation, it is positive that a marked saving could be made if the conditions on the particular property were favorable by using an open layout. But the committee is not prepared to make a general statement recommending either open or closed terminals without first knowing the conditions that exist on the particular property. However, below are seven questions and answers, which would seem to make it a comparatively simple matter to decide for or against an open or closed terminal:

Questions:

(1) Climate? (2) Finance? (3) Do you anticipate any change in desired location? (4) Are the same cars operated the entire year? Or do you have an open and closed car barn equipment, with permanent storage for out of service cars? (5) What proportion of the 24 hours are all of your cars housed? What proportion of cars are in barn between rush hours? (6) Do you intend storing out of season or out of service cars at operating terminals? Or do you have other locations for permanent storage? (7) Is most of the repairing and inspection of rolling equipment done in the day time or at night? And will barn be located so that an arrangement would be desirable, as shown in Figure 2?

Conclusions:

(1) Mild and comfortable climates would be favorable to unprotected yards. Extreme weather would make closed terminals desirable. (2) Inability of management to get large sums of money for investment would favor an open terminal. (3) Anticipated change in location would want an open terminal. (4) A large proportion of cars when out of season stored in separate storage barns leans toward unprotected terminals. (5) The more cars housed and the less on the road the entire 24 hours favors protected trackage. (6) If the terminal is used for storing out of service cars, as well as actual operating rolling equipment, it makes protected depots a necessity. (7) If terminal is located at lay-over point or end of trips for all cars, so that they may be inspected at turning points and no repairs are made at night, this would be a point in favor of an open operating barn.

Respectfully submitted,
EDWIN W. OLDS, Chairman.
JOHN HANF,
MARTIN SCHREIBER,

THE SELECTING AND TRAINING OF INVESTIGATORS AND ADJUSTERS FOR THE CLAIM DEPARTMENT.*

BY ELLIS C. CARPENTER, CLAIM AGENT, INDIANA UNION TRACTION COMPANY.

This is a subject that the writer feels is one to which he cannot do justice and should have been assigned to some one of broader experience. Inasmuch as our worthy secretary has been so insistent and one of the first qualifications of an adjuster should be loyalty, I have consented to take a look at the subject from our view-point, not with the idea of being able to instruct those who may listen to the reading of this paper, but more with the idea of contributing something on the subject, trusting that it will be followed by a lively discussion in which there will be an exchange of ideas and out of the whole there will be much benefit.

Let us look at the investigator first. I assume it to be the duty of an investigator, in pursuing the investigation of accidents and matters incident thereto, to secure reliable and accurate information and develop a state of facts from which the adjuster, or head of the claim department, may determine what should be done in the particular case under consideration, and whose statements, where necessary, will be verified by sworn testimony.

Qualifications.

In order to do this, what are some of the qualifications which a successful investigator should possess? He should be loyal to his department and the interests of his employer. He should be of pleasant address and sufficiently familiar with the English language to be clear in his statements. In some localities where there is a large foreign population, he should also be able to speak whatever language is spoken by the class of people with whom he is expected to deal. His penmanship should be legible and his spelling correct, although in securing evidence, and taking statements of witnesses, the best results are obtained by using the peculiar expressions of the witness and putting the statement as nearly as possible in the witness's own words, being careful to make it clear as a whole. He should have a spirit of fairness in his manner and dealing that will win the confidence of the persons with whom he comes in contact, together with frankness and sincerity in seeking information. His countenance should be open, with the ability to look his man squarely in the eye, without wavering, but with a softness of expression that will at once tend to put him on easy terms. These will be sufficient to successfully deal with fully three-fourths of the general public.

But what of the other one-fourth? Among these latter will be found persons of all ages, types and nationalities, and with all the peculiar characteristics with which peculiar people are endowed. It is the latter class (if we may so class them) that taxes the ability of the investigator. In order to successfully meet and secure information from such, we will suggest some other characteristics and conditions that will aid the investigator in his work. His countenance should be pleasing, his personality attractive, with a sufficient force of character to command the respect of others. His manner should be considerate, not officious; willing, if necessary, to listen to a tale of woe and by a proper show of sympathy or a pertinent remark in a humorous or other vein, to turn the mind of the witness in the proper channel and guide his thoughts along the right line without apparent effort. His sense of humor should be sufficiently developed to appreciate a story when told by the other fellow, so as to enable good terms to be established between the parties, but sensible enough not to let his own humor run rampant.

He will find many persons who are critical and fault-finding, but after the criticism has been made or the fault (either real or fancied) pointed out, he will seldom find it necessary to flatly contradict it, although he may know it to be wrong, but he can indicate some of the troubles of a motorman or the things which harass a conductor, appealing to the sympathies of his man, by putting him in the conductor's place and seeing what he would do under like circumstances.

He should be able to adapt himself to circumstances and surroundings to such an extent as not to appear to be above the level of the person from whom he seeks information.

He should be sufficiently capable in his judgment of human nature to discern the side of his man easiest of approach, and warm up to him in the quickest way.

He should be sufficiently advised upon the subject under investigation to know what he is looking for and recognize it when he sees it, without embodying, in procuring state-

* Presented before the American Street and Interurban Railway Claim Agents' Association, Atlantic City, N. J., October 15, 1907.

ments of witnesses, a vast amount of immaterial or irrelevant matters. This comes, however, only after careful study and considerable experience. There are persons who are hard workers and conscientious, who do not have sufficient capacity to distinguish between a supposition and a positive statement, an opinion or a statement of a fact, and whose investigations, when supposedly complete, do not contain sufficient information upon which to predicate a theory of defense or to know, with any certainty, how an accident occurred, nor who is responsible.

His honesty should be above question and likewise his morals.

He should be clean of speech, correct in his personal habits and as neat in dress as circumstances will permit, but care should be used not to overdress in dealing with the poorer and middle classes.

His temper should, at all times, be under control, but a glance at his face should reveal to the other fellow a goodly quantity that is held in reserve for emergency. In rare instances a quick, sharp outburst of the right proportion, will bring your man up with a halt and then you can lead him on at will, but men, as a rule, can be led far easier than driven.

I know of a case, however, where an investigation was being made which involved some valuable information from the department of the master mechanic of a certain road; the master mechanic failing to appreciate either the importance of giving the information or the grit and activity of the investigator, threatened to thrash him if he bothered him any more; suffice it to say the matter was determined then and there, the information secured by the investigator, while the doctor ministered to the needs of the master mechanic, who nursed a very sore head. In the case in point, the proper remedy was administered, but I am glad to know such cases are rare.

The investigator should, as these various phases indicate, be above the average in his judgment of human nature, so that he may use his own weapons in firing the rightly proportioned shot in the right way at the bull's-eye of his subject.

He should not overlook the fact that information is sought largely from disinterested persons, and that they are conferring a favor on him, and due appreciation should be shown.

I am well aware that all investigators do not have all of the various characteristics referred to, but in the selection of men for this work as many of them as possible should be possessed, combined with a liberal allowance of good sound horse sense, which will carry a man over many a rough place and enable him to be a success in this work.

You cannot lay down a set of inviolable rules which are applicable to this work on account of the varied personalities and conditions with which the investigator comes in contact. He should be allowed wide latitude in approaching and dealing with men in his own way, but keeping in mind three things: 1st. Secure facts as accurately and intelligently as possible. 2d. Be fair and frank in his dealings, thus making friends. 3d. Take his leave always in such a way that he may, if necessary, see his party again.

The Successful Adjuster.

As to the successful adjuster. Most of what has been said of the investigator is applicable to him. As the adjuster's work brings him in contact with that phase of human nature that is not only willing but desirous of getting something for nothing, he must be a person of a more positive character, who is capable of meeting all classes of people in a pleasant way, commanding their respect and at the same time maintaining his own. He must be able to act quickly, say "yes" or "no" as the exigencies require and have the ability to discern the psychological moment to a close deal. He must read his man as he goes, and talk to him either directly or through a second person, for there are times when a side remark to some one else will soak in and be more effective than a direct statement to the claimant.

He must be familiar with the legal phases of his work so as to command the respect of the legal representatives of claimants and not be trapped or made to fear a case that is close, but he must be able to intelligently discuss the case, where necessary, and put his opponent on the run.

He must have some knowledge of anatomy, the muscular and nervous systems of man, and be able to impress claimants with his ability to read symptoms and diagnose real conditions, and where necessary to meet attending physicians or others and by asking intelligent questions elicit information regarding real conditions, and not be imposed upon by fictitious statements.

The adjuster, many times, must take up the investigation of expert evidence and meet attending physicians and

the grasp of the subject shown by intelligent interrogation, he is less likely to be dealt with unfairly. If he has reason to believe this to be the case, he can maneuver his case so as to secure whatever additional physical examinations he deems necessary by his own physician, or he can commit the attending physician in a written statement regarding a claimant's condition that will be far more favorable when a compromise seems pending, than the testimony of the physician will be in court and which will be quite handy with which to confront the physician during the trial, should he give testimony at variance with his signed statement.

It pays handsomely to be friendly with the physician. One of the most effective ways to secure his friendship is to protect him in his bill for services to the claimant. The money, in this way, is paid direct to the physician by the company and he is more likely to serve the fellow who pays the bill. What does it matter to you if you allow an extra ten dollars to the physician, if he helps you save a hundred or so in a settlement? Isn't it a good investment?

In my opinion, it is good policy, so far as possible, to close a case pleasantly, having it understood by all parties concerned, and leave the matter in a friendly way. Seed sown in this way is sure to be harvested later by the friends of satisfied claimants being told to deal directly with the adjuster, instead of through attorneys, should they have a grievance to adjust.

In a large percentage of the cases, the adjuster must take the initiative and yet be on the defensive. In liability cases, where attorneys have not been employed, he must seek his party, grasp conditions instantly upon meeting and master the situation in his own way. No one can tell him just what to do, for he deals largely with persons with whom he has had no previous acquaintance. Opinions are formed, conditions created, settlements made or foundations laid for settlements upon the instant. The adjuster must be able to tell, from the manner in which he is received, whether or not he should strike at once at the proposition or use his ability to create better conditions. That person does not live who can intelligently direct me how to meet and deal with some one with whom he has no acquaintance, and I am sure I would not be egotistical enough to attempt to direct some one else by giving specific directions for such individual cases. The adjuster must care for and deal with them in his own way, meeting contingencies as they arise, his success being measured by the results he is able to attain.

There is no department of the railway service that is so likely to be brought in contact with every other department as the claim department. This being true, both the investigators and the adjusters should conduct themselves in a manner to keep the good will and respect of the other departments by not catering to any particular department or individual, but dealing fairly with all. Be sure you are right before making a positive assertion, fixing the blame for an accident, permitting it to rest just where it belongs. In other words, serve your company and not any particular department. When such a reputation has been established, your judgment will be recognized, and your opinion sought by the proper officials of your company.

I would not know where to look for a more congenial, courteous or whole-souled set of fellows than among the investigators and adjusters of this association. We all have our own cares and pleasures in our every-day work and we should be stronger therefor. Let us all work together to strengthen the association, better the railway service and protect our companies from fraudulent claims.

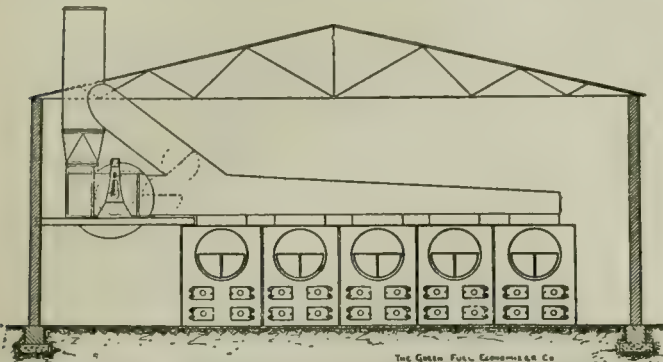
A RELIABLE SASH LOCK.

While the design of a sash lock appears to be a matter of minor consideration, it is nevertheless an important detail of the interior finish of a car and should receive careful attention by reason of its effect upon the maintenance of the windows. It is desirable that a wide range of action be possible for car windows. The "National" sash lock, manufactured by the National Lock Washer Company, Newark, N. J., and shown in an accompanying illustration, provides for this wide range of adjustment in the following manner: It holds and locks the sash at any height; it prevents rattling, and by its use the window can be framed loosely enough to be easily raised and lowered. The releasing levers are so arranged that raising the lower lever unlocks the upper one, but pressing on the upper one has no effect on the lower. Thus the window at all times is under the control of the operator.

Those concerned with practical matters in powerhouse work will be interested in the Justice reliance hydraulic jack, which is designed to operate with equal efficiency both horizontally and vertically, and is shown by Philip S. Justice & Co., of Philadelphia.

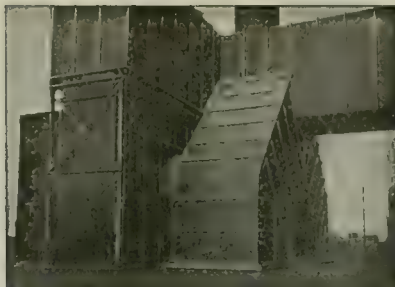
FUEL ECONOMIZERS AND MECHANICAL DRAFT.

Mechanical draft apparatus and fuel economizers are frequently installed at the same time in connection with a power plant because they are complementary in promoting fuel economy. The object of the economizers is, of course, to recover heat from the flue gases and to act as a reservoir for hot water. The object of the mechanical draft apparatus is to utilize the economizer to the fullest extent, to burn the cheapest grades of fuel, to handle heavy and sudden overloads on the boilers, to dispense with expensive chimneys, to obtain draft under all conditions of weather, to secure thorough combustion and by these means to use less coal and save money.



Mechanical Draft—Induced Draft Apparatus Arranged Above Boiler Room Floor.

The mechanical draft also tends toward convenience and flexibility in the operation of the boilers. With forced draft it is stated that four or five times the average amount of twenty pounds of coal per square foot of grate area may be burned and that as compared with ordinary draft where approximately twenty-four pounds of air must be admitted per pound of coal burned with mechanical draft, eighteen pounds or less of air will give perfect combustion.



Mechanical Draft—Equipment at Plant of East St. Louis Suburban Railway.

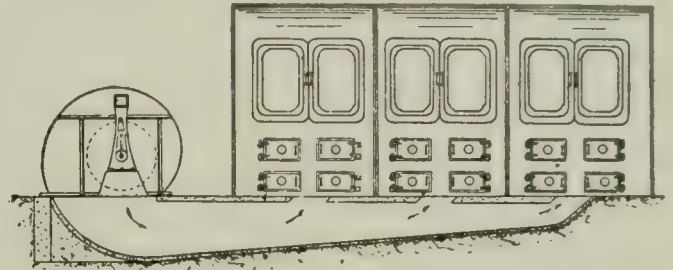
It is also claimed that with a good mechanical draft plant the smoke may not only be decreased but the cost of fuel may be reduced by using cheaper grades and that it is even possible to burn soft or hard coal slack or the cheapest western coals and yet obtain high boiler efficiency.

Systems of Mechanical Draft.

There are two systems of mechanical draft in general use in stationary plants. In the forced draft system an efficient air pressure is blown into a closed ash pit through suitable dampers, one-third of the pressure being required

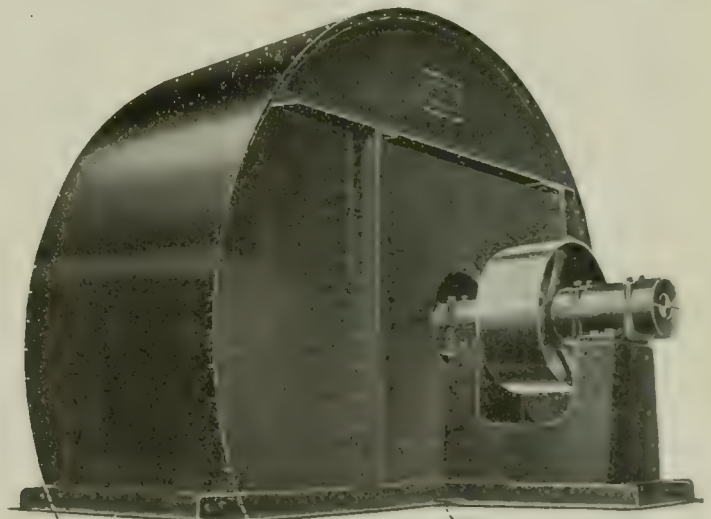
to force the air through the bed of fuel, the balance of two-thirds being required to draw the gases through the boiler and stack.

This is the least expensive system of mechanical draft to install and may be readily adapted to an existing boiler plant, as a fan which handles cold air from the boiler room is practically all that is required. The disadvantage of this type of plant, however, is that as the air in the ash pit and sometimes in the furnace is under pressure there is a leakage of hot gases outward which heats the air in the boiler room and tends to destroy the boiler setting. It is necessary also to shut off the draft when the fire doors are opened for stoking or slicing the fire. This type of draft however is the only system applicable to certain types of furnaces and mechanical stokers.



Mechanical Draft—Forced Draft Apparatus for Battery of Three Boilers.

In the induced draft system the fan takes the place of a chimney and the operation of the furnace is carried on exactly as with a chimney with the exception that there is a higher draft available. There is practically no leakage of hot gases. The draft is more uniform from all parts of the grate and there is no danger of burning the grate bars by the action of the jet of air. As the temperature of the gases which the fan will be called upon to handle will vary from 350 degrees to 600 degrees Fahrenheit or more the construction of the fan must be sufficiently large to handle the increased volume of gas at this temperature and the bearings of the fan must be protected.



Mechanical Draft—Three-Quarter Housing Bottom Horizontal Discharge Fan.

Mechanical Draft with a Fuel Economizer.

It is claimed that by the use of a fuel economizer in connection with an induced draft system that the gases are cooled before they enter the fan, that the fan may be run at a slower speed and the economizer will save from ten to fifteen per cent. of the coal. Or by running the fan at the same speed as before a larger quantity of cheap coal can be burned. The combination of the fan and economizer makes it possible to increase the steam producing capacity of the plant for periods of heavy loads while the economy for ordinary operation is likewise increased, the theory being that economizer surface is more effective in absorbing heat from low temperature gases than boiler surface and performs part of

the functions of the boiler surface so that it may be considered that boiler capacity is increased in the same or greater ratio than that in which heating surface is added by the economizer.

The power plant of the East St. Louis & Suburban Railway is a good example of the advantage of using both economizer and mechanical draft. It consists of two mechanical draft fans, the overhung wheels of which are driven by Corliss engines housed in a low brick building. These fans, which are nineteen feet six inches in diameter by seven feet wide at the top of the blades and which were installed by the Green Fuel Economizer Company of Matteawan, New York, it is stated are the largest ever built with overhung wheels.

The fans and the engine house are separated from the main power house and the boiler room by a railroad track, the smoke flue passing over the latter at a considerable height, as shown in an accompanying illustration. Dampers are so arranged that the gases from this flue can be led to the suction of either fan by the "downtakes," or can pass out through the T-flue to either or both of the stacks.

The fans are installed in connection with a Green fuel economizer, and it is estimated that the fan and the economizer, after paying operation and depreciation charges, will show a net saving, as compared with an ordinary stack or chimney, of 15 per cent. yearly on their first cost, when using coal costing 60 cents per ton.

The first installation of Green Fuel Economizers was made sixty years ago and from that time an accurate record has been kept of all installations, which amount to a total of approximately 250,000 horsepower. Figures are also at hand showing the cost of up-keep, so that the Green Fuel Economizer Company is able to determine definitely whether a mechanical draft or economizer is advisable for a plant and when an installation is made is able to guarantee that the saving represented will be made.

PRODUCTS OF THE PENNSYLVANIA STEEL COMPANY.

The works of The Pennsylvania Steel Company are located at Steelton, Pa., three miles below Harrisburg, on the left bank of the Susquehanna river. The plant covers a space on the river front extending over three miles, and has 46 miles of railroad track having direct connections with the Pennsylvania Railroad, Northern Central Railway, Philadelphia & Reading Railway and Cumberland Valley Railroad. It includes blast furnaces, Bessemer and open hearth furnaces, rail mills, slab mills, billet mills, steel foundry, bridge and construction works, and frog and switch works, which it is said are the largest in the world.

The concentration of so many separate branches of the steel industry enables the Company to manufacture finished steel through all processes from the receipt of the crude ore. The plant is thoroughly equipped with electric power, several of the departments having their own sub-stations, with the latest types of transformers.

The bridge and construction department is thoroughly equipped for handling any class of structural work, among its notable achievements being the Niagara arch, the Williamsburg bridge, the Blackwell's Island bridge in New York, and the Gokteik viaduct in Burmah, British India.

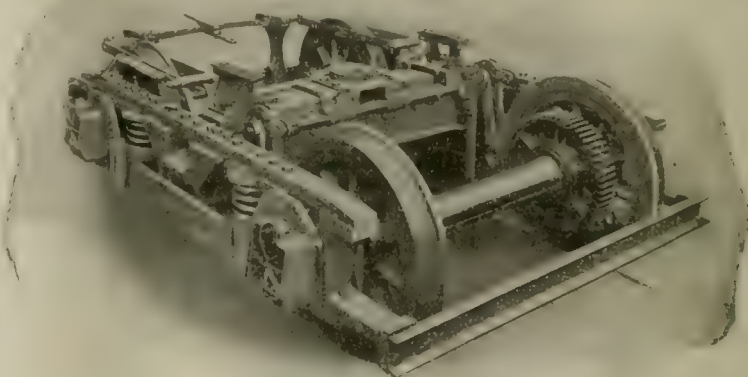
The frog and switch department covers 25 acres of ground, of which 10 acres are covered by buildings, and it has the largest capacity of any plant of its class in the world. This department's product is of a high class of material, millions of pounds of Manard steel being used yearly for product subjected to excessive wear. This special steel enters into the construction of Manard frogs for steam and interurban service, Manard crossings for all services, rapid renewable Manard hard centre frogs for street and steam railways in paved streets, and big pin switches for all services. Many of the great railroad systems are making very extensive use of the Manard frogs. Interurban railroads should appreciate the advantage of such material for their open track. The rapid renewable Manard hard centre frog, for use in paved streets, was adopted after many experiments, which proved conclusively that a renewable centre, in order to be available, must be of such a design that the renewal can be effected without removing the street paving, and also capable of being tightened without the necessity of resplentering the centre. In tongue switches the effort has been to produce a durable switch, one in which there was a minimum of danger of the tongue shifting during passage of a car. In this switch all wearing surfaces, including the tongue, are of Manard steel, and through the use of a 5-inch pin and an efficient tightening device working thereon, any possibility of shifting under traffic is eliminated, and through the bottom bearing given this pin on a plate of Manard steel, the depression of the heel of the tongue is largely avoided.

In switch stands, improved standards are manufactured

of more or less expensive design, from the ordinary ground lever to the semaphore stand, a new departure in signaling devices, which conceals the semaphore target automatically when the switch is set for the main line. For interurban use this stand, with low or intermediate target, type 50-E, is recommended. The New Century switch stand, type 50-A, proves its popularity by continuous and greatly increasing demand.

STEEL CASTINGS FOR RAILWAY WORK.

The Atha Steel Casting Company makes a specialty of steel castings for railway work, such as railway motor frames, caps, boxes, armatures and fields, cross heads, guide yokes, rocker shafts, frame braces, foot plates, driving brake shoes, center plates, end sills, center sill filling castings, draft rigging castings, body and truck bolsters. The wide experience of the company in this field permits the furnishing of products that will meet the requirements of varying service. The Atha company first began to make open hearth steel castings in 1888, when the name of the company was Benjamin Atha & Co. For a number of years castings were made entirely in dry sand molds, but in a short time green sand was used, which has effected a revolution in the manufacture of



Truck for Electric Service With Atha Steel Bolster.

steel castings. The business of the Atha company has grown with the industry and necessitated the doubling of the capacity of the foundry in 1906, when the Atha Steel Casting Company was incorporated. This company now has one of the largest independent foundries in the east and is turning out open hearth steel castings in great variety. The company has been making railway bolsters since 1899 and states that it has yet to hear of a single case where the Atha bolsters have failed to give satisfaction.

The standard bolsters are made in one piece of a superior



Atha Cast Steel Body Bolster.

quality of material to withstand rough usage without fracture or permanent set. There are no rivets and the entire bolster is made to stand the stresses to which it will be subjected. In other words, the Atha bolster is a unit, dependent upon nothing but its own design, material and workmanship. There is only one piece to fail in service, and that one piece is so well constructed that the failures of Atha bolsters have been less than 0.006 per cent.

Electric Railway Review

DAILY EDITION

PUBLISHED BY THE WILSON COMPANY

IN HONOR OF THE ANNUAL CONVENTIONS OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AND OF ITS ALLIED ASSOCIATIONS OF ACCOUNTANTS, ENGINEERS, CLAIM AGENTS AND MANUFACTURERS, AT ATLANTIC CITY, N. J.

Subscription in advance, including regular weekly issues and daily editions published from time to time in places other than Chicago, postage free; one year, \$2.00; foreign, \$5.00; Canada, \$3.50; single numbers, 10 cents.

PUBLICATION OFFICES: 147-151 North 10th Street, PHILADELPHIA

EDITORIAL OFFICES: The Steel Pier, ATLANTIC CITY, N. J.

BUSINESS OFFICES: 160 Harrison Street, CHICAGO; 150 Nassau Street, NEW YORK; 1529 Williamson Building, CLEVELAND.

Application made at the Philadelphia (Pa.) Postoffice for entry as second-class mail matter.

VOL. XVIII

PHILADELPHIA, PA., OCTOBER 17, 1907

No. 15d

President Bell, of the Atlantic City Hotel Men's Association, with the usual insight and prescience which characterize his movements, chose a good day when he chose yesterday for the presentation of the proposal published elsewhere in this issue looking towards the establishment of a permanent headquarters for purposes of large industrial conventions at Atlantic City. Such weather as we had yesterday is calculated to make almost any proposition attractive, and if yesterday's sunshine is a safe sample of Atlantic City in October, the fact should be taken into consideration in judging the scheme as a whole. We are by no means prepared to say that the plan is one that associations, such as those whose conventions are now in session, should adopt. There are many vital factors that must be given the most studious consideration before a decision can be rendered. While the proposal to make contracts to hold conventions for a period of five years at a given place have been informally talked about for a long time, nothing has ever been developed in the way of official or formal attention to the plan. Furthermore, the financial side is of great moment and the price per square foot for exhibit space named in the proposal of the Atlantic City people will at first glance appear to many to be rather high. We trust that the plan will be given that deliberate and careful scrutiny which its broad scope and substantial character demand. If some way can be found to establish a permanent headquarters for these large industrial conventions either at Atlantic City or elsewhere it should be adopted, because something of the kind is sorely needed.

The work of the National Fire Protection Association, which was described in the paper presented before the American association on Wednesday by Ralph Sweetland of Boston, should attract a great deal of interest among the electric railway men who have to face the problem of fire protection. In outlining the very commendable work which is being undertaken by this association in the way of formulating standards for fireproof or fire-resistive construction and for various devices and appliances for protection against fire, Mr. Sweetland shows that the most careful and painstaking methods are employed and the most exhaustive experiments made by the association's committees before a standard is adopted, and that no manufacturer's product is stamped with the approval of the association until it is known to conform in all essential features with the predetermined standard. Not only are such devices carefully examined before receiving approval but the association's Factory Inspection Service sees to it by frequent inspection that the manufacture is kept up to the standard. Such a work as this is of the greatest importance to any business which has to cope with the fire problem and should be considered of especial importance to the electric railway industry, which in its car barns and power houses is perhaps more affected by a fire loss than others. Not only are car houses and power plants more subject to fire hazard than other buildings on account of the peculiar element, electricity,

with which they are so largely concerned, but an electric railway is probably more subject to loss of revenue in case of a fire loss than other plants. Burnt cars are not as easily replaced as a merchants stock in trade, nor can power be easily secured in event of destruction of the generating equipment. Under these circumstances it would seem that the American Street and Interurban Railway Association should not only take a great interest in the work of the National Fire Protection Association but should co-operate with it wherever it is possible.

===

No city railway is immune from the vicious damage claim and its supporters. Companies throughout the country must guard against the prejudiced jury and the "shyster" lawyer and his confederates, the unscrupulous physician and the "grafting" claimant. There should be no room for doubt concerning the determined attitude

**Accidents
Lessened by
Instructions.**

of street railway companies towards unjustified claims; but in his interesting address before the Claim Agents' association, F. W. Johnson, of Philadelphia, stated that by neglecting to instruct their car men regarding accidents, companies risk the possibility of qualifying the employes to serve as innocent tools of designing claimants, and thus aid and abet the conspiracies of "shyster" lawyers. Mr. Johnson is strongly in favor of systematic methods of instruction of car men. He said that well-meaning, hard-working men on the cars are the most powerful allies of the claim agents in the work of preventing accidents and in handling accidents properly. Printed instructions, Mr. Johnson believes, will produce decreases in serious liability accidents and in unreported accidents, and increases in the average number of witnesses secured per accident and in favorable verdicts from courts; but the instructions must be worded in language so simple that they can be understood easily by the men. These and other suggestions contained in the paper are of merit. Managers who are distressed at alarming increases in expenditures for injuries and damages should consider whether the practices of other companies respecting claims, as indicated at the meetings here, are adaptable to their own needs. The claim department, though an expense and not a source of revenue, can be made an invaluable protector of net profits.

===

That the value of the exhibition of railway material is steadily increasing each year is evident from even a most casual inspection. The various manufacturers are ever increasing their efforts to show the standard as well as new apparatus and appliances. The present rapid development

**Look Over
The Exhibits**

in both alternating and direct current equipment, and the invasion of the steam road field by the motor car and electric locomotive, make it practically impossible for any person to keep fully informed of the development and changes taking place. In fact the busy man finds it difficult to keep up with all that is taking place in his own individual line. A careful examination of the exhibits to be found on the steel pier should

afford a good general idea of the development in the electric railway field. In this way a study of the exhibits will help to prepare the engineer and manager for entering into the more intelligent investigation of new apparatus so necessary to meet the ever-changing condition encountered in electric railway work.

For several years "Question Boxes" have been the vogue for the various associations affiliated with the American Street and Interurban Railway Association. When the question box was instituted doubtless it filled a long-felt want, but the first year or two sufficed to fill that want and in succeeding years there was a marked falling off in the quality of the question boxes. In a number of instances the editors of the question box have by careful work compiled a series of very creditable brief essays on topics of current interest; but all of the "Question Boxes" submitted at this convention do not conform to the highest standard. The answers are few, and generally speaking are "ayes and noes," without needed explanations concerning the conditions on which the replies are based. Such a question box is pretty nearly valueless because it does not give conclusions and does not give the data upon which the reader can base conclusions applicable to his own conditions. We believe that there is a distinct field for the properly edited question box—matters which are pertinent to the work of the association but of minor importance—questions which are suitable as subjects for brief discussion of say 1,000 words or less, but which would not require a production such as we expect to find under the name report or professional paper. We believe that the ideal method of treating the question box is to secure the data after the prevalent fashion, and then use these data as a text to discuss the philosophy of the subject, giving a brief exposition of the reasons for and against and offering a conclusion on the part of the editor, or at least a straddle in which both sides are fairly stated. The summary which precedes data in the report of the sub-committee on "Rail Corrugation," read before the Engineering Association, which was published in the Electric Railway Review of October 16, 1907, page 535, is what we conceive to be nearly an ideal method of treating a question box question.

At many conventions the courtesies extended by the American Street and Interurban Railway Association, which, it must be remembered, is comprised of corporations and not of individuals, have been sadly abused by the irresponsible representatives of the member companies and also by the guests to whom privileges secured by the official badges of the association were extended. At some conventions the extent of this abuse has been so great as to amount to a scandal. The system of registration with numbered badges, which was introduced first in 1904, put a temporary check upon some of the more flagrant violations of good taste, and this year we understand there has been a revival of old practices which has caused the entertainment committee and the executive committees of the association much chagrin. Another abuse has also developed, the registration of manufacturers who are not members of the Manufacturers' Association as guests of the American Association. In the old days, when the American Association imposed upon the hospitality of the street or electric railways in the convention city, this may have been a matter of indifference, as the manufacturers were subjected to only nominal expense for exhibit space, but under the existing conditions, when it is the manufacturers who bear the pecuniary burden involved in providing the convention halls such as we now have and the convention entertainment, it is an imposition that those eligible to membership in the Manufacturers'

Association, and perhaps competitors of those concerns which are members of the association, should, through the indiscretion of some of the railway men, be permitted to usurp the privileges of membership.

Upon early knowledge of an accident, more than on any other one advantage, depends its successful handling by the claim department. In the paper of Charles B. Hardin, of St. Louis, presented before the Claim Agents' association, this point was emphasized. To render more certain the almost indispensable aid of speedy information, Mr. Hardin advised the extension of private telephone service over the entire railway system. Among other helps towards perfection in the work of the claim department, Mr. Hardin urged a card record of physicians, a company medical department, and instructions to new conductors and motormen, supplemented by occasional talks to all of the men at the car houses. The trying nature of the service, the frequent long strains and the never-ending hours when prompt and painstaking labor may be demanded, support Mr. Hardin's statement that employes of the claim department should be well-paid if proper results are achieved. No fairer suggestion was made in this address than that the claim agent can so conduct himself as to acquire and maintain a standing in the community that will redound to the benefit of his company.

PROTECTION OF CARS AT RAILROAD GRADE CROSSINGS.

Considering the frequency of crossings of electric with steam railroads and the great variety of conditions under which they occur, it is perhaps not remarkable that there are so many ways in which suitable protection is sought to be secured. It does not necessarily follow that there is not some one method that is better than another or that there should not be some uniformity of practice even under diver conditions. It was once said in a convention of steam railway men in a discussion upon bumping posts that the best bumping post the speaker had ever seen was a general superintendent located upon the track at a point just beyond where the train or car should stop.

It is probably not fair to use the conductor of an electric railway car for this purpose, for two reasons:—First, his powers in the way of deacceleration are not so great, and second, while he is serving as a puffer he has no control over either his car or the man in charge of the brakes and controller.

A time-honored method of attempting to secure protection of this sort is to send the conductor ahead after a full stop with the injunction upon the motorman that he shall not start the car except upon and until receipt of the proper signal. In practice, however, this method has its weak points. The conductor, relying upon an intuitive perception that there is never a train upon the road at that time of day anyway, begins to give a progressive signal shortly after his heels have left the platform. The ninety-ninth case in the hundred is the one when there happens to be a moving train upon the steam road and the conductor and motorman are laid off and are fortunate if they and a car load of passengers are not laid up.

Fortunate, indeed, is the official who can say in answer to the question, "What precaution has your company adopted for the protection of its cars on grade railroad crossings?" "Don't need any; track elevation or depression has eliminated them." But few localities have reached that stage. Gates—which throw most of the responsibility upon the other party—derailing switches, which have a tendency to make the car crew wish they had been in less haste; interlockings, lights in

abundance which make night operation as safe as that in the daytime, but no safer; flagmen or whistlemen, who may be afflicted with temporary paralysis or laryngeal asthenia at the critical moment, or—and this is important—such wise requirements as may be promulgated by enlightened city councils all these and more methods are in vogue as the accepted forms of protection in divers parts of the country. Which plan shall be followed, even when one course or another is optional, appears never yet to have been determined.

The determination is a serious matter. It is not possible under all conditions to insist upon the adoption of appliances which shall make an error mechanically impossible. As upon steam roads the time is not yet ripe when automatic signals shall be required as a *sine qua non* of operation, the next best method must be adopted. Evidently this must involve the interpolation of the personal element into the equation. But whether this takes the form of the conductor's quickstep and rearward beck, a hand-operated derail or a watchman armed with gates, flags or whistles, the one word whose significance must never be forgotten and the value of whose iteration cannot be over-estimated, is "Discipline, discipline." And the word and all that it implies is to form the earliest babbling and the latest breath of conductor, motorman and whoever else has to do with those small but numerous and closely contested fields wherein steam and electric power contend for the right of way.

It may be that some future Hague tribunal will evolve a scheme of universal peace by decreeing the abolition of all grade crossings; but until then it is to be regretted that many an official will continue to follow the plan suggested by one claim agent of enjoining "Stop, look and listen," and when the motorman neglects all warnings and has a smash-up, get out of it as easily as he can and fire the motorman.

PLAN FOR A PERMANENT EXHIBIT HALL AND CONVENTION HEADQUARTERS AT ATLANTIC.

A. T. Bell, president of the Atlantic City Hotel Men's Association, on October 14 submitted on behalf of that association a draft of a proposal for the building of a convention hall. This was addressed to the executive committees of the five American Street and Interurban Railway associations and of the Master Mechanics', Master Car Builders' and Railway Supply Manufacturers', associations representing the steam railway convention interests, and is as follows:

The Atlantic City Hotel Men's Association believes that no city in the country equals Atlantic City in the number and excellence of its hotels at the service of large conventions.

There is also no city with better transportation facilities or more convenient to the large centers of population. There is lacking at present an ideal exhibition hall; but nowhere, so far as the association knows, is there a permanent structure perfectly designed and equipped as an exhibition place for a steam or street railway convention.

It is true that the location over the ocean of the Steel pier in Atlantic City is unique and attractive and the experiences of the railway supply men in June, 1906, and June, 1907, indicate that it is a very desirable exhibition place in the absence of rain and high winds. An exhibition covering a period of eight days can, however, hardly fail to include one or more days of unfavorable weather. Any outdoor location then becomes uncomfortable and both exhibitors and spectators lose valuable time.

Furthermore, the growing tendency towards heavier exhibits will eventually require a special hall for railway exhibition purposes. While the Steel pier is able to carry heavy loads, the weights now proposed are approaching those of the heaviest cars and locomotives. In fact, the ideal structure must necessarily be so strong that it may as well also carry the track exhibit. The combination of track and regular exhibits which such strength would make possible, would add greatly to the interest and value of the convention.

It should also be remembered that in making the arrangements for the 1906 convention on the Steel pier, the restrictions of the Boardwalk Easement deed caused some embarrassment. While this was largely overcome and in 1907 a better understanding of conditions prevented similar difficulties, nevertheless, the ideal exhibition hall should not be subject to the easement deed.

These facts have led the Atlantic City Hotel Men's Association to consider what might be done to afford the exhibitors ideal facilities.

That the citizens of Atlantic City, as a matter of public spirit, will provide the unusual structure and equipment needed by the railway conventions can hardly be expected. The interests in control of Young's Ocean Pier on the Boardwalk at the foot of Tennessee avenue, are, however, preparing to improve their pier and will provide an exhibition hall of the type desired, if satisfactory arrangements can be made. There is, therefore, an opportunity to secure through a private corporation suitable accommodations, provided that assurances from the railway associations warrant the expenditure necessary to the development of the plans in detail, and that additional assurances from the individual exhibitors justify the cost of the heavy construction and special equipment essential to the peculiar requirement of these exhibitors.

These conveniences may be used by the Pier Company in July, August and September for exhibits by the general advertisers of the country. Some exhibitors who are members of the association will undoubtedly wish to take part in the summer exhibition. A special part of the structure will be set aside for those who maintain a continuous exhibition during the June conventions, the summer exhibition and the October conventions. The revenue from the summer exhibition, together with what may reasonably be expected from June and October, will warrant the necessary investment.

An exhibition hall with the following location, plan and equipment is proposed:

(a) The site of the exhibition hall will be the central portion of Young's Ocean pier. This pier is located on the Boardwalk between Tennessee avenue and New York avenue. The Boardwalk is not only Atlantic City's chief thoroughfare for visitors but is so directly connected with her most important hotels as to be an integral part of them. The site proposed adjoins the outside of the Boardwalk. The hotels, the Boardwalk and the exhibition hall will therefore form one complete plant for convention and exhibition purposes.

(b) The exhibit building will have a net area of exhibit space of approximately 150,000 square feet, or more than twice that now used. Of this, as much as exhibitors' contracts warrant will be built at once and such additional areas added from year to year as the demand justifies, until the total amount is built.

(c) The building will be a long and comparatively narrow structure, approximately 90 feet wide, with a 15-foot exhibit space next the wall on either side, two 15-foot aisles, and two 15-foot exhibit spaces back to back between the aisles. Thirty-foot exhibit spaces may be obtained by throwing two such center spaces together.

(d) At the far end of the building, rooms for the meetings of the railway men will be provided. Every exhibitor will thus be satisfied with his location, because every railway man, in going to and from the meetings, will pass every exhibit.

(e) Good light and good wall space will be secured by lighting the exhibit room with windows at least fourteen feet above the floor.

(f) For handling heavy cases, machinery, etc., there will be over the double central exhibit space, and perhaps over the other spaces as well, a traveling crane of heavy capacity running the entire length of the building.

(g) There will be high pressure steam connections to a number of spaces, compressed air outlets in a still larger

number and electric feeder and telephone wires in every space.

(h) The spaces will all be equipped with standards, columns, counters, sign cornices, railings and so forth and the whole building will be decorated in accordance with a general scheme. Thus each exhibitor need bring only his exhibits and such special forms of decorations and accommodations as he may desire.

(i) If a proper franchise can be secured from the city, it is proposed to run a railway track giving direct outside railroad connection with the pier. In this event, tracks will be laid below the deck of the pier in such a way that the rails can be covered when not needed. Tracks will be laid in the 15-foot aisles, and also, for track exhibits, on platforms on both sides of the pier outside of the building.

(j) In addition to the exhibit spaces and aisles, there will be provided suitable rooms for the secretary and his assistants, for meetings, for storage of crates, boxes and other paraphernalia, for lavatories and for miscellaneous purposes. Most of these rooms will be created in the main structure by means of movable partitions and will be adjustable in size.

(k) An approach to the pier and a considerable proportion of the exhibit hall will be built to carry the heaviest locomotives and other equally heavy loads. For the rest such a construction will be adopted as seems best after consultation with exhibitors.

(l) The exhibit hall will be heated.

(m) No extra charge will be made for heating, janitor service, general lighting, local telephone service, standard booth signs, services of travelling cranes, and steam, electricity and compressed air for power purposes.

(n) The exhibit hall will be fireproof and of the highest standard in every respect, including structure, facilities and equipment. It will be operated in a first-class manner and all exhibitions appearing in it will be the best in their respective fields.

Such a plan provides a specially designed building along lines which the supply men have themselves suggested. Each exhibitor will receive the full equivalent of his payment in exhibit space, at a cost not materially greater than that to which he has been accustomed. These results will be obtained without the annoyance and difficulties incident to the purchase of a site and the construction of suitable buildings and equipment by the exhibitors themselves.

The Atlantic City Hotel Men's Association desires the criticism and suggestions of those interested and also an expression of opinion as to whether the following financial proposition will meet with the approval of your association, and whether your individual exhibitors may reasonably be expected to make contracts for the equivalent of 60,000 feet per annum for each convention for five years, payment to be made in advance.

The proposed financial arrangement is as follows:

For space in the exhibition hall during October and including the convention of the American Street and Interurban Railway Manufacturers' Association, \$1.00 per square foot.

For the month of October, as above, during five consecutive years, 1909, 1910, 1911, 1912, 1913, if paid in advance before the building is first opened, the sum of \$3.75 per square foot, equal to 75 cents per year.

For the month of June and including the convention of the Railway Supply Manufacturers' Association, \$1.00 per square foot.

For the month of June, as above, during five consecutive years, 1909, 1910, 1911, 1912, 1913, if paid in advance before the building is first opened, the sum of \$3.75 per square foot, equal to 75 cents per year.

For the months of June and October, as above for five consecutive years, 1909, 1910, 1911, 1912, 1913, including both the steam and street railway conventions in those months, if

paid in advance before the building is first opened, \$6.00 per square foot, equal to 60 cents per month per year.

Space reserved in the exhibit hall for the association will not be let during June or October except to qualified exhibitors; provided, however, that if a minimum amount of space is not taken by the association or the individual members comprising it before a date to be mutually agreed upon, the rest may be let to others. Under certain restrictions, contracts with exhibitors may be cancelled in order to protect the reputation and standing of the pier.

The subject is now submitted for consideration in order to obtain assurance that the associations of railway men will hold their meetings in Atlantic City during a period of five consecutive years beginning with 1909, provided the exhibit hall shall be constructed for the conventions of 1909, and in order also to obtain from the Manufacturers' associations their approval of the facilities and the financial arrangement proposed so that individual exhibitors may be encouraged to enter into contracts with the Pier company. If these essential conditions are granted by these associations, the Pier company will undertake to secure the proper engineering and architects' plans and to enter into suitable contracts with the individual exhibitors. Should they be successful in this, as anticipated, the work will proceed promptly. If the desired arrangements cannot be made and a proper number of contracts secured, the whole subject will be dropped and the associations entirely released from their obligations. In any event, it is not intended that any association, as an association, shall assume liability for the payment of rent for exhibit space. Arrangements for exhibit spaces will be made entirely with the individual exhibitors and be contingent upon sufficient contracts being signed to assure the success of the plan.

Should the associations agree to meet in Atlantic City for five years, it is intended that the members of the Atlantic City Hotel Men's Association shall enter for the whole five years into contracts regarding hotel rates and other matters.

In short, the interests in control of Young's Ocean pier and the Atlantic City Hotel Men's Association will—if your association and the other associations addressed will (1) determine to meet for five years in Atlantic City for the customary length of time in 1909, 1910, 1911, 1912 and 1913, provided the terms of this proposition are carried out; and (2) signify your approval of the general scheme proposed above—make detailed plans along the lines indicated and endeavor to enter into contracts with the individual exhibitors and others.

Annual Meeting of the Manufacturers' Association.

The regular annual meeting of the Manufacturers' association will be held in Casino hall over the entrance to the Steel pier at 11 o'clock this morning. The chief business of the session will be to elect five members of the executive committee to succeed the following, whose terms expire: John A. Brill, Charles K. King, Howard F. Martin, William Wharton, Jr., and E. M. Williams. President McGraw and the members of the executive committee especially desire that there shall be a large attendance at this meeting. The growth and importance of the association and the success which has attended the conduct of its affairs within recent years are such as to make it a reasonable expectation that the desires of the officers with regard to attendance at to-day's meeting will be realized.

The place of meeting for the American association for to-day's session, beginning at 9.30 A. M., has been changed from Casino hall to the Sun parlor near the end of the Steel pier.

Charles F. Baker, for many years superintendent of motive power and machinery of the Boston Elevated Railway, and now associated with L. B. Stillwell, has recently completed his work at Baltimore for the United Railways & Electric Company. He has recently been appointed acting superintendent of construction in charge of equipping the power and sub-stations of the Hudson Companies at Jersey City, N. J.

PRESIDENT BEGGS' ADDRESS BEFORE THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.

I sincerely hope that you may all find Atlantic City to be what your officers and executive committee intended and expected it would be to you, one of the most enjoyable and suitable places in which we have ever met. Very careful and exhaustive investigation was given to the location of this year's convention before a selection was made, we having had under serious consideration Boston, Baltimore, Washington, Norfolk and Atlantic City. We visited Norfolk in a receptive frame of mind, hoping that it might be practicable to hold our convention either on the grounds of or near the Jamestown Exposition, but after carefully considering the matter from all points of view, we were afraid that neither the hotel accommodations nor space for our exhibits were available at Norfolk and vicinity, notwithstanding the profuse promises made by representatives of Norfolk and the Jamestown Exposition and I think it will be admitted that the experience of the Jamestown Exposition this year justified the action of your officers, although many connected with our association were very anxious to have the convention held at Jamestown. We finally selected Atlantic City because of the ample and magnificent hotel accommodations here and the admirable provision made for our exhibits, there being but few cities in the country that have sufficient space of suitable character in which to house our exhibits. This matter is becoming of more importance year by year and suggests the thought to many of those who are charged with the responsibility of the administration of your association, as to the necessity of locating at some one city where ample hotel accommodations and suitable space for exhibits are available.

Since our last annual convention your officers and executive committee have obtained commodious and admirably adapted permanent offices for the association in the new Engineering Societies building at No. 29 West Thirty-ninth street, New York. This change subjects the association to considerably increased rental but it was absolutely necessary to have larger and better adapted offices for the secretary and treasurer and for the statistical library, in order to carry on the work of the association on the broader lines contemplated for it by the adoption of our new constitution and the perfection of the organization of the affiliated associations, and I feel that the rental arranged for in the Engineering Societies building is as reasonable as we could have obtained in any first class office building in New York City, and locates the headquarters of the association with several engineering societies of the country.

During the year the secretary and treasurer has more than maintained the record made during the preceding year, in the amount and value of the work turned out of his office, and it is with great pleasure that I bear testimony to his untiring energy and efficiency. From the statistics gathered in the secretary's office he has been enabled, during the year, to render valuable service to a number of companies holding membership in our association. That these services have been of great value and highly appreciated is evidenced by the fact that one of the companies to whom this service was rendered sent to the secretary and treasurer a check for a substantial amount in recognition of his work. This check the secretary and treasurer voluntarily and properly returned to the company, which prompts me to suggest that in cases where the companies feel that the service they have obtained from the office of the association is of such great value to them, that it would not be amiss for them to make a contribution direct to the association, to be used in enlarging the scope of its work, as your officers have been constrained to keep expenses down as much as possible, notwithstanding they recognize that additional help could be employed with great advantage to the secretary and treasurer, and I hope that the finances of the association will justify the incoming officers and executive committee during the ensuing year in authorizing the additional expenditure necessary.

At this time I desire to repeat a suggestion which I made at the meeting of the executive committee of your association yesterday afternoon quite late in the session, and I give it now in order that it may be brought before the affiliated associations. I believe that additional effectiveness could be given to the office of the secretary and treasurer at a minimum of cost if the positions of working secretaries of the several affiliated associations—I mean particularly the Accountants', the Engineering, and the Claim Agents'—were placed in the office of the secretary and treasurer of the American association, and that the positions of secretaries of those three associations should be honorary positions. This would enable a statistician and additional clerical force to be employed in the permanent office of the association, this work being done by one of the assistants of Professor Swenson, and the honorary secretaryships held as are the positions of other executive offices of this

association, who, as a matter of fact, do much more work than the secretaries.

It is gratifying to be able to report that, notwithstanding the increase in the dues, that all of the larger companies which are called upon for the larger amount of dues have continued their membership in the association, and that the total membership at the close of our fiscal year, September 30, 1907, was 227, as compared with 200 at the beginning of our fiscal year, October 1, 1906, and that, notwithstanding the expenses of the association increased during the year to the extent of \$2,991.75, the balance to the credit of the association at the beginning of the ensuing fiscal year, October 1, 1907, is \$6,137.95, as against \$6,976.90 twelve months previous. The associate membership in 1906 was 113; in 1907 it is 148, a gain of 35.

While upon that subject, in order that you may better comprehend the solicitude that your officers feel respecting the necessity of administering the financial affairs of this association with care, I might state that the receipts of the association for the last fiscal year were \$24,724.77, and that the expenses—kept down as they were—amounted to \$25,563.72. This association should have dues coming in to an amount of from \$30,000 to \$35,000 per annum, in order to enable it to perform the work in the manner it should be done to the greatest advantage of the association, which means the advantage of its members. It is in line with making this amount of money go as far as possible that I suggest this consolidation of the salaried officers of the various affiliated associations. It is in line with the consolidation of some of those companies throughout the country, which has been going on for several years, to reduce expenses.

Passing from the business affairs of the association to that of the companies holding membership therein, it is to be earnestly regretted that we cannot report more favorable conditions existing between many of the companies and the communities in which they operate, largely owing to the continued unreasonable, vindictive and demagogic attitude of many of the public officials and politicians in the various localities where our companies operate; the only stock in trade possessed by many of these officials and politicians being their unprincipled attack upon public service corporations, most of them following the examples set in higher places, but with less ability, the result being that we are passing through the most trying period that the managers and investors in these properties have ever experienced, and while I believe that this wave of unreasoning prejudice, denunciation and unwise legislation is at its crest, if it has not already commenced to recede, nevertheless it is a period when the greatest ability, courage, perseverance and patience are required successfully to withstand the abuse and attacks from all sides that are heaped upon those charged with the trying, exacting and perplexing responsibilities incident to operating public utilities at any time, but particularly in times such as we are now passing through.

No consideration appears to be given to the fact that while all elements entering into the operation and maintenance of electric railways and other public utilities have greatly increased in cost, we not only cannot increase the charges for the service rendered, but in many cases unjustifiable and unreasonable demands are made for reductions in charges for the service rendered, notwithstanding the amount possible to be earned upon the capital invested does not exceed and in many instances does not equal the amount that could be realized on investments in mortgages or other classes of property not subject to the risks incident to investment in public utilities.

This has become so marked that I venture the prediction that until a very radical change is worked in the minds of the general public it will be almost impossible to obtain additional capital to make the extensions and additions necessary to give to the cities and towns the transportation and other public utilities the facilities their increasing growth and the demand for better equipment and service constantly renders necessary. And this condition is, in my opinion, likely to continue until the several states provide for the creation and appointment of commissions with power to intelligently and impartially investigate and regulate the conditions of operation and the charges to be made by public service corporations, and remove them from the exploitation of local politicians, whose principal business is generally to play to the galleries, by attacking every thing done by a public utility corporation, whether right or wrong, and setting themselves up as being better qualified to administer and operate these corporations with their complex and laborious requirements, than those who have spent their lives in acquiring the technical and business skill and experience necessary to successfully administer this class of properties.

I venture the statement that there is no calling or profession in the world so difficult to fill successfully and with

credit as that of administering the means of transportation in our large cities, be they surface, overhead or underground railways, where several hundreds of thousands, and in some cases millions, of people must be handled daily, and the bulk of them within quite a limited time, during the hours of congestion in the morning and evening. And instead of receiving the hearty and intelligent co-operation of public officials to enable this service to be well performed, the corporations are frequently handicapped by unreasonable and impracticable regulations and the failure to enact legislation and ordinances which would properly regulate traffic on the streets of the towns and cities and enable the public to be transported more safely and speedily. It is impossible in many cities to obtain any effective remedy against obstinate teamsters who may obstruct the streets and unnecessarily delay thousands of passengers on street cars, simply because the teamster may belong to some organization of which the local politicians are in dread.

The magnitude of the business of the street, suburban and interurban electric railways of the country may be judged by the fact that at the close of the year 1906 the total capital liabilities of these companies in the United States amounted to \$3,765,317,875, being an increase of practically \$400,000,000 during the year 1906. The total mileage of these roads at the close of 1906 was about 36,932, an increase of 3,782 miles during the year.

Since our last convention the development of single phase alternating equipment has made gratifying progress, greatly facilitating and rendering less expensive the construction of high speed electric interurban lines over outlying, sparsely settled territory, thereby rendering unnecessary the large investment required for sub-station and feeder construction for direct current transmission. There has likewise been gratifying progress made in the development of more efficient types of motors for direct current operation.

A matter of great importance and one which I do not think has been given that degree of attention which it merits by a large number of our companies of this association, is that relating to depreciation and amortization and I feel that it is high time that the companies recognized the vital importance of this question and took means to set aside funds to provide for the continual wear that is going on and for which no provision is being made, as it is neither proper nor practicable to make good this wear by new issues of capital. Furthermore, companies having limited franchises should, in my judgment, make provisions for the repayment to the investors in the stocks and securities of these companies at the expiration of the franchises, and I have no doubt these matters will be brought home to many more of you within the next few years as they are to some of us at the present time.

In connection with one of the large companies which I have managed for some ten or eleven years past, in the operation and administration of which I commenced nearly eleven years ago setting aside a fixed amount of our gross receipts monthly—after charging to operation and maintenance the current repairs and renewals—out of which has been paid extraordinary replacements and renewals.

This company, in line with the general attitude of many public officials referred to, has been for many years subjected to the attacks of self seeking politicians and notwithstanding we entered into a contract with the city nearly eight years ago whereby many concessions were made by the corporation to the city, in consideration of a few years extension of the franchise, among which were the sale of 25 tickets for \$1.00 or 6 for 25 cents, the granting of transfers, the free transportation of policemen and firemen and other concessions, the city council some months ago instructed the city attorney to institute proceedings to bring about a further reduction of our fare to 3 cents and in pursuance of this instruction the city attorney employed a firm of well known public accountants to make an exhaustive examination of our books for a period of ten years from January 1, 1897 to December 31, 1906. On this work a large force of expert accountants were kept for several months and have presented to the city authorities possibly the most exhaustive report that has ever been made upon a street railway company in this country. Among other things they say: "We found the books and records of the company to have been kept with unusual skill and accuracy and we were accorded at the hands of the company every courtesy which would facilitate our work and we are pleased to give here an expression of our appreciation of the consideration shown us. The attitude of the management in this respect is creditable, in view of the fact that our visitation was not at the instance of the company nor was our work presumed to be for its benefit."

They further stated that: "It is proper at this point in our report to observe that from the standpoint of the stockholder the books disclose results which mark the management of this company as being of uncommon capacity. From the same

standpoint there is little left to be desired since in addition to the payment of good dividends the property has been so well kept up that it probably is in better condition at the end of each year than ever before, while ample reserves have been accumulated with which to meet every contingency which may reasonably be expected to arise in the conduct of the business. The standpoint from which we view the matter, however, is essentially different from that of the stockholder, since the interest of the public, represented in this inquiry by the city government, is not necessarily conserved by large returns to the stockholders but is centered in the question of how cheaply may good service be given."

These expert accountants, acting for the city, and looking at the matter purely from an accounting point of view, and having no experience as to the operation of electric railways, take the position that we are not justified in creating the reserve funds which I know are absolutely necessary to properly maintain and keep up the property and to provide for the demands which are inseparable from the proper administration of this character of properties. Applying careful and close management, which the accountants denominate as of "uncommon capacity," and because of a familiarity with the fire insurance business, I felt that it was good policy to charge a small percentage—one per cent—of our gross receipts monthly to operation and carry it to a "Fire Insurance Reserve" fund, out of which all fire insurance premiums and losses not covered by insurance, have been paid, the balance being invested in interest bearing securities, with the result that at the present time we have in this fund \$450,000 of first class 5 per cent bonds—interest on which is likewise credited to the fund. It is unnecessary to state to you gentlemen who are experienced in placing fire insurance on these properties, how much influence the fact that we have this invested fund has upon the rate we are accorded by the old line fire insurance companies. This charge against operation the expert accountants think was unnecessary, and propose to credit it back to net earnings. They likewise attack and propose to carry back to net earnings an amount of \$350,000 we have invested in first class 5 per cent bonds to the credit of "Injuries and Damages Reserve," this fund having been accumulated out of a maximum charge of 4 per cent. of our gross receipts. For several years of my operation of the property the amount charged against operation and carried to the credit of "Injuries and Damages Reserve," was only 3 per cent. This amount it is likewise argued by the accountants should be credited to net earnings, all for the purpose of showing that the company might have been operated for so much less money as to have permitted a fair dividend to have been paid upon the capital of the company and yet a lower rate of fare granted.

The absurdity of this will be evident to any manager of a large company who knows how long it would require to settle up and the amount of money necessary to pay for the injuries and damages that are hanging over these large companies and which could not under any circumstances be settled in any reasonable manner in a less period than from five to seven years. I have claimed that these companies should be so administered that if they were to go into liquidation at any time, they would have a fund created from month to month, as accidents occur, which would pay approximately all amounts that might be required to discharge all claims pending against the company for injuries or damages either to person or property. I feel very sure that when these matters are properly presented to a court of equity, the position of the company will be maintained, and if the expert accountants should be present, they will acquire some knowledge and experience that cannot be obtained in an accounting office by simply computing columns of figures. This I say with all due respect to the profession of public accountants.

I commend to your consideration the advisability of revising to some extent the schedule of dues as provided for in the constitution adopted two years ago. Some of the larger companies feel that the amount they are called upon to pay is out of proportion to the value they receive as compared to the advantages of the association to the smaller companies. This is a matter worthy of your most careful consideration as it now requires approximately \$25,000 per annum to meet all the requirements of the association and a larger amount could be expended with advantage to the member companies.

To the officers and executive committee as likewise to the standing committees and to the past presidents of the association I hereby tender my hearty acknowledgment and thanks for their zeal and attention to the business and interests of the association during the past year, and I bespeak for the incoming officers and committees equally enthusiastic, loyal and self-sacrificing service, for there never was a time when it was more necessary to stand shoulder to shoulder in protecting and advancing the interests and welfare of this great industry.

The officers of the operating department of a railway corporation can assist the claim agent very largely to keep down the expense by adopting only the very latest and improved appliances for avoiding accidents and constantly drumming into the minds of the employes operating the cars the necessity and importance of doing their utmost to observe the rules.

which are laid down for them by the managers, which, if strictly carried out, would largely reduce the number of the accidents.

The Claim Agents' association is progressing favorably and is in a vigorous and healthy condition and I desire to express my thanks to the officers of the parent organization for their kind and courteous consideration and support during the past year.

James H. McGraw (Manufacturers' association): If, as the last speaker said, the claim department is the most expensive department of the traction companies what will you say of the manufacturers? I fancy that if the street railways were not obliged to pay the bills of the manufacturers we would all be able to pay larger dividends on the stock and securities of the companies. I am very glad to stand up and be counted on behalf of the manufacturers' association this morning, but as you all know, the manufacturers are people of deeds and action rather than of much speaking. I take it, therefore, that as there is much business to be accomplished by the convention this morning you will only expect a word from me as representing the Manufacturers' association. Old things pass away and new things come. Four years ago it was decided by the officers and the executive committee of the association that the old policies and the old methods were no longer useful and adequate in the development of this association, and back of it in the development of this great industry. Therefore, Mr. Ely, at that time president of the association, and his associates on the executive committee, undertook the reorganization of the American Street Railway Association, and the suggestion came to the manufacturers from the parent organization itself that they organize and that they lift the burden, if you please, that had settled down upon the shoulders of the association in the way of the exhibits and the entertainments that were supplied by the local companies at those conventions. It had become a burden for the reason that the local company in inviting the convention also invited the manufacturers, and in a large measure was supplying the space for the exhibits at that time. The manufacturers organized. For four years they have taken care of the exhibits, and they have taken care of such entertainment as has been placed at your disposal.

At St. Louis it was not necessary to have an exhibit, as the exhibits were all placed in connection with the exhibition. At Philadelphia, all of you who were there remember the display of exhibits, which up to that time exceeded anything that had been attempted. It still grew larger and better. At Columbus last year and here this year at Atlantic City it is a most magnificent display that we have been able to make. We have about 75,000 square feet exclusive of aisle space, covered with exhibits. The association has about 280 members and the number of individual exhibits at this convention is 210 or 211. Therefore we feel that the Manufacturers' association has justified its existence. We feel that it is a pleasure, and we are proud to feel that we are a part of and co-operate with, this magnificent association, the American Street and Interurban Railway Association, that has at last taken its proper place among the foremost scientific bodies of America. We feel that there is a great work still before us, and that there is a great work still before you.

Judging from the president's address, the things that he puts forth and the other statements, the data with which we are all familiar, I think no one would question my statement when I say that the American street railways have done and are doing a work for the so-called common people, and for the masses of the people of this country, far greater and more important than has been done or undertaken by any single industry of this country.

Therefore, we ought to be proud of this great work to which so many of us are devoting the best years of our lives. The success of the Manufacturers' association is due largely to the backing and the co-operation and the support that we are receiving from the president and the executive committee of the American association.

It was you who brought the Manufacturers' association into existence. We will stand shoulder to shoulder with you and co-operate and help to lift the burden in this work, to the best of our ability, but we want your advice and co-operation and suggestions, as we have in the past.

I want to publicly in this manner thank Mr. Beggs and his associates on the executive committee for what they have done for us in our work. I also want to thank the Hotel Men's association of Atlantic City, and Mr. Bell and his association, for the hearty co-operation and for the generous effort they have made in helping to put the convention in Atlantic City, and especially with reference to the exhibits here on the Steel Pier. They promised us everything, ladies and gentlemen, even to good weather, and they are making good.

Mr. President, I wish you and the members of the convention great success in this convention. We hope it may be the best that you have ever held in the history of this American Street and Interurban Railway Association. I thank you for your kind attention.

President Beggs:—Mr. McGraw, on behalf of the American association, I desire to thank you and through you the Manufacturers' association, and I would be pleased to have you convey to your association to-morrow at its meeting the expression of appreciation of this association for the great work it has done, and is still doing, on behalf of the members of this association. During the year one of the requests made by the officers and executive committee of this association was that during the meetings of the American association the exhibits of the manufacturers should be closed in order not to divert our own members from the meetings, and that the manufacturers might be present during the opening sessions of the American association to hear what some of our members, at least, thought of some of their products. This we deemed would add largely to our attendance. We have had hearty co-operation in every request that has been made, and as president of the association I highly appreciate it.

Mr. McGraw:—Mr. President, if you will pardon me, I might add one word in regard to that car that came up this morning. I was secretary and member of the Railroad Test Commission of the Louisiana Exposition. That car was turned over by our commission to your association. The commission requested all the manufacturers who had loaned or given apparatus to that car to continue that loan of the special apparatus with which the car was supplied indefinitely.

No definite action, so far as we know, was taken by any of the manufacturers. At least, we did not get altogether satisfactory replies. The commission went out of existence some years ago. It is not in the position to act at the present time, but I have this to say, Mr. President, that if that car is important to the American Street and Interurban Railway Association—which I have doubted from the attitude of the executive committee and officers—if it is important and they will go on record to that effect, I feel that those manufacturers will be glad to supply this apparatus without cost, I mean, and I feel that the car can at this time be rehabilitated, if it is wise and important in the minds of your executive committee or the convention. I think it can be done.

The chair made a number of convention announcements including the statement that an invitation from the Asbury Park Convention Bureau to hold the 1908 convention in Asbury Park had been received.

C. D. Wyman offered the following amendment to the By-laws:

That paragraph a of Article VI of the By-Laws of the American Street and Interurban Railway Association be amended to read as follows:

"The entire charge and management of the affairs of the association shall be in the hands of the executive committee, which shall consist of the president, the vice-presidents and one member appointed by each affiliated association and all the past presidents of the American Street and Interurban Railway Association and its predecessor, the American Street Railway Association, these past presidents to be honorary members of the executive committee, but without power to vote at meetings of the committee. The executive committee shall make arrangements for carrying out the objects of the Association."

The amendment was adopted.

There was no report of the committee on "Membership" other than the data included in the secretary's report.

The report on "Compensation for Carrying Mail" was postponed, awaiting the arrival of G. T. Rogers, chairman of the committee.

Richard McCulloch, chairman of the committee on "Subjects," reported as follows:

It is hardly necessary for the committee on "Subjects" to submit a formal report. Its report consists of the schedule of arrangements and the papers submitted at this convention.

In making the schedule an effort has been made to arrange the meetings of the various associations so that meetings of a similar nature will not conflict. By arranging the meetings of the Engineering and Claim Agents' associations for Monday, Tuesday and Wednesday, the Accountants' for Tuesday, Wednesday and Thursday, and the American association for Wednesday, Thursday and Friday, an opportunity is given a delegate to attend the meetings of one association in three days, or the meetings of all in five days. As far as possible the schedule has been arranged so that the time of meetings of a similar nature will not conflict.

For several proposed subjects the committee was not able to obtain writers, and as these are important subjects,

it is hoped that a discussion of these topics may be secured for next year.

If it is within the province of this committee to make recommendations for next year, the committee would recommend that the new committee on "Subjects" be appointed at this convention. This new committee should lay out the programme for 1908 at once, so that the work of selecting authors for the papers, which is the principal work of the committee, may be entered upon without delay.

The report on "Car Wiring" was then presented.

W. Caryl Ely asked if Mr. Corning considered the report of the committee and the things that the committee was able to secure by way of improvements, have resulted beneficially to those engaged in the business beyond any question of doubt, to which Mr. Corning replied in the affirmative. Mr. Ely continued and cited this work as an example of what the association was doing for the member companies. He said that when it was thought wise to reorganize the association, and the work started, there came before the executive committee a communication from the Underwriters association asking that this association appoint a committee to confer with the Underwriters association with regard to the formulation of reasonable rules in regard to wiring. He had asked of the former secretary if there had ever been a committee on the part of the association. The secretary had said no; that those invitations had been received year after year, but the association had never taken any action in regard to it. Mr. Ely considered the work of the committee to be a valuable achievement for the business which never was obtained until the association was reorganized.

Ralph Sweetland said that as chairman of the committee of the National Fire Protective Association on "Car Wiring," or as it is known now, the wiring of street railway property, including rolling stock, he knew the committee would be pleased to receive any suggestions from this association. The two points on which Mr. Corning had requested a conference had been taken up before the last meeting of the "Electrical" committee.

President Beggs said he was glad to have the assurance of Mr. Sweetland. He believed that there had been many exacting regulations formulated by the Underwriters in past years simply because those who understood better the hazards and the method of preventing fires in railway properties were not sufficiently frank with the Underwriters. There should be no difference and if the Underwriters could show to those charged with the care of railway properties that a certain method of wiring or protecting them was better, the railways were the direct beneficiaries.

President Beggs: The next order of business is the report of the committee on "Standardization of Equipment," the chairman of which, H. C. Page, of Springfield, has presented the report here and requested that I read it. The report that was presented and recommends to the favorable consideration and for adoption by this association is the report of the Engineering association committee on "Standardization;" it is now before the American Street and Interurban Railway Association for its action.

I take it that many of you will find possibly the recommendations embodied in this report are not just what you might have been doing in the past, or not just what you would think would be the best thing to do in the future; but it is a start in the direction of bringing about a uniformity of appliances and methods of using them, and if we cannot get all that we want, it is highly important to have obtained a start; and I therefore recommend that this report receive the very favorable consideration of the individual members. I know what industry and earnestness the members of the committee of the Engineering association have given to this matter.

I make these remarks for the purpose of possibly avoiding getting into a long technical discussion on what might be practically trivial matters in here, and the report is now before you for your action. I might add that it is not obligatory upon any company to make any changes in any of its apparatus. This is only a recommendation reached after consideration by those best qualified to determine what is best to adopt on behalf of the association. We may not all be able to adopt all at the same time, but if we work towards the general object proposed to be attained by the appointment of this committee it will be greatly to the advantage of every company in this country. As I had occasion to say before the Engineering association on Monday, it goes directly to the money in our treasury if we can have one standard of axles.

A. E. Lang said he had attended the meeting of the Engineering association and had been very much interested in the report and its discussion. He was satisfied that the committee has labored zealously to bring about a report that would meet the conditions as well as may be. In order to

bring out criticism and opposition, if there were any, on this report, he moved that it be approved and adopted as the standard for the guidance of the members of this association.

The report was adopted by unanimous vote.

The paper on "The Technically Trained Man and the Electric Railway Profession," by Prof. H. H. Norris, Cornell University, Ithaca, N. Y., was then presented.

Henry W. Blake (Street Railway Journal): Professor Norris' discussion on the technically trained man and the electric railway profession is the first paper which I recall which has been presented at a street railway convention by an active professor in one of our larger universities. In view of the large number of men who are graduating as electrical engineers from our technical schools into other branches of the electrical business, it is very desirable that a paper of this kind should be presented before the association, and it is appropriate that the topic should be suggested by one who has done so much for the street railway industry and association as Professor Norris.

Courses in engineering other than those required by military or civil engineers have received university recognition for a few decades only. But the tremendous demands during the last twenty or thirty years for technically trained men in all branches of engineering has resulted in the establishment of new scientific institutions and the expansion of the engineering department of most of the older universities. These courses have proved so popular that the engineering students, who formerly constituted only a small percentage of all those enrolled at the older universities, now equal in number the students in the academical departments if they do not exceed them. A tabulation was made last June by the editor of the Electrical World of the different schools engaged in engineering education. It showed that after omitting all manual training schools, as well as all colleges and universities which taught electrical theory only as a part of a course in physics, there were in this country 117 schools which have electrical engineering courses. Omitting from this number those institutions in which the electrical course is embryonic only or is purely academic in character, there remain at present 96 schools which teach electrical engineering either as an entirely separate branch or as a specialization in mechanical engineering. These schools had in the year 1906-07, 8929 electrical engineering students and had graduated 10,959 men from their electrical engineering courses. Of this number, 1,348 men were graduated in 1907.

No statistics were obtainable as to how many of these graduates had entered the electric railway field or how many of the undergraduates were expecting to do so, but it is safe to say from the specialization of electric railway engineering in a number of schools, and the large amount of time given to it in all of them, a considerable percentage of the undergraduates are prepared to do good service in this branch of electrical engineering. The practical question then arises whether the electric railway companies are prepared to utilize the services of these men to the same extent as they are sought in other branches of the work.

To some it may seem that 1,400 new electrical engineers a year, soon probably to rise to 2,000 or more, will be greater than the absorptive qualities of the general electrical field, vast as we know it to be. This would probably be true if their activity should be confined to purely engineering work, but this is by no means the case. The demand for technically trained men from manufacturing, commercial, operating and, to some extent, financial corporations as well, is probably greater than ever before. In fact, it may fairly be doubted if the schools are turning out nearly as many men as can be utilized with benefit to the electrical industry and with profit to the graduates. Experience has shown that the technical training which a man receives in any one of our higher class engineering institutions gives him a grounding in scientific principles and a discipline of mind which will enable him more easily to adapt himself to any department of work than if he had not enjoyed that advantage. This fact has been clearly recognized by the manufacturing companies, most of whom offer especial inducements to college graduates to become associated with them. To cite an example, one large electrical manufacturing company took on its force 243 new college graduates this summer. A successful manager of a number of electric lighting properties has made a college degree a condition of employment to any position looking forward to responsible work, whether connected with the engineering or the operating departments of his various corporations. He says that the mental discipline received in a university enables the graduate to adapt himself quickly to practically any department in which he may be placed, and that the chances are greater that he will develop the ability requisite for the work than one who had not received the same technical training. Many of the steam railroad companies make a special effort to secure technical men to recruit their ranks.

Professor Norris' paper suggests a concrete plan by which the results secured by other companies in utilizing the college graduate may be carried out by street railway companies. His apprentice course of some 18 months should form an excellent method for learning the practical application of the principles acquired at the university, and the establishment of a trained corps of men in the way suggested by him should be of great future assistance to the railway companies.

Prof. A. S. Richey, (Worcester Polytechnic Institute): In my work in Indiana I have had considerable opportunity to use technical graduates. It was the policy of the Indiana Union Traction Company to offer positions to technical graduates—minor positions, as sub-station operators, helpers, etc., we had no regular apprenticeship course, but at nearly all times for several years we have had technical men learning the electrical railway business, or some parts of it. Some of those men, besides making good for themselves, make good for the company, and with the Indiana Union Traction Company now the heads of at least two of the important departments are filled with those men. Other men, of course, made good, but left the company and went with other companies. Those other companies profited by the experience which was given those men by the Indiana Union Traction Company. But I think, with very few exceptions, the Indiana Union Traction Company got its money's worth out of those men while they were there. The exceptions were much more rare than the general average of all the employees with the company of that sort. I think the apprenticeship course that Professor Norris suggests is a very good one. I think that if it had been possible to have put those men that we had, and which the company still employs, I suppose, through such a course as that, they would have become much more valuable to the company in a much shorter time than they are doing now. The manufacturers, of course, realize that. Mr. Blake spoke of the large number of technical men who were going out every year. That that number is yet to grow may be shown by the fact that each spring, along two or three months before commencement time, representatives of the large electric manufacturing companies, of the American Telephone & Telegraph Company, and companies of that sort, make visits to the technical schools and solicit men to come with their company. They cannot get enough of them, and I think that while they are offering advantages which are better and better every year, that it would be a good idea if the electric railway companies would formulate some scheme such as has been suggested, and get the benefit of more of those men than they are getting.

The technical schools are taking an interest in this electric railway work. Worcester Polytechnic Institute, which is a small institution, compared to many others, through the country, has just completed a laboratory which with its equipment represents an investment of about a quarter of a million of dollars, and between one third and one fourth of that investment represents equipment which is devoted exclusively to electric railway work. Our senior class has work which is in a measure elective. No one course was elected by more than three fourths of the men in the senior class in electrical engineering except the electric railway course, and that course was elected by every man in the senior class. Ten men who are taking post graduate work in electrical engineering this year, are, every one of them, taking the electric railway engineering course. Three of those ten men have been interested enough in your association to come here from Worcester at their own expense—and that expense to a student in an institution of that kind means more than it does to a great many of you men—they have come down here at their own expense to attend this convention for what they can get out of it. That gives you some sort of an idea of the interest that is being taken by us, by the technical schools, by the technical students in electric railway work. But the technical schools can only give a foundation in electric railway engineering. We are giving the men what we can. We are giving them all that we can with the money that we have to invest in equipment, and all that we can with the facilities that we have, but the men must have actual experience before they make electric railway engineers, before they make engineers of any sort. That is the reason why this request or suggestion has been made for a sort of apprenticeship course which will round out that work of the technical schools more quickly and in better shape than simply beginning at the bottom and working up.

There is another way in which the technical schools and the electric railway association might co-operate. As I mentioned before the institutions have put a great deal of money, some of them, into experimental and other equipment which is suited first by all means to testing and experimental work.

Purdue University at Lafayette, Ind., and the American Railway Master Mechanics Association have had working arrangements for a number of years. Purdue University has a splendid laboratory for railroad experimental work, and that interest has been taken is shown by the fact that it has been kept up from year to year. Some such working

arrangement as that might be gone into by this association and the various technical schools who are taking up the electric railway work, and who have put money into equipment which is fitted especially for that sort of work.

One thing comes to my mind now, in the report of the committee on "Maintenance of Electrical Equipment," the very great divergence of opinion as to the best brushes to use on railway motors. It cannot be possible that the very hardest brush is the best brush, and at the same time that the very softest brush is the best, under the same conditions. Nobody seems to know what those conditions are, nor where to bring that wide divergence of opinion down to a point, and who is better fitted to take that up than these institutions which are equipped for this experimental work and who have the time and inclination to go into and find out the why of these things? That is simply another way in which we can co-operate, and where the technical schools might again be of advantage to the electric railways beside in the way of furnishing them the technically trained men whom they must have to continue their operation.

C. S. Sergeant (Boston Elevated Railway). I was very much interested in Professor Norris's paper. I have been interested for a great many years in utilizing technical graduates so long as they could be prevailed upon to remain with us, but they are birds of passage.

If one were to criticize at all it would be as to the brevity of the course in each department. I do not believe in a smattering. I think that this business becomes more specialized all the time, and that there is a good deal of danger in the young man who flits about from a couple of months in one department to a month and a half in another—there is a good deal of danger that he will think he knows it all in a year or two. That is the worst thing that happens to a young man. It doesn't matter to the company, because the company does not have to use that particular man if he has that proclivity, but it is a very bad thing for a young man. I do think that we can not have too many educated men in the business. I think one of our great things to do is to encourage the better education on the part of men who take care of motors and of that department. In the car barn we cannot afford to pay very high prices for foremen, but yet it is a splendid training ground for men in this business, if they can have a thorough knowledge of how best to take care of motors. I cannot think of anything that affords more inducement to a man in the future in the mechanical line than that. Yet we put in a graduate and carry him along for a month or two, and he goes away and we stay on with our same old foreman. I am heartily in sympathy with the movement to employ more technical graduates, so far as it is in my power to keep them and employ them and get them for the compensation we can afford to give.

C. D. Wyman (Stone & Webster): I may however be permitted to add to what has been so well said a bit of personal work which the firm which I represent and which is so largely interested in so many companies is doing along this line of securing or aiding in the technical education of men who are coming into the service of street railways as well as lighting industries. We have been fortunate enough to secure, for what we call our school, from ten to twenty graduates from Cornell, from the Massachusetts Institute of Technology and from a number of other technical institutions, and in our school we endeavor to give them first some practical education along the line of investigating actual statistics derived from the operation of our various companies, and after having, if possible, a year's study, and thereby gained a farther broad and general view of the principal lines of work, they then are very willing and anxious to undertake practical results with some of the different companies that we control, and every year there go to these companies from ten to twenty young men who get right down to business. They follow various lines; some who are specially interested in electrical engineering make their line of work that department in connection with some of our companies, and in the 30 companies in which we are interested, I assume that ninety per cent in control of those companies have come along that line. Many others, however, are very anxious to get into operating work and so they start perhaps in shops and through there on up through the superintendent's departments, going into all the departments according to certain lines of education—a sort of curriculum, which we plan—and become alternately superintendents, managers, and presidents of the various companies. We find this a most advantageous method and it meets with the very hearty co-operation of those young men. I have been very greatly interested latterly in reading something of the railroad course which the Chicago University is endeavoring to establish, or has, I believe, already, to some extent, established. And these practical courses which the technical schools and some of the universities are establishing along the lines which have been suggested here this

(Continued on Page 589)

SOME PRACTICAL POINTS IN STEAM TURBINE CONSTRUCTION; WITH PARTICULAR REFERENCE TO THE PARSONS TYPE.*

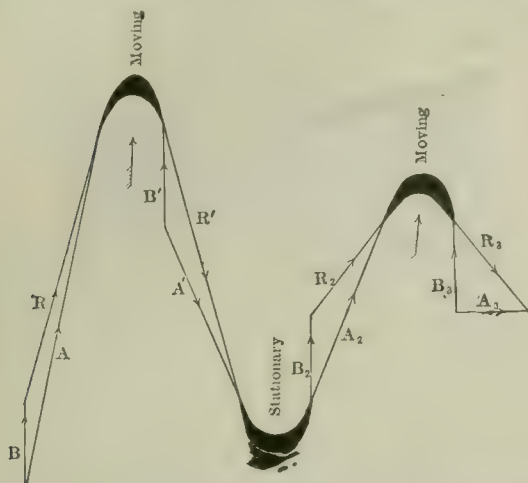
BY ST. JOHN CHILTON, ENGINEER, ALLIS-CHALMERS COMPANY, MILWAUKEE, WIS.

The greater part of what has been written of the principles governing steam turbine design deals with theoretical considerations that must be left to the experience and judgment of the manufacturer, and are, therefore, of particular interest only to the designer and specialist. The interest of the power plant engineer lies in the results obtained, nevertheless there are practical considerations of

lated by varying the number of nozzles in action and the quantity of steam supplied to individual nozzles.

The velocity of flow through the buckets, in this type of turbine, can be reduced by increasing the number of re-expansions, or stages, a stage being defined as the elements required to develop and to abstract the velocity due to a single-pressure drop; that is, a set of expansion nozzles, with the necessary number of rings of rotating and stationary buckets.

Various applications of the impulse principle are found in turbines of different manufacturers; but in all of this type, velocity is first imparted to the steam and then abstracted by the rotating element without having additional velocity imparted to the steam.

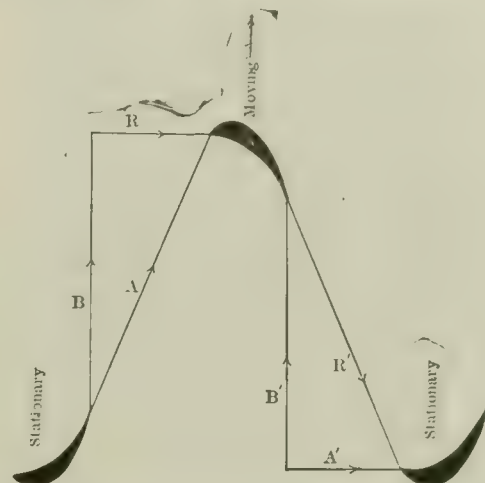


Parsons Type Steam Turbine—Figure 1, Relative Positions of Impulse Buckets and the Direction of Flow of Steam.

interest indicating results that may be expected from turbines having stated characteristics, and that may be of assistance in fixing operating conditions. In this paper an effort will be made to bring these out.

Impulse Turbine.

Steam turbines are divided into two general types, best known as impulse and reaction. In an impulse turbine steam is first expanded in a nozzle or nozzles, in which it acquires a velocity depending, within certain limits, upon the fall in pressure. It is then allowed to impinge upon buckets suitably fastened to the periphery of a disc, and they, in turn, abstract

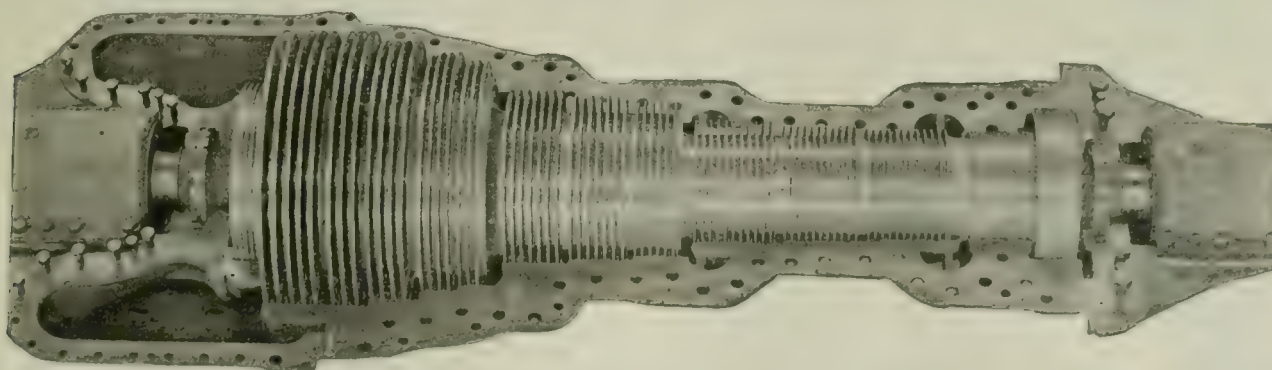


Parsons Type Steam Turbine—Figure 2, Relative Position of Reaction Blades and the Direction of Flow of Steam.

Only a part of the periphery of a disc is active at any instant unless multiple-stage construction is used; then the proportion of active buckets increases with the increasing volume of steam, until, in the last stage, all the buckets may be active.

Reaction Type.

The reaction, or Parsons, type has no expansion-nozzles, as ordinarily understood, but is provided with alternate rows of stationary and rotating blades. Steam is admitted to the first row of stationary blades, then passes through the length of the turbine, falling in pressure and increasing in volume



Parsons Type Steam Turbine—Figure 3, Allis-Chalmers Steam Turbine. Rotor and Half Cylinder, Showing Blading and Balance-Pistons.

the velocity, thereby imparting rotation to the shaft to which the disc is fixed. No fall in pressure occurs within these rotating buckets; the rotative effort, therefore, is due wholly to the velocity imparted to the steam within the nozzles. When more than one ring of rotating buckets is used to abstract the velocity from a single nozzle, or single group of nozzles, the flow of steam, with little or no further expansion, is reversed by stationary buckets which guide it into a second ring of rotating buckets. Figure 1 shows relative positions of nozzles, stationary and rotating buckets, and the direction of flow of steam through them.

The quantity of steam delivered to the buckets is regu-

until the exhaust-opening is reached. Expansion occurs in both the stationary and rotating rings of blades, and the velocity thus required is abstracted by the rotating element; the velocity acquired in the stationary blades being abstracted by impulse action, and that acquired in the rotating blades, by reaction.

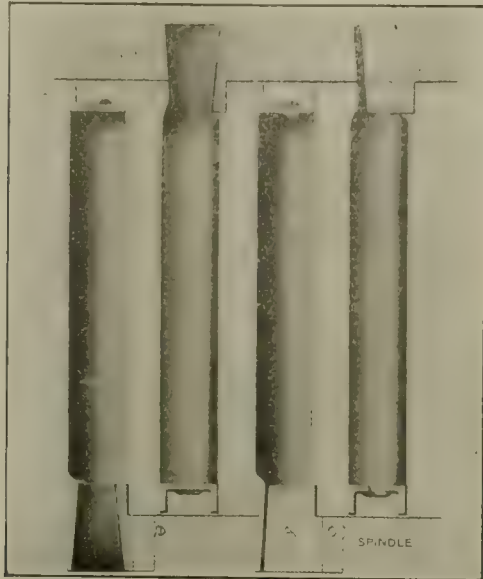
Figure 2 shows the relative positions of stationary and rotating blades, with the direction of flow of steam through them.

The cross sectional area of the steam passages through the blades is increased from the high to the low-pressure end of the turbine, to correspond with the increase in volume of steam. Where this requirement necessitates blades of too great a length, the diameter of the rotor, or spindle, is increased. (See Figure 3.) This admits of a greater number of

* Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 16, 1907.

blades per ring, hence, an increased number of openings between blades, thereby permitting of the retention of the blade-lengths within limits mechanically practical. Blades of different lengths are so grouped, with reference to the fall in steam pressure, as to maintain a substantially-constant velocity-ratio.

In the Parsons-type turbine the entire annular space between rotor and cylinder is filled with working steam, and all



Parsons Type Steam Turbine—Figure 4, Allis-Chalmers Steam Turbine. Rotor and Half Cylinder, Showing Blading.

the blades are active, thus eliminating useless friction, due to idle rotating parts.

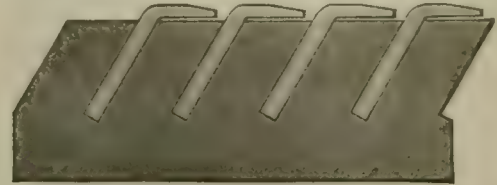
Fundamental Principles.

The work developed in turbine blades depends upon the quantity of steam supplied and its velocity, and not upon pressures and pressure-areas, as in steam engines, therefore, the widths of the blades can be so proportioned to the lengths as to insure necessary strength and stiffness, and, thus, amply meet all mechanical requirements.

As has been already stated, expansion takes place in both stationary and rotating blades of the Parsons-type turbine. Each pair of blade-rings, consisting of one stationary and one rotating ring, may, therefore, be considered as corresponding to a stage in the impulse-type. The reaction turbine has, accordingly, many stages when compared with the impulse-type, and the velocity of steam is thus much lower. Theoretically, the ratio of steam-velocity to blade, or bucket-velocity,

turbines, running at even much lower speed. Another disadvantage of high steam-velocity, is that the erosive effect of steam increases directly with the square of its velocity.

In reciprocating engine practice it has been customary to compare the weights of engines as an indication of relative strength and rigidity. Even with this prime mover, such comparisons are often unreliable unless distribution of weight is also considered. In steam turbines there are no reciprocating motion strains to be considered, and the most important factors are of a nature distinct from those governing reciprocating-engine design, for instance, the rotor-diameter, and, therefore, the cylinder-diameter, is changed for different speeds. The weight depends chiefly upon the diameter of these parts, and, furthermore, to remove all weight that does not contribute to its strength, considerable additional expense is incurred in the construction of the rotor. Indeed,



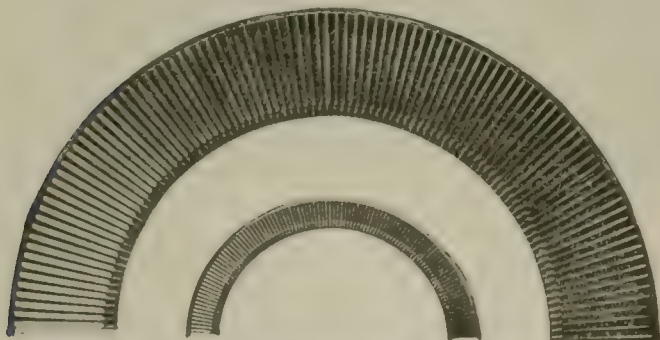
Parsons Type Steam Turbine—Figure 5, Section of Foundation.

so many things have to be taken into consideration if weights of steam turbines be compared, that any such comparison is misleading, even in turbines of the same type. Owing to difference in construction, no comparison is possible between turbines of different types.

Both types of steam turbines are essentially high speed, and the tendency is toward increasing the speeds that were accepted standards a few years ago. Higher speed means increased economy of operation, and experience has shown this speed advance to be practical mechanically up to the limits set by the generators to which the turbines are connected. Appreciating this, some manufacturers are voluntarily incurring the expense of developing new standards.

Difficulties Overcome.

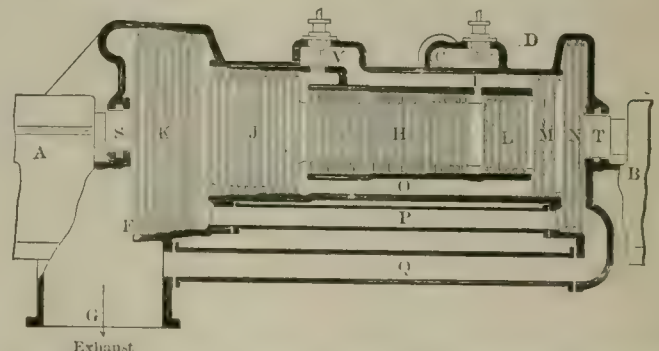
Each type of turbine had its inherent difficulties to be overcome before the requirements of commercial operation could be met satisfactorily. In the reaction, or Parsons-type, an important source of loss in efficiency is the steam leaking past the ends of the blades without doing work. It is desirable, therefore, to reduce this loss to a minimum. The quantity of steam thus lost past a ring of blades depends upon the peripheral length of the ring, the percentage that the clearance is of the length of the blades in the ring, and the clearance at the ends of the blades. Obviously, then, leakage will be greatest over the shortest blades. The effect of speed upon economy, here, is self-evident. Increase of speed and consequent decrease in rotor- and cylinder-diameters



Parsons Type Steam Turbine—Figure 6, Half Rings of Blading Ready for Insertion.

required to obtain the most economical results, approximates two to one. Hence, the peripheral velocity of the rotating element in a reaction-turbine, with its many stages, is generally much lower than in the impulse-type, with its few stages.

Since the peripheral velocity of the rotating element required depends solely upon the velocity of the steam, and is independent of the speed of the turbine the rotor-diameter must be correspondingly increased when the speed is reduced. Lower speed, therefore, does not necessarily mean lower blade velocity; in fact, the highest peripheral velocity of blades in a reaction-turbine is generally below that in impulse-



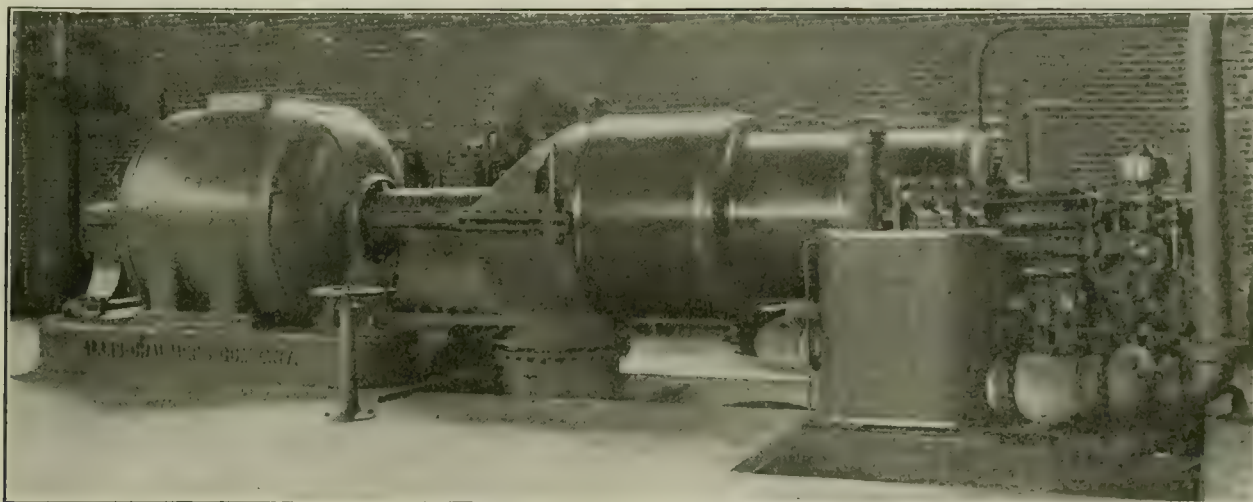
Parsons Type Steam Turbine—Figure 7, Elementary Parsons Type.

reduces the peripheral length of the rings, and, by increasing the blade-lengths, reduces the percentage that the clearance is of the lengths of the blades; this clearance remains practically constant. It is also evident that economy demands the smallest possible radial clearance consistent with safety. In reaction-turbines small clearances between stationary and rotating blades, in line with the flow of steam, are unnecessary, and in practice the clearance is never less than $\frac{1}{8}$ -inch between the smallest blades, and often as much as 0.75-inch between the largest blades, thereby allowing ample room for difference in expansion of rotor and cylinder.

Blading.

Necessity for small radial clearance soon demonstrated the advisability of protecting the tips of the blades to prevent them from being knocked out through accidental contact with cylinder or rotor. Many interesting patents, in fact, endeavoring to accomplish this, have been taken out by manufacturers of this type of turbine. The one that experience has proved both practical and effective is seen in the blading construction in Figure 3, and more in detail in Figures 4, 5, and 6. In this construction the blades are cut from drawn stock and each blade is formed by special machine tools so that at its root it is of angular dovetail shape, while at its tip there is a projection. To hold the roots of the blades firmly, a foundation-ring is provided. (A in Figure 4.) This foundation-ring is first formed to a circle of the proper diameter, and then slots are cut in it by a special milling machine, and these, accurately spaced and inclined to give the required pitch and angle to the blades (Figure 5), are of dovetail shape to receive the roots of the blades. The tips of the blades are substantially bound together and protected by means of a channel-shaped shroud-ring (B, Figure 4), in which are holes punched to receive the projections on the tips of the blades. Accurately spaced by a special machine, these holes match the slots in the foundation ring.

The foundation rings themselves are of dovetail shape in cross section, and, after receiving the roots of the blades, are inserted in dovetailed grooves in the cylinder and rotor where they are firmly held in place by keypieces. (C, Figure 4.) Each key piece when driven in place, is upset into an undercut groove, (D, Figure 4), thereby locking the whole structure together.



Parsons Type Steam Turbine—Figure 8, 1,000-kw., 1,800 R. P. M., 60-Cycle, Allis-Chalmers Parsons Steam Turbine and Alternator.

After being inserted in the turbine, as above described, each blade is so firmly held between the bottom of the slot in the foundation-ring and the side of the groove, owing to the dovetailed shape of its root, that it is impossible for a blade to get out of place.

The flanges of the channel-shaped shroud-rings are purposely made thin, so that, in case of accidental contact between revolving and stationary parts, they will wear away enough to prevent the blades from being ripped out. This protection is such that to rip them out a whole ring of blades must be sheared off at the roots. The strength of the blading, therefore, depends not upon the strength of an individual blade, but upon the combined shearing strength of an entire ring of blades.

The blading is made up in half rings, and the photograph (Figure 6) shows two of these ready to be put in place in a turbine. These rings are a thorough machine shop job, easily inspected, with the uncertainty of hand-work eliminated.

No matter what precautions are taken to prevent trouble, it is generally appreciated that the possibility of defective material creeping in, makes easy facilities for repairs advisable. With the construction described, any blading trouble would be localized and damaged rings could be removed and the turbine continued in operation until such rings could be replaced conveniently. These half rings can be inserted quickly and without disturbing the thrust-balance of the rotor.

The improvements effected by this construction may be summed up as follows:

1. Firm attachment of blades.
2. Ample stiffening of blades of all lengths against effects of vibration.
3. Accurate spacing and accurate angles of blades.
4. Protection of blade-tips, so that accidental contact will not rip out blades.
5. Smaller clearance, resulting in diminished steam-leakage and, hence, increased economy.
6. Improved baffling against steam-leakage by reason of the shape of the shroud-ring.
7. Protection against a possibly defective blade coming out and destroying other blades.
8. Accurate machine-work, as against uncertain hand-work.
9. The facility for thorough inspection of workmanship.
10. The localizing of any possible trouble and the convenience of making quick repairs.

Balance.

Another difficulty that, in the past, caused some trouble, was due to the method used to balance the thrust along the rotor, resulting from the drop in pressure in the rotating blades of the reaction-turbine. Balance-pistons, connected with several points in the turbine cylinder, by means of equalizing passages, are used for this purpose. These balance-pistons (marked L.M.N.) are shown in Figure 7. The earlier construction was to place the three balance-pistons upon the high-pressure end of the turbine-rotor, as shown in Figure 7. No trouble was experienced from this arrangement except with the largest, or low pressure, piston. In the larger turbines, this became of considerable diameter, and, owing to the necessity of constructing it with a web, showed a tendency to warp, thereby bringing in contact the dummy-rings in the

periphery of the piston with those in the cylinder. These dummy-rings serve as baffles to prevent steam-leakage past the pistons, and their contact at high velocity meant not only their own destruction, but also injury or destruction to the surrounding parts. A simple but effective means of eliminating this trouble is shown in Figure 3. The two smaller balance-pistons, easily made sufficiently stiff to prevent warping under any conditions of operation, are allowed to remain upon the high-pressure end, but the largest piston is placed upon the low-pressure end, of the rotor immediately behind the last ring of blades. In this location its effective area starts from a smaller inner diameter, hence the required area can be obtained with a smaller outer diameter. It can be also constructed as part of the rotor, and, therefore, has ample stiffness to prevent warping. It receives its steam pressure from the same point in the turbine as the largest piston shown in Figure 7, which it replaces; but the steam passage is through holes in the webs of the blade carrying-rings, which are pressed on the rotor to obtain the largest diameter shown in Figure 3. Entrance to these holes is through the small annular opening in the rotor, visible in Figure 3, between the second and third bar's.

As the area of these balance-pistons cannot be changed without replacement, and as it is not advisable to change the blade-angles after the blades have been correctly set in place, doubt may arise as to the possibility of calculating the thrust with sufficient accuracy to obtain perfect thrust-balance. From the construction of the blading, the accu-

racy of the blade-spacing and blade-angles can be depended upon. It remains, then, only to determine, by calculation, the pressures at the various points in the turbine. It is, therefore, interesting to note that repeated tests have shown the pressures at different points in turbines having correct blade-spacing and angles to be within one per cent of the calculated pressures.

Steam Pressure.

For new installations, inquiry is often made as to the steam pressure best suited to turbines. Taking everything into consideration, it seems probable that the most economical operating pressure will be found at about 150 pounds above atmospheric pressure at the throttle valve, and that a greater saving can be effected by the use of a small amount of super-heat than by increasing the initial pressure beyond this point. Reliable data shows the gain in steam economy by increasing the pressure from 150 to 175 pounds to approximately two per cent; an increase of pressure from 150 to 200 pounds improves the steam economy by approximately three per cent. Against this should be placed the increased cost of piping, valves and boilers, and the loss due to increased leakage. The selection of the most economical steam pressure, therefore, resolves itself into a comparison of the cost of fuel and initial investment, that ought to be made for definite conditions. Increasing the steam pressure also has a tendency to add to, rather than reduce, the cost of the turbine.

Since steam turbines have become better known, the impression is not so common, that higher vacuum is required to obtain economical results with this prime mover than with reciprocating engines. Higher vacuum is not required to obtain good results; but as turbines are not subjected to the changes in temperature, present in the cylinders of reciprocating engines, they can utilize high vacuum to better advantage. The difference in steam economy, within the range between six inches and three inches absolute, is, approximately, five per cent per inch. The saving effected between three and two inches is approximately six per cent, and between two inches and one inch approximately seven per cent. An idea of the relative quantity of condensing water required for different vacuums may be gained by comparing that required for the usual operating vacuums. For example: with injection water of 70 degrees F., the usual temperature upon which condenser guarantees are based, it is customary to figure upon using about 36 pounds water per pound of steam condensed, to obtain a vacuum of 3 inches absolute, and about 1.4 times this quantity is required for a vacuum of two inches absolute. With injection water of 60 degrees F., which may be considered the winter temperature, the quantities required for the foregoing vacuums are approximately 28 and 34 pounds respectively. Having the quantity of condensing water required, the cost of fuel, and cost of water delivered to the condenser, the vacuum best suited to the conditions under consideration may be determined. Theoretically, the effect upon the turbine of reducing the vacuum below that for which it is designed, is to reduce the capacity and to lower the rating at which maximum economy is obtained. Turbines, however, are designed with sufficient flexibility to allow of varying operating conditions within wide limits, hence the theoretical reduction in capacity is not one that need be considered unless an unusual reduction in vacuum is contemplated. In the reaction-turbine, for a given initial pressure, lower operating vacuum permits of fewer rings of blades; likewise a smaller area of exhaust-opening. Therefore, the effect upon the cost of the turbine is to reduce rather than increase it; the difference, however, is not sufficient to be of importance in determining the operating vacuum desirable.

Although much remains to be determined concerning super-heated steam, experience has shown that in turbine plants, a substantial saving in fuel can be effected by its use. Steam consumption tests show that the increment of saving becomes smaller as the super-heat is increased. For 50 degrees F. super-heat at the turbine throttle a reduction in steam consumption is effected, approximating 7 per cent. The reduction for 100 degrees F. approximates 10 per cent, and for 150 degrees F., 12.5 per cent. This saving is due in part, to the maintenance of drier steam, and to a reduction of skin-friction upon the blades. The effect of super-heat upon a turbine designed for dry saturated steam is to increase its capacity by reducing the quantity of steam required, thereby raising the rating at which maximum economy is obtained.

The Parsons-type turbine is too well known to require detailed description. However, the important position occupied by steam turbines in power-plant work insures interest in marked improvements in details of their construction. The turbines shown in Figures 3 and 8 have several besides

those already described, and among them may be mentioned the governor-mechanism. This is of the hydraulic type, and the governor is required to operate the small, balanced oil relay-valve only, while the two steam valves, main and by-pass, are controlled by a strong force due to oil pressure of about 20 pounds per square inch, acting upon a piston of suitable size. As a turbine by-pass valve opens only when the turbine is required to develop overload or the vacuum fails, a good feature of this governor-mechanism is that this valve can be kept constantly in motion, thereby preventing sticking, even if called into action only at long intervals. Another feature of importance is that the oil supply to the bearings, and that to the governor, can be inter-connected so that the governor will shut off the steam if the oil supply fails.

The speed at which turbo-generators must operate necessitates mechanical construction different to that found satisfactory in other classes of electro-generators, and also more expensive. Owing to the compactness of these generators, however, and to the small number of poles, better electrical efficiencies can be obtained.

The high peripheral velocity necessitates the use of stronger material in the rotating parts, and special provisions must be made for holding the field windings firmly in place and for protecting the insulation. Special attention is given these requirements in the generator shown in Figure 8, and one of the interesting features of its rotor is that the winding is placed in radial slots to prevent rubbing between adjacent conductors that might cause injury to the insulation. The generator referred to is totally enclosed to insure noiseless operation, and forced ventilation is provided by having a small fan on each end of the rotor. If desired, the air inlets can be piped through the basement to the outside of the building, and a lower operating temperature thus obtained.

THE CLAIM DEPARTMENT AND WHAT SHOULD BE DONE TO MAKE IT MOST EFFECTIVE.*

BY CHARLES B. HARDIN, CLAIM AGENT, UNITED RAILWAYS COMPANY, OF ST. LOUIS, MO.

No problem occupies the manager's mind to a greater degree at the present time than the claim department, and what should be done to make it most effective. And well may he think of a department whose expense equalled almost eleven million dollars last year, and is increasing at an alarming rate from year to year, and for which not a single tangible asset remains with the company. Yet we all know that if it were not for this expense, judiciously handled, almost all the income that we do not already spend, would be absorbed by the sheriff in the satisfaction of judgments.

The intent of this paper is to state out of my own experience certain things that have been beneficial to me, and to suggest other means which I hope may be beneficial to you and me, if we can persuade our managers to adopt them.

The claim department should be governed by a man who has absolute authority as to the employment of the men who go to make up the personnel of that department. This is necessary, because in no department of the road are the demands for absolute loyalty to the company and strict application to business so great, and the head of the department cannot guarantee the manager the proper fulfillment of these demands if the men feel that they are not strictly accountable to the claim agent for the results they get. Few changes should be made, and the men should be encouraged to remain, for only by experience can a man become a successful claim man. It is a business that cannot be learned in a correspondence school. The members of the claim department should be well paid, and made to understand that the salary is not limited to a certain sum, if the proper results are achieved; that there are no 8 hour rules in existence; that they are on duty 24 hours a day, and subject to call at any time. The manager, however, should not be too close in his allowance of men for this department. To get the correct facts about an accident quickly is your constant endeavor, but you cannot do this at all times if your men are always overcrowded with work.

There should be at least one female investigator in every claim department. She can get information that a man cannot get, and in investigating cases of injury to women, she is invaluable. You will also find it advantageous to have some men whose connection with the department is not generally known. Many persons are averse, for various reasons, to giving information to known representatives of the claim department, yet will talk freely to an apparent stranger.

* Presented before the American Street and Interurban Railway Claim Agents' Association, Atlantic City, N. J., October 16, 1907.

What you want is correct information upon which to base your judgment. If you then err, you may be excused. If, through lack of effort, you do not get the correct information, and make an error in judgment, you should be blamed most severely.

The men should be assigned in rotation to duty from 6 o'clock P. M. up to midnight, or late if the traffic holds up, to look after the accidents that occur during these hours, but arrangements should be made whereby two or three other members of the department can be reached without delay, should an occasion arise, such as a car collision, or a car jumping the track, where the night man cannot see the injured parties at once. This can be done by designating certain members each evening to remain at home, or in close touch with their telephones. Their services may not be needed, but the claim agent can retire at night with a more comfortable feeling in his breast if he knows that, should a serious accident occur, he can reach a sufficient number of his men instantly to assist him in properly taking care of it.

Every member of the claim department should have a telephone in his residence, and if he does not voluntarily have it placed there for the convenience of his family, it should be installed at the expense of the company. You will find it very beneficial to have adjusters, and investigators, call up the main office at an hour designated when they leave the office. In this way you are always in close touch with some outside member of the department, and know just when you can get hold of any particular member.

The Claimant's Standpoint.

In the adjustment of claims against the company, do not assume the attitude of a Shylock toward the claimant. Try to look at the claim from the claimant's standpoint as well as your own; in this way you will better serve your company, because when the matter is presented to the jury later on, it is an equal chance at least that the jury will view it from the claimant's standpoint. The settlement of liability claims should be effected as soon as possible. Educate your men so that they can form, from the injured party's statement, a good idea of the company's liability, or the probability of a judgment being rendered against it if the case should be taken to court. If the agent thinks the company is not liable, he should get a release; if he is uncertain as to what would be a fair settlement, or the injured party demands more than he thinks the company should pay, he can make a plausible excuse to get away for a while to communicate with you over a telephone, and receive further instructions. I believe where the injured party's statement makes a case for the jury, and there is bona fide injury, a settlement on reasonable terms should be made, for we all know the direction in which the jury's sympathy leads. This is particularly true in cases of injuries to women. The liability of a large judgment for a small injury is ever present here, and the supreme courts rarely cut down the amount of a judgment, and even less frequently reverse one, in favor of a woman on account of excessiveness.

A special effort should be made to close up serious injuries to minors, as the statute of limitations does not begin to run against the cause of action until they have reached their majority. This may be so far in the future that the probability of making a successful defense must be greatly discounted. Some may think the plaintiff labors under the same disadvantage, yet my experience has led me to conclude that the burden rests upon the defending public service corporation to prove it is not guilty. The calling of the attention of your men to the court decisions in ruling cases in certain classes of accidents, and seeing that they become familiar with them, will aid them very much in forming correct conclusions as to the liability in similar accidents.

The new conductors and motormen should be sent to the claim department for instructions in relation to accidents and accident reports, or should be specially instructed by the employment agent. In addition to this the claim agent should give occasional talks to the men at the sheds, and point out to them the many difficulties under which he labors, and impress on them the important relation they bear to the claim department. Try to make them realize that an accident is a serious thing for the company, and that when one does occur, they must get witnesses. What a cold chill comes over the claim agent when the report of a serious accident comes to his desk and he finds the names of only one or two witnesses turned in by the crew! Many conductors and motormen seem to think they are expected to interest themselves in accidents and get witnesses only when the accident occurs on their particular end of the car. They should be taught that it is as much the con-

cern of the one as the other, regardless of the end of the car on which the accident occurs, and the employees who come upon the following cars should also interest themselves in getting witnesses.

The anti-corporation fever is so rabid in my state that you cannot successfully defend a plain case of suicide with but two witnesses, proof of the corpus delicti being sufficient to overcome that many. The crew involved in every serious accident should be brought to the claim office and personally interviewed by the claim agent, and a statement complete in detail taken. This will often open up lines of defense hitherto unknown. Every superintendent should take an active interest in the operation of the claim department, and work constantly to keep the number of accidents down to the minimum. He should bring every employee who has an accident of any seriousness into his office and have a heart to heart talk with him, endeavoring to impress upon him what a serious thing for the company an accident is, so that he will not have another. Nothing is so demoralizing to the employees as to let them become impregnated with the idea that "accidents are bound to happen." He should particularly impress upon them the necessity of making a truthful report when an accident does occur, and failure to make a report should result in the instant discharge of the derelict employee. No claim presents so perplexing a phase as the one unreported and the most stringent measures should be adopted by the management to keep these down to the minimum.

Early Knowledge.

The success in handling an accident case depends more upon an early knowledge of its occurrence than any other one thing. The employees should be frequently impressed with the importance of this. We have all our accidents, as well as every other class of trouble, reported to our central telephone exchange, from which they are immediately distributed to the different departments affected. The private telephone service should be extended over the entire system by the management as soon as possible. The use of public telephones is sometimes slow and dangerous; not only are the conductors and motormen frequently at a loss to find one, but what they have to say in reporting the accident is heard by outsiders, and this often results in the knowledge getting into the hands of the "ambulance chaser" much to your sorrow. Then the giving of instructions to your men is attended with more or less danger over a public telephone.

We have found a well organized and well equipped medical department very beneficial to our company. It is located on the same floor as our offices. The chief surgeon, or one of his assistants, is always there and can make any examinations desired by the claim department of claimants who come to the office. We have learned, however, that it takes careful watching to keep the amount of its labor within reasonable bounds. The inclination to call up the company surgeon and have him come to see injuries, especially where his services were free, was too often acted upon, and we found we were giving about \$2,500 worth of free treatment a month. In addition to this, we had to take into consideration the bill of the family surgeon when negotiating a settlement, so we have eliminated the subsequent treatment, except in special cases, and confined the work of the medical department to giving first aid and making special examinations.

However, in addition to this work, our medical department treats all injured and sick employees. In this way the treatment of the injured is distributed among the different outside members of the medical profession, thereby doing away with some feeling of jealousy. You will make a costly mistake if you do not make every effort to conciliate the outside surgeons. "Suggestive therapeutics" was never more in evidence than it is to-day, and an unfriendly surgeon can manufacture a typical case of traumatic neurasthenia, the nemesis of the claim agent, from the slight shock attending the overhead blowing. We all know that the surgeon's bill is the last bill paid by the injured, and frequently is never paid.

You will find it beneficial to send a man to see the attending surgeon, get him interested in your side of the case by assuring him he will be taken care of if a settlement is made, and see that he gets his pay if a settlement is made. We almost invariably agree upon a specified amount in cash and the payment of the attending surgeon's bill by the company, and have the bill sent to my office from which it is paid by voucher. I have found that the surgeon is as much, if not more, interested in collecting his bill than is either the patient, or the company, and the positive assurance from you that he will get his money as soon as you get a release, will assist you materially in obtaining what you want. You must be consistent in this, for, however many times you have protected the surgeon in the past, the failure

to do so once, if he thereby loses a bill, will cause him to forget all you have done for him in the past and result in his next case going instantly into the lawyer's hands, who, of course, looks after the surgeon's interests.

You will find that it will assist you in keeping a line of the doctors to have a card system. Have a card for each doctor. Place thereon the name of every case handled by him, the final disposition of it and the name of the attorney, if one gets into the case. Also note thereon the name of every case in court in which the doctor testifies as an expert. This information will be found valuable in aiding you to decide what to do in his cases, and if he has testified several times against you, it may be useful to your attorneys in cross-examination. The same record should be kept of attorneys presenting claims.

The Legal Department.

However closely you may settle your claims, or careful you may be in declining them, you will have some lawsuits to defend, so cultivate and maintain the most cordial relations with the legal department of your company. There is a disposition on the part of some lawyers not to take up claims with the claim department, but to bring suit, and then take up the question of settlement with the legal department. Everything should be done by you and the legal department to discourage this practice. We all know that a dollar looks larger to us than it does to our lawyers. Have an understanding that no final action looking to the disposal of a pending claim, suit or judgment, shall be taken without consultation with you. This will enable you to keep in closer touch with every important phase of your business, and to give that department the benefit of some knowledge you may have of the matter that does not appear in the papers. It will also give your department a higher standing among outside lawyers. This may also be increased by refusing to settle with claimants if they have engaged reputable lawyers, unless they will settle with and dismiss their lawyers, or make a settlement through them. Occasionally this may cause you to pay more money, but it pays in the long run. This rule of conduct does not apply in dealing with "ambulance chasers" who should be settled with only when you cannot settle with their client, that is, if you want a settlement; and in claims presented by this class of lawyers, if there is a doubt of liability it should always be resolved against the claimant. You should by all means so conduct your department and have your own acts support it, that the general public will recognize that it can get a fair hearing, and fair treatment if there is cause for filing a claim against your company. This does not mean that you should make a settlement of every claim presented, but endeavor to establish by your investigation the exact manner in which the accident occurred, and then if you decide not to settle the claim, explain to the claimant why you refuse, and while he may not agree with your conclusions he will, in a majority of cases, give you the credit you deserve.

Remember at all times that yours is an honorable calling, and by your conduct you can acquire and maintain that standing among your fellow-men that will redound beneficially to your company, and be a source of great personal pleasure.

Demonstration of Thermit Welding.

Prominent among the exhibits is that of the Goldschmidt Thermit Company, 90 West Street, New York. This concern is represented by a number of its engineers. Besides holding the regular exhibit in the Music Hall on the Steel Pier, the Thermit Company maintains a special demonstration booth just outside of the pier for the purpose of giving actual demonstrations of welding street car rails, compromised joints, electric motor cases, truck frames, wrought iron and steel pipes, thus allowing the delegates to become familiar with every phase of the process. It is shown that by its new system of using yellow wax as a pattern or matrix for the mold, it is possible to repair motor cases at a cost seldom exceeding \$15, and often for \$4 or \$5, thus enabling the saving, at a small expense, of motor cases, which would cost from \$80 to \$100 to replace.

The following named engineers are engaged in demonstrating the process, and explaining its operation: G. E. Pellersier, G. F. Gailor, H. S. Mann, W. R. Hulbert.

When M. Girard, the commissioner from France to the Louisiana Purchase Exposition held in St. Louis, Mo., in 1904, inspected the Bitulithic pavement in Lindell boulevard in that city, he expressed the opinion that it was the finest boulevard in the world and would do credit to any street in the whole of France, where the streets and roads are famed throughout the world for their excellence.

REPORT OF THE COMMITTEE ON CAR WIRING.*

Following their appointment in February, the members of your committee received from the secretary of the association a request for views concerning the changes suggested in the rules of the Underwriters' National Electrical Association relating to wiring and equipment of a street railway property including rolling stock. The material was desired for use at the annual meeting of the Underwriters held in New York the latter part of March. Through a misunderstanding as to the date of this meeting your committee was not represented.

The chairman was then instructed by the secretary of the association to obtain a copy of the approved changes in the rules to see what suggestions concerning them and the other rules might be made with advantage to street railway companies.

Your committee's views were brought to the attention of the Underwriters' representative by the chairman with the result that the approved changes were modified before being published in the 1907 edition of the "National Electrical Code," as follows:

As approved by Underwriters' Association at meeting in March, 1907.

As modified and appearing in edition of code, published in July, 1907.

Rule 28, sec. b (flexible cord).

"Must not be used when the difference of potential between the two wires under normal conditions is over 300 volts."

"Must not be used when the difference of potential between the two wires is over 300 volts."

Supplemented by the following fine print note:

"The above rule does not apply to the grounded circuits in street railway property."

Rule 33, sec. c (car houses).

"Must have a cut-out switch located at a proper place outside of the building so that the trolley wire in the building can be cut out at one point, and section insulators must be installed so that when this cut-out switch is open the trolley wire will be dead at all points within 100 feet of the building. The current must be cut out of the building whenever the latter is not in use or the road is not in operation."

"Must have an emergency cut-out switch located at a proper place outside of the building, so that all the trolley wires in the building may be cut out at one point, and line insulators must be installed, so that when this emergency switch is open, the trolley wire will be dead at all points within 100 feet of the building. The current must be cut out of the building when not needed for use in the building."

Fine print note added as follows: "This may be done by the emergency switch or if preferred a second switch may be used that will cut out all current from one building, but which need not cut out the trolley wire outside as would be the case with the emergency switch."

Rule 33, sec. e (car houses).

"Must have all rails bonded at each joint with a conductor having a carrying capacity at least equivalent to No. 00 B. & S. gage annealed copper wire. All rails and all lighting and stationary motor circuits must be connected to the outside ground return circuit by a No. 00 B. & S. gage copper wire, or by equivalent bonding through the track."

"Must have all rails bonded at each joint with a conductor having a carrying capacity at least equivalent to No. 00 B. & S. gage annealed copper wire, and all rails must be connected to the outside ground return circuit by a not less than No. 00 B. & S. gage copper wire or by equivalent bonding through the track. All lighting and stationary motor circuits must be thoroughly and permanently connected to the rails or to the wire leading to the outside ground return circuit."

Examination of these modifications will show that they permit of a more liberal application of the rules to street railway property than was the case in their originally approved

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 16, 1907.

form, and it was possible to have these changes brought about because they did not materially affect the principles involved.

Your committee would further suggest a change in Rule 32, sec. f (Lighting and Lighting Circuits), as follows: Clause reading, "No lamp of over 32 candle power to be used," to be changed to read, "No lamp consuming more than 128 watts of energy to be used." This change is suggested as it was evidently the purpose of the old rule to limit the energy consumption through a single outlet, rather than the quantity of illumination; and the advance made in incandescent lamp manufacture in the past three years has greatly increased the possible illumination for the same consumption of energy.

There are two suggestions which, from their nature, call for more radical changes in the rules than could be approved by the Electrical committee without the sanction of the Underwriters' association in annual meeting.

The first relates to Rule 32, sec. g, paragraph 2 (Heaters and Heater Circuits), and calls for its modification in such a manner as to allow the use of a truss-plank heater by providing a thickness of 3-16 inch of approved fire-resisting insulating material between the back of heater and truss plank.

The second refers to Rule 33, sec. e, paragraph 3 (Car Houses), which requires bonding for all rail joints to have a capacity at least equivalent to No. 00 B. & S. gage copper wire, and it is suggested that No. 0 B. & S. gage wire should be large enough and might reasonably be specified.

For the reasons above stated it would seem best to refer these suggestions to the succeeding committee, to be taken up by it with the Underwriters and have them acted upon at their meeting next year, and this course your committee respectfully recommends.

Respectfully submitted,

JOHN W. CORNING, Chairman,
C. B. KING,
L. P. CRECELIUS,
HUGH HAZLETON,

Committee on Car Wiring.

INSTRUCTION OF EMPLOYEES IN ACCIDENT WORK.*

BY F. W. JOHNSON, ASSISTANT GENERAL CLAIM AGENT, PHILADELPHIA RAPID TRANSIT COMPANY.

In developing the subject of this paper, the speaker will not attempt to enlarge upon the advantages possible from work of this character. Many of the members of this association, doubtless, are working out ideas in this direction, and attention, therefore, will be directed more particularly to a consideration of various methods by means of which instructions of this nature may, to the best advantage, be prepared and imparted to the men on the cars.

Before proceeding to a discussion of the subject-proper of the paper, it is possible that attention may profitably be devoted at this time to several matters of a nature preliminary to the actual work of instruction.

In considering the matter of instructing employes of street railway companies in the work of preventing accidents, and of the proper handling of accidents, it is well to recognize the fact, first of all, that each step in the work must be governed somewhat by the local conditions surrounding each individual company, and, because of this fact, it oftentimes is advisable to adopt slight changes in the method of procedure, as between one community and another. This minor detail, however, should not be allowed to overshadow the all-important fact that, taken as a whole, the accident situation is much the same the country over.

We find different laws, and different ordinances in different localities, it is true. But, it is equally true that we find the same prejudiced jury in the south that we have to contend with in the north. We battle with the same familiar type of "shyster" lawyer, unscrupulous physician and grafting claimant in the east that we find in the west. In whichever direction we travel, we meet with the same old collision of cars; the same old team accidents, and the same old premature starts. The unreported accident and the disinclination of car employes to secure adequate witnesses to their accidents, appear to figure prominently in all quarters.

Thus it is that while local conditions should be given careful consideration in determining the scope and character of the work of instruction, it should also be remembered that the difference between one locality and another, oftentimes will lie rather in a difference in the methods of procedure than in the fundamental principles of the work.

Hand in hand with the problem—which of the two de-

partments, the claim or the operating—is the better qualified to conduct an educational campaign of this nature, oftentimes travels a fear upon the part of some that friction may develop between the two departments if the claim department is allowed to enter upon this work. Such a possibility is supposed to center about a division of authority in the eyes of the employes.

Taking up the first point, the writer for many substantial reasons which lack of time forbids giving in detail, is strongly of the opinion that of the two departments the claim or accident department is by far the better adapted for the work.

Several observations bearing upon the second point may not be amiss at this time. The possibility of a division of authority in the eyes of the employes is something that must, of course, be avoided. Discipline demands that they should look to but one source for their orders. For this reason, the writer favors the carrying on of the work of instruction by the claim department, through the operating department, so to speak. In other words, though the material is prepared by the claim department, and is imparted to the men on the cars by representatives of the claim department, they should be only the mouthpieces of the operating department, so far as appearances are concerned.

Printed Instructions.

Also, we would touch briefly upon the seeming lack of confidence with which the officials of some companies approach the matter of issuing printed instructions to their employes, governing accident work. This timidity appears most often in an expression of fear that matters of this sort may be brought into court in the trial of damage cases against their company.

The writer has little hesitation in stating that he is of the opinion that this very fear, expressed in this very manner, has proven a very considerable factor in the past in bringing about the extremely unfavorable conditions with which many of these same companies are contending at the present time. It may be good business policy to keep the conductors, motormen and inspectors of a street railway company in the densest ignorance of the best interests of their employers in the handling of accidents, but the writer has yet to be convinced of that fact.

Let the question be asked in all fairness: "What possible injury can be done to a defendant company, taking the situation as a whole, by the introduction of matter of this sort, in the occasional trial of a case in court?" Granting that such a procedure does add a few hundred dollars to a verdict now and then, the injury thus sustained is pitifully insignificant in comparison with the benefits received in other directions.

Let us say, for instance, that a certain company has issued printed instructions to its employes, cautioning them against allowing their cars to collide, or against starting their cars prematurely while passengers are boarding or alighting. What possible injury is to be done to the company's interests if these instructions are brought into court?

If the facts themselves prove the collision, or the premature start, the damage has already been done, for the liability has then been established.

The worst that can be said of such instructions, if properly compiled, is that they are evidence of a determination upon the part of the company to transport its patrons with as great a degree of safety as possible.

But, it may be argued, it is in the closely contested cases that the introduction of matter of this sort might work to a company's disadvantage. The answer is—"prepare your instructions with this very object in view." "While cautioning your men, so word the instructions that the burden of responsibility, regardless of court decisions, is placed squarely upon the party injured. Make the law fit your instructions, and the average plaintiff's attorney will hesitate somewhat about swinging a double-edged sword of this character before a jury box, for it cuts both ways."

Shoulder what little damage may be inflicted from this direction. You will be getting at the other fellow by a decrease in serious liability accidents; by an encouraging decrease in your unreported accident column; by a gratifying increase in the average number of witnesses secured per accident; and, finally, by a corresponding increase in the number of favorable verdicts in the courts.

General Plan Desirable.

Before entering upon the work of instruction, it is well that a general plan of campaign should be mapped out, based upon a thorough knowledge of local conditions and requirements. Such a course will assist materially in securing intelligent, concerted action upon the part of all those engaged in the work.

* Presented before the American Street and Interurban Railway Claim Agents' Association, Atlantic City, N. J., October 16, 1907.

Also, the suggestion is advanced that the field of action should be restricted somewhat. In other words, study in advance the weak spots in the company's armor; determine the types of accidents which occur with the greatest frequency, and which are proving the most costly to the company; note the chief weaknesses of your men in their work of handling accidents, and examine the records to ascertain what particular sections of your territory have proven unusually productive of serious accidents in the past.

By keeping to the middle of the road, so to speak, and by concentrating the fire of your batteries upon the more important types of accidents, it doubtless will be found that the men will more readily grasp your ideas, and put them into actual service. In short, do not confuse the mind of the average \$2 a day conductor or motorman by attempting to make a claim agent, surgeon or expert accountant out of him.

Coming to the actual work of instruction, there is presented the choice of placing matter before the men in the form of oral instruction, or of printed instruction, or of making use of both of these means. In determining this point, one should be guided somewhat by his experience of the past, and opinions doubtless will differ somewhat as to the better method to pursue.

The writer, personally, favors the employment of both oral and printed instructions. By means of oral instruction it is possible to reach practically all of the men of a company, some, of course, to a greater degree than others. It must be accepted as a fact, that few conductors or motormen can sit through a good, earnest accident talk without learning something new regarding the handling of accidents. By this method, also, it is possible to drive instructions home to some men whom you could not possibly hope to reach to advantage through the medium of printed instructions alone.

Effectiveness of Oral Instruction.

Of the two methods, that of oral instruction unquestionably is the more effective. It positively will gain ground all along the line. But as street railway employees are prone to forget, the problem immediately arises, "How may ground gained by oral instruction be retained?"

Supposing that we consider first, the frequency with which talks of this nature may be advantageously held. Opinions again will differ somewhat upon this point. The suggestion may be advanced, however, that too frequently accident talks must of necessity cover much of the same ground, and will eventually dampen the interest of the men in such meetings. On the larger systems, the writer is of the opinion that two talks a year, to the entire body of employees, will be found sufficient, provided that some method is devised for keeping in touch with the men in the interim. Hold the first talk, for example, late in the spring, after the extra summer men have been broken in and before the heavy summer riding commences. The second talk might be held to advantage during the fall months, before the usual run of winter accidents begins.

On systems of less magnitude, where the employees can more readily be gathered together, it is quite possible that several talks throughout the course of the year could be held to advantage, bearing in mind, however, the suggestion hereinbefore mentioned.

Taking up the matter of printed instructions, the writer strongly favors the employment of this method as a secondary battery, designed expressly for the purpose of holding ground gained by oral instruction. This method affords a means for incessantly pounding away upon suggestions advanced in the accident talks, and likewise provides an ideal medium for keeping in close touch with the men on the firing line, provided up-to-date methods of communication are adopted.

This calls to mind the printed instructions regarding accident work, usually contained in the company rule books. The average rule book is monotonously complete in its details, and if any claim agent fondly imagines that his conductors and motormen are going to sit up late at night, after a hard day's work, faithfully studying the dry, tedious instructions set forth in the depths of these rule books by the aid of tallow candle and dictionary, he is doomed to be disappointed. Accident instructions are, of course, essential to the completeness of a company rule book, but a lot of dry, unwieldy, ponderous regulations of this sort and in this form, leave much to be desired, if one is looking for results.

Necessarily, if printed instructions are to be of material assistance in the work, they should be constructed along live, interesting, up-to-date lines. Instructions that were issued no later than last month to counteract an epidemic of collisions of cars, will not apply to the numerous unreported accidents which we are experiencing this month, nor to the

avalanche of premature starts with which we may be inundated next month.

Weekly Accident Bulletins.

In considering the matter of placing printed instructions in the hands of the men upon the cars, it is possible that a brief description of the issuance of weekly accident bulletins, with which the writer is somewhat familiar, may prove of interest.

The accident bulletins are issued regularly each week, one of them being handed personally to each conductor, motorman and inspector, generally upon pay-day. They are printed upon a good quality of white paper, in good readable type, and are designed with a view to presenting an appearance of neatness and attractiveness.

These bulletins are practicable for almost any line of instruction. They deal entirely with the accident situation, giving advice, suggestions and warnings applicable to the types of accidents occurring during the week, or which are anticipated during the various seasons. They are couched in short, sharp language, plain and to the point, and, as nearly as possible, are written in the simple, every-day language of the men themselves.

A few timely suggestions governing the issuing of accident bulletins, may prove of assistance to those in search of new ideas along this line.

Write your bulletins on good, broad-gage lines, and in language plain, direct and forceful.

Discard the dry, stilted, rule-book style of getting down to facts.

Avoid sermons, sarcasm, ridicule, disagreeable personalities and dry-rot.

Devote part of your efforts to the work of preventing accidents, and part to the proper handling of accidents.

Be versatile in your choice of subjects, and original in your manner of handling them.

Opening paragraphs should be of sufficient interest to arrest the attention of the reader.

Make the bulletins always optimistic in tone—always working for a still better showing next month.

Drive a single point home solidly, rather than confuse your readers with a number.

Use the bulletin to call attention to serious accidents throughout the country—explaining the cause of the mishap—then follow it right up with your warning.

Cite instances of employees discharged for carelessness or indifferent work—but finish strongly with appreciative words for those who are doing their best for you.

A word of encouragement now and then helps many a man who has been down on his luck to get back on to his feet.

Throw some individuality into your work—your enthusiasm may prove contagious with the men whom you are striving to reach.

Be fair and just in your relations with the men. Remember that it is human nature to feel pleased with a word of commendation in appreciation of particularly faithful work, and never lose sight of the fact that your most powerful allies in the work of preventing accidents, and of the proper handling of accidents, are the well-meaning, hard-working men on your cars.

The Chicago Pneumatic Tool Company has on exhibition its latest form of track-drilling frame. This frame is built to carry the Duntley electric drill and angle gear and is designed especially with a view to ready application, rapid operation and quick removal from the tracks.

The Dressel Railway Lamp Works, of New York, have on view at Booths 922 to 924 in the Ball Room a number of electric headlights and other lamps of their own design, suitable for electric roads. The samples shown represent but a very small proportion of their output, which consists of signal lamps, headlights and railway lamps of all descriptions. New designs and special railway lamps of all kinds are constantly being added to their list.

The Poor Conductor.

These are the days that the conductor catches it going and coming. Usually the early morning produces chilly weather. If the conductor happens to be piloting an open car, he is made the target of sarcastic remarks.

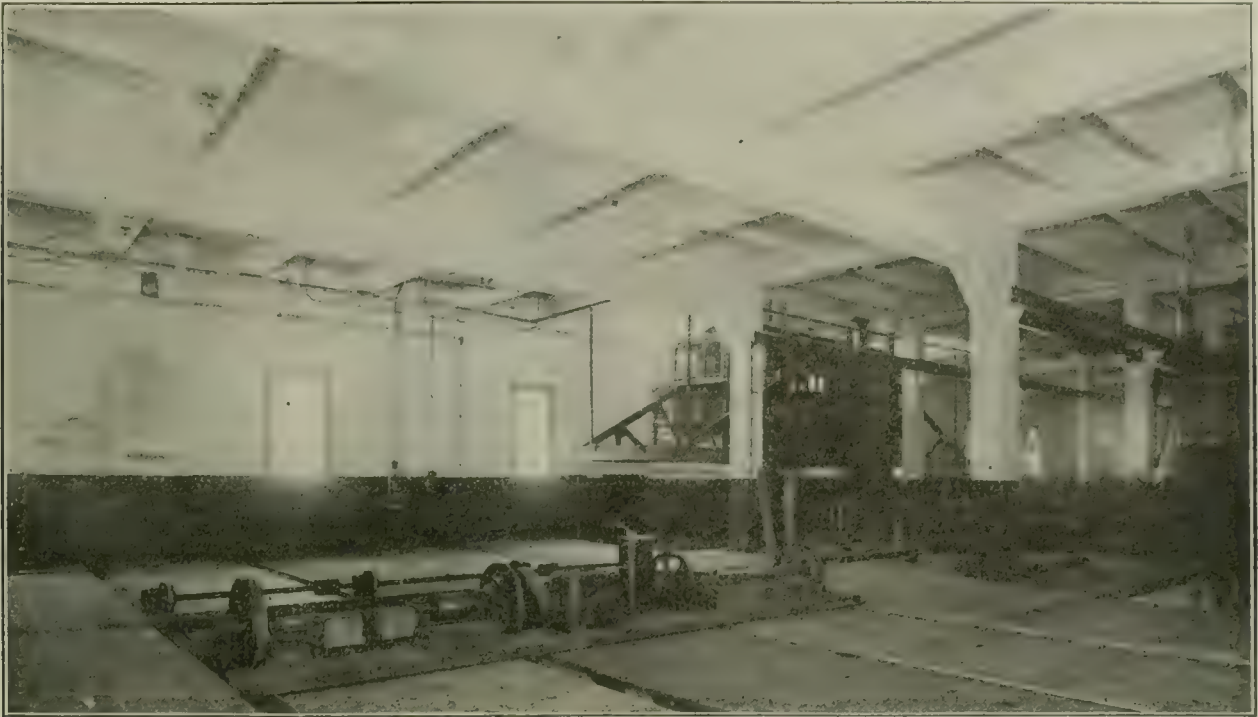
Then again in the evening, the sun may have warmed things up and the conductor of a closed car gets his. Meanwhile, the work of converting the open cars into their winter arrangement is going on rapidly. Soon there will be no question of the popularity of the closed car and the conductor will be happier than he is these days.—*The Trolley.*

THE INFLUENCE OF THE DESIGN OF RAILWAY STRUCTURES ON ECONOMY OF OPERATION.*

BY H. T. CAMPION AND WILLIAM M'CLELLAN, NEW YORK, N. Y.

There is no doubt whatever that some of the finest engineering in the world has been done in connection with the larger

engineer, together with the widespread diffusion of information, is such that one need not be surprised at the great effort that is made to reduce the expense to a minimum. But in spite of all this, it is almost pathetic at times to see the amount of effort spent in wrong directions and the neglect of very important factors of operation in the attempt to reduce minor ones which are perhaps more obvious and outstanding.



Structural Design and Economy—Paint Shop With 48-Foot Girders.

power plants of the country, and the writers have no intention of criticising or discussing these more important examples of railway work. In traveling over the country, however, on various kinds of engineering business, one naturally sees a

Perhaps this neglect is found more frequently in connection with structures and their accessories than anywhere else. When a power house consists of an engine or two with only a few boilers, it seems as though any one can design it. The



Sub-station With Reinforced Concrete Crane Girders—Sub-station Interior.

large number of the smaller plants. In many cases it is interesting to note the great ingenuity by which money is saved and extraordinary results accomplished. The struggle for net earnings is so great and the intelligence of the average

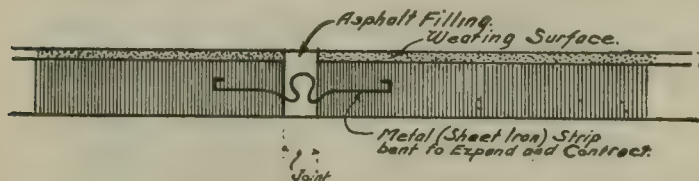
car barn may apparently be placed here, there, anywhere, so long as it is along the line of the road. The cars may be gotten out and into it in any fashion which occurs first to the person who makes the design. Presumably, the car inspectors will get the trucks from under the cars in some way, so no great effort need be made to do this quickly and conveniently. Reinforced concrete is somewhat new and desirable in many

* Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 16, 1907.

cases, so that it is often used to the exclusion of steel, brick, and other materials whether it is most suitable and least expensive or not. These are only a few points indicating how the law of economy is violated.

The effect which the design of structures has on cost of operation is twofold; first, through maintenance charges; second, through convenience and adaptability in reducing the labor item. The writers know of several roads to-day, for example, which are operating an unnecessarily large total number of cars because too great a percentage of them are in the shop constantly. Cost of operation suffers here because of the increased fixed charges and, again, because of the large repair cost.

But the real cause is the lack of shop facilities. In many cases, this lack is due, not to actual want of space, but rather because the space is inappropriately utilized, or proper accessories are not provided.



Sub-station With Reinforced Concrete Crane Girders—Water-proof Joint.

In connection with the power house, coal and ash-handling furnish other examples full of infinite and frequently expensive variety.

The greater demand for liability, both for the public and the employees, has introduced a cost which can be reduced through proper attention to design of buildings and highway bridges. This is particularly so for the new high tension alternating roads. Finally, the matter of maintenance, really a large item in the cost of operation, is greatly influenced by the choice of materials.

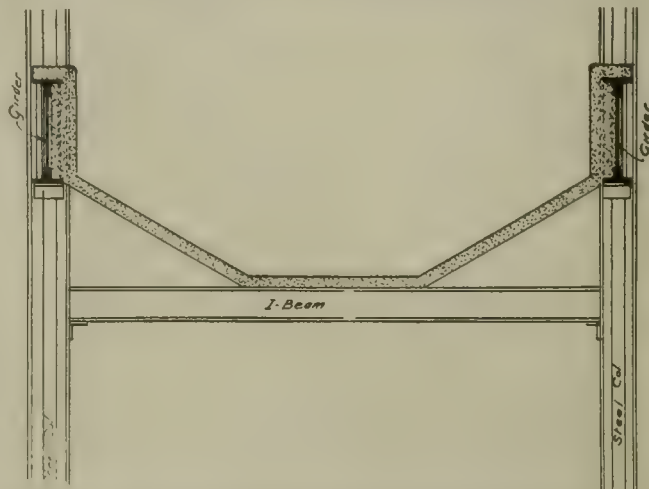
As proof that these are facts and not fancies, it is only necessary to point to the great number of roads which are yearly taken under the control of large operating firms or companies. About the time these roads are taken over, they

really is. If there were, greater efforts in design would always be made to reduce it to a minimum.

There is not space in such a paper as this to cover the whole ground of our subject. We shall merely give some more or less detached notes on these points which come up for discussion most frequently, particularly in connection with smaller systems, and where the answer is often not obvious or easily obtained and yet is of the utmost importance.

Materials.

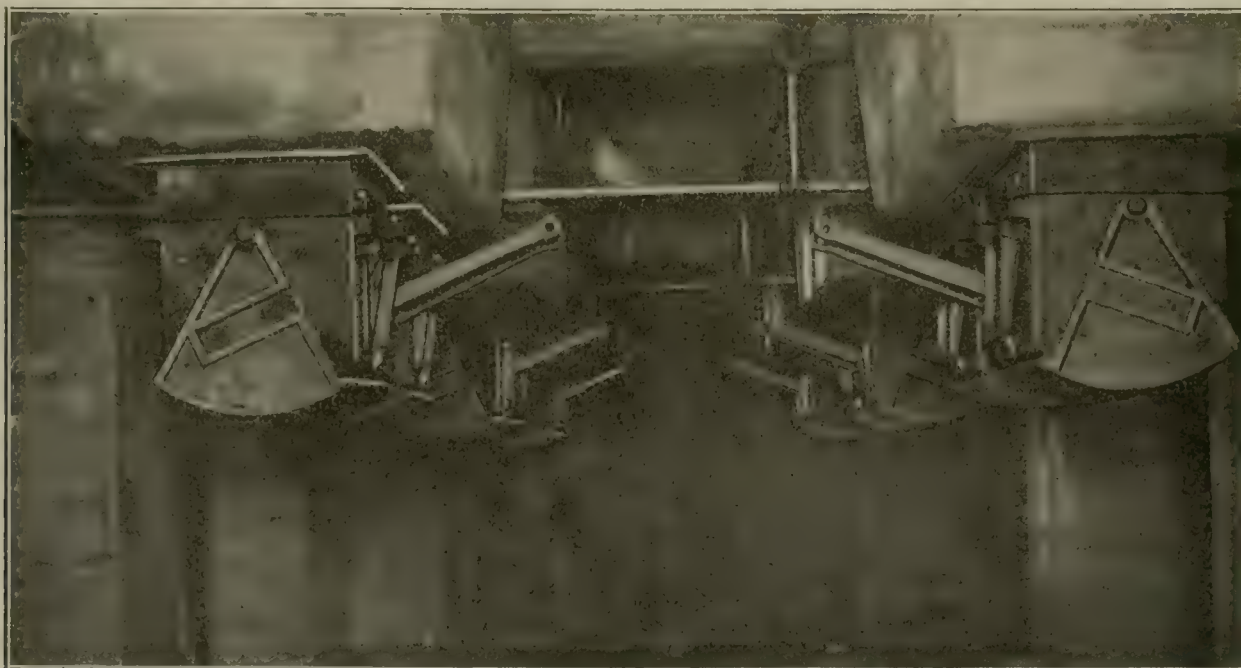
Before discussing certain details of particular structures, it may be well to say a few words about materials in general,



Sub-station With Reinforced Concrete Crane Girders—Section Across Car Pit.

especially as there seem to be many erroneous ideas prevalent.

This may be called the day of reinforced concrete, not because other materials are not being used in large amounts but because its introduction has been recent and the increase of its use very rapid. There seems to be a disposition on the



Sub-station With Reinforced Concrete Crane Girders—Suspended Concrete Ash Pits.

are tottering and about to fall. As soon as they are acquired, the strong engineering talent of the new company starts an extensive system of improvement. Many times it is carried out gradually and in such a way that the original owner with perhaps little money could have done it had there been sufficient insight and foresight.

The reasons for this apparent blindness are not hard to find. First, we have the almost total absence of any systematic recording or analysis of costs; and second, an utter lack of any proper idea of a provision for maintenance. There is no understanding of what a serious cost proper maintenance

part of all owners to try to find some excuse to explain why they have not found it advisable in certain cases to use reinforced concrete. We have frequently found men of late who apparently believe they are using some inferior substitute when building with steel or wood for structural work. Yet it does not seem to be as well known as it ought to be that reinforced concrete has certain limitations and, although it is one of the most useful building materials ever devised, it is still not applicable to all kinds of work.

In the first place, reinforced concrete is not beautiful in itself and unless much money is spent in very elaborate

centering and in finishing, it cannot be made attractive from the standpoint of æsthetics. The beauty of reinforced concrete lies in its solidity and its very apparent durability.

It is also very apparent that changes cannot be made in reinforced concrete buildings. Therefore, unless plans are fairly well determined for a building, it would not be advisable to build of reinforced concrete. It should be remembered that



Sub-station With Reinforced Concrete Crane Girders—Steel and Concrete Ash Bin.

in destroying a reinforced concrete building there is little or no salvage. And frequently added expense to dispose of the material after it is taken down is necessitated.

The most attractive features about reinforced concrete are, of course, its fire-proof qualities and the total absence of any maintenance charges. It must be conceded that these two arguments are very powerful and will warrant even some extra amount in the investment. The difference in cost, however, should be very carefully calculated and capitalized in order to see whether such extra expense as may be required is warranted. Maintenance charge on interior steel work is very small and for long spans such structural work costs less than concrete steel under ordinary circumstances. There may be certain conditions which may warrant using concrete for very long spans. The writers are now engaged in placing concrete roof girders over a span of 70 feet. These girders require no greater head than would a steel or wooden truss and, though 18 inches thick, they will not look cumbersome owing to their great length. Concrete girders on such a span are only possible because all the material except cement is found right on the site.

In one paint shop girders of 48 feet span were found much cheaper and entirely advisable under the circumstances. This span is not what would be considered a long span, however.

In view of the numerous accidents which have happened to concrete structures lately, it should be emphasized that there need be no hesitancy in using this material. It is necessary, of course, to exercise eternal vigilance as to the materials used and the method of placing. The cement, sand, and stone may be chosen under the best specifications and with the most rigid inspection, but this is no guarantee whatever that a good building will result. As nothing definite can be determined by inspection after the removal of the forms, the inspection must be unceasing and rigid while the concrete is being placed. This feature must be considered as an inherent weakness in all concrete construction. It can be almost entirely eliminated by vigilance.

Another advantage which concrete has is its ability to take up vibration. No one need fear that even extreme vibration will cause any failure in a reinforced concrete structure. This makes it particularly useful for highway and other bridges where its cost is not prohibitive.

In the substation illustrated it will be noted that the crane girders are made of reinforced concrete. These have been in use for several years and, together with numerous other examples, have shown that it is both safe and advisable to use

reinforced concrete in such cases, where all other conditions will warrant it.

On the other hand, there are cases which will be noted where steel is more advisable and where concrete is really not applicable at all. In noting the advantages of reinforced concrete, the very definite advantages of steel should not be forgotten. It is very much less bulky, which would be an argument where space is very valuable or hard to obtain. It is entirely unaffected by oils which are frequently found in connection with machinery and engines. It is for this reason that some persons favor steel for turbine foundations rather than reinforced concrete. Numerous experiments have shown that signal oil dripping on concrete soon causes it to lose its strength, and disintegrate. It may, therefore, be possible that concrete foundations under turbines might be seriously weakened if the lubricating oil dripped or soaked into the concrete to any great extent.

As a matter of fact, the joint use of structural steel and reinforced concrete is frequently the best solution of the problem—examples are illustrated herewith. Around the engines and turbines, and for turbine foundations, this will usually be true.

Coal and Ash-Handling

One of the features which has much to do with influencing the cost of operation and which is frequently neglected in the smaller plants is that of coal and ash-handling. Certain circumstances demand an overhead bunker with conveying apparatus while, under other conditions, pockets are more advisable. Where overhead bunkers are used, great care should be taken in the choice of type and material, as otherwise maintenance costs may be very high.

In the suspended, or catenary type, the structure requires frequent painting and, to insure a reasonably long life, a lining is demanded. This lining is usually built of concrete in which a metal mesh should be placed to prevent, as much as possible, the cracks which arise, not only from temperature variations, but also from alterations in the shape of the structure due to load changes.

If long life and low maintenance is to result, the effect of this alteration in shape due to change of load must be carefully looked after in design.

Water draining over coal forms an attacking sulphurous acid. Should cracks and fissures develop in the concrete lining, this acid will enter, not only corroding the steel structure but also eating its way into the more porous concrete and possibly neutralizing its alkaline properties.

In the rigid type of bunker, we have other conditions to guard. A sketch is shown of this type in which steel has been used for the main supporting members because the loads, or



Sub-station With Reinforced Concrete Crane Girders—Concrete Ash Bin.

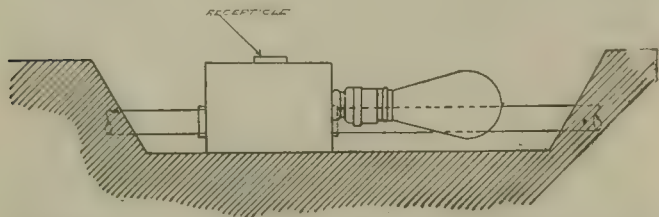
their resulting movements, are so great as to make the entire use of concrete inadvisable on account of the great bulk necessary and the expense entailed by its added dead load on the foundations of the structure. The principal danger to be guarded against is its tendency to crack from temperature changes, opening it to the dangers enumerated in the case of concrete linings of steel bunkers, and, furthermore, causing

unsightly leaks in the boiler room. There is also the abrasive action of the falling coals on the surface of the concrete.

The last item can be guarded against by applying to the inner surfaces of the structure a hard well rubbed granolithic surface which, if properly applied, will resist such abrasion as a comparatively soft material as coal will cause.

The first objection, temperature cracks, can and should be taken care of in the design. The units of the structure should be in short lengths and a water-tight joint can be provided in a number of ways. One illustration shows a simple and effective way of making a joint.

It is difficult to give any accurate comparison of costs of the two types of bunkers. There is, of necessity, great variation owing to difference of size, design, and amount and kind of coal passing through. The life of the unlined bunker with



Sub-station With Reinforced Concrete Crane Girders—Detail of Pit Light.

average coal will be perhaps eight to ten years. The writers took down one and found, by drilling, the metal shell reduced more than one-half in thickness in this time. Maintenance on the rigid concrete type and on the lined catenary type is practically zero, though the rigid type has somewhat the advantage. Depreciation on the rigid type and concrete lined type is practically zero.

What is more surprising, however, is the great lack of attention given to economical handling of coal for hand-fired boilers. We must pass this with only a word. Frequently an overhead bunker is advisable.

In the handling of ashes, there often could be much improvement.

Where the ashes drop directly underneath the boilers, pockets can be most effectively and economically constructed of concrete and made a part of the boiler room floor structure, leaving a comparatively clear basement for the handling of ashes, either by the industrial railway method or by some conveying scheme.

In some cases, pockets have been lined with fire brick but the temperatures are so much under the point where concrete loses its water of crystallization that it seems an unnecessary expense to spend money for this purpose.

In building in the cast iron gate frames, care should be taken to set them in two or more pieces, for if they are set in one piece, their expansion will certainly cause serious cracks in the concrete pockets.

In storing ashes removed from the boilers for final disposal at such times as best suit the operating conditions of a railway reinforced concrete ash bins have been almost universally adopted on account of the fact that metal structures are not only costly but have a very short life under the trying duty of containing coal ash with its high percentage of corrosion acids.

These concrete structures too can be arranged in so many ways to suit local conditions, that they meet requirements that no other material could. Their cost varies considerably on account of location, height, and ratio of wall, floor, and roof area to cubical contents, but a range of from 30 to 50 cents per cubic foot of contained area will cover most cases. In large structures, the price may be even lower, but as no maintenance of the structure is required, the first cost is the last cost.

The illustrations show one of these bins made of a combination of structural steel and reinforced concrete, and a bin made entirely of the latter material.

Sub-Stations.

So far as operating costs are concerned, little can be said on sub-stations as structures. They have received much attention and are, on the average, very well designed. Concrete has been used much and advisedly. It is expensive, however, to use monolithic concrete for bus bar compartments. Brick, with either stone or concrete slabs, is much better. Concrete is very useful in floors, however, and frequently serves to dispose of the loricated duct problem cheaply and effectively.

Car Barns and Shops.

As remarked before, many roads have an unwarranted investment in rolling stock simply because of inadequate

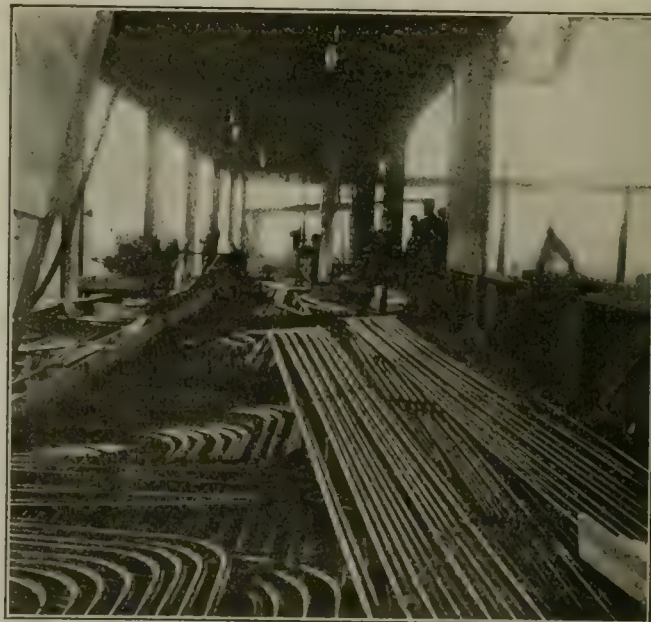
shop facilities. Steam roads have proven in the past—and are doing so yet—that low operating costs mean good shop facilities. By the latter term are included facilities provided for "road repairs" as well as for "shop repairs." Care for both classes is absolutely essential to success in operating, and in this feature alone more roads fail than in any other.

"Road repairs" are naturally made at the barns, while "shop repairs" are made at some centrally located plant. These buildings should be located and designed relatively to each other, so as to provide the greatest usefulness. It is true that an electric car has no strict "stage," but can go on indefinitely with very brief or no layovers. Nevertheless, this is not a practical method of operation. Cars must be taken off for thorough inspection at regular intervals. This inspection, however, should take as little time as possible, and the shops and barns should be located so as to make this possible. No rule can be given. Simply keep in mind that every hour a car is kept in the shop unnecessarily means loss.

The car barn and shops should be absolutely fireproof. This will be appreciated when it is remembered that cars are largely inflammable and fire usually causes total destruction. In addition, there is always a comparatively large amount of inflammable material around with workmen carrying on operations which require heat or flame. Finally we have the numerous chances for accidental arcs. At present, reinforced concrete is most popular and will probably remain so. Other materials serve very well, however, and local conditions will frequently prove them more advisable. It is interesting to note the following approximate costs of different types drawn from experience:

	Per sq. ft.
Timber barn, two-track bays, sides covered with corrugated iron	\$0.55 to \$0.70
Timber barn, three-track bays, brick or stone walls	1.10 to 1.30
Fireproof concrete barn, three-track bays, concrete or brick walls.....	1.25 to 1.50
Clear span steel roof, eight to ten tracks, brick walls	1.40 to 2.00

The cost of barns is often needlessly increased by including much special track work in the covered barn space.



Sub-station With Reinforced Concrete Crane Girders—Ducts Ready for Concrete Floor.

Even transfer tables can usually be left outside of the barn proper and the cost reduced.

In shops particularly, the space should be nicely proportioned, and there should be no backward movement in the progress of the cars through the shops. For convenience, we may divide a shop plant as follows:

1. Inspection shops with pits and standing space in rear.
2. "Jacking-up" shop, with carpenter, machine and blacksmith shops close by.
3. Paint shop.
4. Erecting shop with pits.

The inspection shops with pits should be ample to receive cars as they come in. The standing space is provided

back of the pits so as to allow the superintendent to properly distribute his work to the different shop departments.

The "jacking-up" shop should be well provided with facilities for removing trucks from cars. For this purpose no device is quite so useful as a double crane of sufficient capacity to raise the whole car body in one lift. We shall some day provide for this lifting in the design of the car body, and thus avoid even the necessity of slinging the car for lifting.

Trucks are usually removed from the end, but this is due more often to custom than to the best method. By one method trucks may be removed from the side by means of a small transfer table. This is especially useful where jacks must be used and where pilots are not easily removed. It will usually be necessary to raise the car only a few inches to disengage the center bearing. Space will frequently be saved and the time much reduced. It will be very available in small combination barns and shops. It is also especially useful for emergency repairs. Moreover, such a device will become almost necessary in barns on high tension systems for the purpose of removing transformers and other heavy pieces. It was for such a purpose that it was first designed by one of the authors.

The paint shop should be in close proximity to the car-penter shop, though paint-mixing should be done in a well-guarded room—perhaps separate room. Ample space should be provided for the cars while drying, the time for which varies greatly according to the finish.

There has been much discussion on pits, but the last word has not been said. Time will be saved by making the pits communicating instead of independent. They should be deep enough to allow a man to work without stooping. One illustration shows a type of construction that is very convenient. It provides ease of working on the car, both from the floor of the barn and from the pit. It is very useful in adjusting or replacing brake shoes.

The lighting in pits is usually inconvenient and insufficient. A pit lighting unit is illustrated which placed every twenty feet staggered on both sides of the pit gives adequate and effective lighting. Extension cords are provided for without extinguishing the general lighting.

Storage Barns.

Proper storage of cars is necessary if costs are not to be increased. Three types of barns have been used.

1. Open barn in which the office, sand compartment, and perhaps small repair shop are enclosed. Generally the cars are entirely in the open.
2. The semi-enclosed barn in which a roof is supported by posts, with walls reaching perhaps 6 to 10 feet above the track, the entire front or entrance end being open.
3. The closed barn made up of 4 to 9-track units, separated by division walls. The entrances are closed by rolling or sliding doors.

The semi-enclosed barn seems to answer all requirements except, perhaps, fire protection from the outside. Steam men have stored their cars outdoors always, but electric men have usually wanted a roof. This is, perhaps, necessary on account of the equipment, and because they frequently go into service on emerging from the barn without first standing in a closed terminal.

The final structure that has a great influence on cost of operation is the grade or highway crossing. It is surprising how fast we are learning how much we can save by abolishing grade crossings. There are many types in use, but the most available material is concrete. The first cost is usually low, the maintenance is nothing, and the depreciation is zero.

In all new roads a constantly growing proportion of the estimate is for such highway crossings. The cost of a single accident is frequently enough to pay for several such crossings. The argument is plain.

It will be evident from an inspection of the model of the self-locking angle cock, manufactured by the Westinghouse Air Brake Company, that all danger of an accidentally-closed angle cock is absolutely eliminated by the normal engagement of projecting lugs on the handle with stops on body, and that every result desired is thereby accomplished in a manner at once simple and practical. Moreover, it will be noted that the handle itself embodies all the novel features involved in the new construction, so that in the case of angle cocks now in service it will only be necessary to supply the improved handle to secure advantages which the self-locking angle cock provide. Care should be exercised of course in applying the self-locking handle to old cocks which have been in service, since the old handle may have become worn, distorting the key fitting and thereby preventing the new handle from properly performing its functions.

THE NATIONAL FIRE PROTECTION ASSOCIATION.*

BY RALPH SWEETLAND, ENGINEER NEW ENGLAND INSURANCE EXCHANGE, BOSTON, MASS.

The National Fire Protection Association, as its name implies, is an association whose object is to promote the science and improve the methods of fire protection. It was organized in 1896 by men connected with stock fire insurance companies in an attempt to unify requirements for construction in new and old buildings, installation of automatic sprinklers and other fire appliances. It was soon seen, however, that if the association was to accomplish its mission, not only the underwriters, but all national bodies having primary jurisdiction, must be included in its membership. To that end, in 1904, its constitution was changed so that it now has as active members the American Institute of Architects, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, American Street and Interurban Railway Association, American Water Works Association, National Board of Fire Underwriters and practically every insurance organization of importance throughout this country and Canada.

Its work might be described as the preparation of standards for so-called fireproof or fire-resistive construction, slow-burning construction and correction of buildings of inferior construction, especially as regards resisting the action of fire; standards for fire doors and fire shutters and wired glass windows; standards for construction and installation of all fire-fighting appliances and apparatus, such as the automatic sprinkler; steam, rotary, centrifugal or electric fire pump, hydrants, hydrant houses, hose, play pipes; chemical fire extinguishers; standards for signalling systems used for the transmission of signals affecting the fire hazard, such as thermostats, journal alarms, watchman's time-recording apparatus and automatic sprinkler alarms; standards for the construction of ash cans, waste cans, safety cans for benzine, gasoline, etc.

As an example of the association's method of treating a subject, I might cite the course pursued before the standard for construction and equipment of car houses was completed. A committee to consider this subject was appointed early in 1905 and a preliminary report was submitted to the association in May of that year, which, after being discussed, was referred back for further consideration. The committee worked on the matter during that year and again submitted a report in May, 1906.

This report, while fairly satisfactory, was not finally adopted and was again referred to the committee. During the next year, after our committee was practically agreed, a conference with members from your association was requested that the endorsement of your association might be obtained. This conference, as you are well aware, was held, a joint report has been agreed upon, the report adopted by the National Fire Protective Association and will, I trust, receive the approval of this convention.

During the time that the matter was under consideration by the committee, the data obtained from numerous fires in car house property were gone over, engineers engaged in designing car storage buildings were consulted and numerous tests to determine the efficiency of the protection afforded by the so-called aisle line sprinklers were made.

Among other important subjects now receiving consideration I would call attention to the work of the committee on "Cement for Building Construction" as this committee's work includes an investigation of concrete, a material coming into such general use not only for foundations, retaining walls and bridges, but also for building construction. Members of this committee together with representatives of the United States government, various engineering associations, the National Board of Fire Underwriters, arranged for extensive tests, which are being made by the Structural Materials Testing Laboratory at St. Louis. Owing to the non-completion of these tests and the importance of harmonizing differences with committees from the various national societies, such as the American Institute of Architects, Society of Civil Engineers, the Mechanical Engineers and others, the report of this committee has not yet been completed. It well illustrates, however, the care which is taken by our association, not only to have our standards conform to what we believe to be the best practice from a fire point of view, but to be in accord with the standards as recommended from other engineering societies.

In the preparation of a standard for the construction and installation of a particular device, such, for example, as the fire door and shutter, wired glass window, automatic sprinkler, etc., an immense amount of experimental work is necessary

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 16, 1907.

to determine the efficiency of the device under as near actual conditions as is possible to obtain. That the tests and investigations may be uniform and that a direct comparison of the efficiency of particular devices may be made, it is necessary that these tests and investigations shall be done by experienced engineers, trained in the particular line of investigation in which the device would class.

For this purpose the Underwriters' Laboratories at Chicago, which are said to be the best of their kind in the world, have been incorporated and tests on these devices, especially as to whether they may create a fire hazard or serve as a fire retardant, are here made. After a particular device has been tested, the report goes to a committee of the association for final review and for the vote as to whether it is worthy of approval or not. Take, for example, the tests which were necessary before the standard for a fire door or shutter could be decided upon. Numerous doors agreeing with the proposed standard were constructed, hung with regular hardware, subjected to a fire upon one side, the temperature running as high as 2,000 degrees, and then while the doors were hot, fire streams were played upon them, thus duplicating actual conditions which occur when a fire door in an opening to a building is subjected to a fire on one side with hose streams playing into the building and striking it.

In the standards for the construction and installation of automatic sprinklers, field conditions as near as possible are duplicated, such as subjecting the sprinklers to as extreme a water pressure as would occur by severe water hammer; the effects of corrosion, as from the fumes of sulphuric or muriatic acid; the effect of loading, as when a sprinkler head is whitewashed or calcimined at the time the ceiling of the room is so treated; the distribution of water from the sprinkler under smooth or joisted ceilings and under varying pressures.

Again the hand chemical fire extinguisher, a device which is coming into quite general use for car storage houses, might be mentioned to show the detail which must be gone into before a standard for such a device can be issued. Not only the quality of the material, thickness of the shell, coating of the interior to resist corrosion, strength of the hose, nozzle, etc., but practically every detail of construction must be carefully gone into.

As soon as a standard for a particular device is issued, numerous manufacturers, who profess ability to make devices agreeing with this standard, request approval of their product. Here, again, the laboratory is called upon to test the particular make of apparatus as to whether or not they conform in all essential features with the predetermined standard.

Originally, after devices as made by a number of manufacturers had been checked up and found to agree with the standard, a list of such manufacturers was issued by the National Board of Fire Underwriters and circulated by the various underwriting boards and associations so that the public could ascertain in advance whether or not a certain manufacturer's device was or was not approved.

It was found, however, that owing to competition, while a manufacturer could make a device which would meet the requirements of the standard when submitted to the laboratories for test, the devices sold in the open market in many cases fell far short of the standard, even when it was known that samples would be obtained from the field, sent to the laboratories and tested. This led to the introduction of what we know as the Factory Inspection Service.

This inspection system has been applied to hand chemical fire extinguishers, fire doors, metal framed and wired glass windows, and is about to be applied to fire hose and numerous other devices. As this inspection service is carried on at the present time, an engineer connected with the laboratories visits the factory of the manufacturer, checks over the material, the process and the completed article, and a tag is then fastened to the article, this tag bearing a serial number and a statement that it was made under laboratory inspection.

Consider again the hand chemical fire extinguisher, as this is a device which must be carefully and accurately made, since possibly months after installation it may be needed and must be free from corrosion, capable of withstanding a high pressure and must freely discharge its contents. A factory where any considerable number of these are being turned out is visited by the engineer two or three times a week. He notes the thickness of the shell, the coating of the interior surface, the attachment of the hose, the condition of the nozzle and the general character of the extinguisher after it is assembled. Tests are also made on a certain number of extinguishers which have been completed since the engineer was last in the factory and if any of these fail, the whole product is rejected.

This inspection service, as you will note, follows quite closely the inspection as carried on by the government for armor plate, guns, ammunition, etc. The cost of this inspection service to the consumer is nominal and is never applied

where its cost is more than 1 per cent. of the selling price. With devices bearing these labels there is a reasonable guarantee that the customer is obtaining that for which he is bargaining.

Such, briefly, is the work which our association is trying to accomplish. In most, if not all, of this work you are necessarily interested, for, with the large amount of property directly under your control, you are anxious to have it in such a condition that there will not only be the least liability of fire, but in case one occurs that the flames will be extinguished with as little trouble and inconvenience as possible, since, regardless of the money which you may collect from insurance companies, the loss in revenue due to destruction of the property is of very serious importance.

In closing I want to express what I believe to be the desire of our association, and this is, that you take an active interest in our work, not only by being represented at our annual meeting, but by serving on committees and assisting in promoting the best methods of construction and protection, that the enormous fire waste, amounting in the United States for this year to nearly \$185,000,000, may be diminished.

THE TECHNICALLY TRAINED MAN AND THE ELECTRIC RAILWAY PROFESSION.*

BY PROF. HENRY H. NORRIS, CORNELL UNIVERSITY, ITHACA, N. Y.

It has only been a few years since many practical business men considered that a technical education had a tendency to render young men unduly theoretical and hence unpractical. There was a good reason for this belief in many cases, as the young men as well as their employers had incorrect ideas of the purpose of a technical education. As pointed out by the writer in a recent paper before the American Institute of Electrical Engineers, the purpose of a technical education is not to teach trades, nor to directly produce business or professional men. The technical school is intended to educate young men in the best sense of the word, and the education which does not make young men better business or professional men is not a satisfactory education. A few years ago there were three classes of employers; one placing too high, the second too low, and the third, a correct estimate upon the value of a technical education. The first class of employers placed too much responsibility upon the young men at first, supposing that they were already engineers. As a consequence many failed to meet the expectations, and gave apparent reason for criticism of their technical training. The second class of employers, not realizing the purpose of technical education, failed to take advantage of it, and did not give the young men suitable opportunity to rise. The third class of employers fortunately realized both the shortcomings and the merits of technically trained young men. Opportunity was given for overcoming the former, and the latter were utilized by placing such responsibilities upon the shoulders of young men as they were able comfortably to carry.

The manufacturers were the first, and have been foremost in utilizing the product of the technical schools. They have carried this to such an extent that apprentice courses are offered by all of the large companies, and the young men are given every possible opportunity to develop normally and quickly. They are taken through all departments of the works, learning in each enough of the detail to enable them to appreciate the reasons for the development of existing forms of apparatus, and for the employment of present methods of construction. They test the finished product and so learn what to expect of the various classes of machines.

The operating companies are now taking this matter actively in hand, and a few lighting companies have developed courses similar in purposes, but necessarily different in plan from those of the manufacturers. The Denver Gas & Electric Company was a pioneer in this direction, and its example is being followed by other companies.

The purpose of the present paper is to inquire of the members of this association whether or not it is practicable for them to institute something corresponding to the apprentice courses of the manufacturing and lighting companies. Some years ago at the request of the Street Railway Association of the State of New York, the writer conducted an investigation to determine the attitude of the members of that association toward the technical school. (Proceedings 1904, p. 187.) The result of this inquiry was to find that technical graduates are favorably regarded by the officers of the railway companies. At that time technical graduates were found mostly in the engineering departments, although some had

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 16, 1907.

risen to managership and superintendencies. In response to an inquiry as to how young men should go about entering the electric railway field, the replies were not entirely satisfactory. The general advice was to begin at the bottom and work up, it being a matter of small consequence what the first position is. There was, however, no systematic way by which a young man fresh from college could learn the electric railway business nor, as far as the writer is aware, is there any at the present time. While it is natural that the graduates should find their way first into the engineering departments, it is the firm conviction of the writer that if their training is a success, the young men should be equally well adapted to the other departments, provided, of course, that they have the necessary personal qualities for superintending and managing.

The men who are now controlling the electric railway companies have largely grown up with the industry. The experience of many dates back before the early nineties, when the horse was supplanted by the electric motor. These officials are now training young men to take their places when they retire, and they naturally desire to find for this purpose individuals with the necessary characteristics and training. For many reasons they have the right to expect the technical schools to supply the class of men required. The first of these is, that the technical schools should, and probably do, attract a large proportion of industrious, active and capable students. A young man who has the nerve and ability to conquer the difficulties of a technical training, especially if he is financially handicapped, ought to be one who is needed in business. In the second place, the mental and physical discipline tend to bring out his good qualities and make him self-reliant and original. They increase his initiative power, the most important business qualification which he can possess.

It is surprising that such a comparatively small number of the technical graduates find their way in the electric railway business. Of the more than two thousand graduates of Sibley College, probably not more than fifty are directly or indirectly engaged in this line. Of these, quite a proportion are in the supply business, and only a small number are actually in the field. This is probably not because railway work is not attractive, but other lines have been so much easier to enter that they have attracted the bulk of the graduates. Some kind of an apprentice course would be welcomed by technical students. They enjoy any work in this direction that is given in the schools, and they show great aptitude for it.

To make the matter entirely practical the following arrangement is suggested for such a one and one-half year's course:

(1) **Three months in Master Mechanic's Department.** This time should be largely spent in the car barns and repair shops. The apprentice can serve as helper on car inspections and repairs, construction of special parts, tests, etc.

(2) **One month in Purchasing Agent's Department.** Partly as assistant to the store-keeper, and partly as general assistant to the purchasing agent.

(3) **Three months in Motive Power Department.** This time should be spent as general helper, oiler or in any other capacity in which the apprentice could be made useful. He could also assist on tests, designs for repairs and inspections. He could also act as emergency supply for sub-station attendance. A short time in the superintendent's office would familiarize him with the details of administration.

(4) **Two months in Transportation Department.** The apprentice could be given miscellaneous work in connection with the preparation of time tables, familiarize himself with the train despatching system, and, in general, making himself useful to the superintendent. In many ways he could assist in this department as emergency supply in ticket offices, on express cars, etc.

(5) **Two months on outside line work.** The apprentice could be employed as assistant with the repair gang, and he could also make himself useful in construction of new work, testing, repairs to instruments, etc.

(6) **Three months in Way Department.** This time should be spent in office work, laying out details of new construction of track, bridges, etc. The apprentice should also assist in surveying and other field work.

(7) **Two months in Comptroller's Department.** This time should be spent as general office assistant, and in conducting special investigations for the financial officers of the company. A technically trained man would be well equipped by this time to be of great assistance in compiling statistics. These cover not only the operation of the company itself,

but of other companies. The apprentice would thus become familiar with the methods of accounting used, and of the relation of this department to the others.

(8) **Two months in General Manager's Office.** The apprentice should now be in a position to be of practical use to the manager, and could be detailed to special duties which happened to demand attention.

One and a half years have thus been scheduled and subdivided among various departments with a view to preparing the apprentice for any line of work in the railway field which may happen to be open to him. He has had the opportunity to demonstrate his peculiar abilities and disabilities, and if he has "stood by" for the full period, he has shown his appreciation of the opportunity. It is obvious that a very large company could handle a number of such apprentices without serious difficulty, if the officers in charge of them were in hearty sympathy with the idea. The plan requires the co-operation of the heads of all departments, and there are numerous objections which appear as soon as the scheme is suggested. The young men are in the various departments such a short time that they are not able to work at maximum efficiency. Further, it requires a little effort on the part of the superintendents of the various departments to lay out the work for the apprentices. The young men are apt to leave, and thus the company loses the benefit of the effort expended. On the other hand, opportunities are constantly arising in every company, demanding loyal, well-trained employees. These are difficult to obtain and could be picked out instantly from the apprentice corps. Smaller companies by slight modifications could use the same general plan, and with the same results.

The matter of pay for the apprentices is one of practical importance. It is not to be expected that they will be able to earn as much as men regularly employed in the department. On the other hand, they should be expected to earn for the company as much as possible. Their wages should be based more upon a reasonable living expense, than upon their earning capacity. This will depend upon the cost of living in various communities. Probably from ten to twelve dollars per week at the start, with a reasonable increase at the end of each six months' period, would be reasonable and satisfactory to all concerned.

This paper is not intended to recommend that companies go into the apprentice business on a wholesale scale. If each year one or two men could be employed by the smaller companies, and half a dozen or so by the large companies, there would be a sufficient supply of new material always in processes of development. Of the men hired probably one-half would drop out before the end of the period, and those who remain would naturally be the ones best fitted for the work. From the writer's personal experience he is aware in a general way of what the companies need in this line, because he has the frequent privilege of recommending young men for various positions in electric railway work. In every such case if the apprentice corps were in existence the needs of the company could have been met better within its own organization.

The man interested in power-plant equipment should not fail to see the exhibit of the Western Tube Company, Kewanee, Ill., on view in Booth 918. The samples of extra heavy iron body valves deserve special mention. These valves are all tested to 800 pounds cold-water pressure, and are suitable for 250 pounds working pressure. Each type has been designed with a solid wedge, offering the most practicable and strongest construction. "High-Duty-Metal" is used in all brass parts; and they have a special advantage in that bolts are used throughout in the construction in place of studs; they are also extra thick in the neck, and the stuffing-box gland is made of malleable iron. A particularly attractive pamphlet, well illustrated, explains the various merits of the Western Tube Company's line of extra heavy iron body valves, and the representatives of the Company are always pleased to explain the particular points of advantage its valves possess.

By reason of this use for hauling ballast, ties, rails and construction material, also as switching locomotives and snow plows, construction or work cars are an important part of the auxiliary equipment of long interurban roads. The Niles Car & Manufacturing Company, Niles, O., has built several types, among which are those having a cab for housing the controlling and brake apparatus in the center of the platform with removable sides and stakes at the sides and ends; also cars with a cab at each end of the platform, leaving the central portion of the car free for freight. The company is building these cars with a 10-ton jib crane at one end for speed and convenience in handling heavy material.

A YEAR'S EXPERIENCE WITH GAS ENGINES.*

BY PAUL WINSOR, CHIEF ENGINEER MOTIVE POWER AND ROLLING STOCK, BOSTON ELEVATED RAILWAY CO.

We have now been operating our gas-engine plants over a year and the following statement of the results may be of interest to some of you.

We have two of these plants, both of them generating direct current and feeding into our overhead system in multiple with our steam-driven power at stations. They have been operated most of the time by two 8-hour watches from 7.00 a. m. to 11.00 p. m. and shut down from 11.00 p. m. to 7.00 a. m. The following figures and statements apply to our Somerville power station. I give no figures for our other plant, as it has not yet been accepted.

The Somerville power station has the following equipment:

One pair of Loomis-Pettibone gas producers, with the usual auxiliaries: Two 600-brake hp. Crossley gas-engines, each 2-cylinder, 4-cycle; two 350 kw. Crocker-Wheeler generators,—direct current.

This plant was started in May, 1906, and since then has given continuous, reliable and satisfactory service. There have been no shutdowns, no accidents and no failures.

The fuel has been soft coal, the same as used in our steam stations, mostly run-of-mine Pocahontas. The economic results are shown in the following tables:

Somerville Power Station, Boston Elevated Railway Company Power Date, January, 1907, to August, 1907.

Kw hr. generated.....	Jan.	Feb.	March.	April.	May.	June.	July.	Total.	Average.
Total lb. coal, including coke.....	204,080	175,200	192,250	202,870	118,640	35,770	60,170	988,980	.....
Lb. coal per kw-hr.....	391,223	364,817	405,050	401,150	234,705	90,991	124,452	2,012,388	.....
Lb. coal per h. h. p. hour.....	1,917	2,081	2,120	1,975	1,979	2,542	2,065	.....	2,034
Sta. load factor based on 16 hrs. per day and 7 days per week..	58.8%	55.9%	55.3%	1,363	1,365	1,755	1,425	.....	1,404
Eng. load factor.....	84.2%	86.0%	87.4%	60.4%	34.2%	10.6%	17.3%	.....	41.6%
Gen. load factor.....	99.3%	101.3%	103.0%	82.3%	78.3%	73.3%	82.8%	.....	83.3%
				97.1%	92.4%	86.5%	97.7%	.....	98.35%

These are the results from actual service and include all the fuel used for power, heating, etc., and the auditor's usual 1 per cent to make his books balance.

A year ago I told you that we were operating on 1.45 pound per kilowatt-hour. Later, before the proceedings were published, I had to withdraw that figure. Overzealousness on the part of the producer men working for the contractors led them to use coal that had not been weighed and lack of proper checking on the part of our men failed to catch them at it and it was not until we took account of coal on hand that we discovered what had been going on.

The following are some of the points that have particularly interested us:

Water.

We have used a great deal of water for scrubbing the gas and for cooling purposes. The average amount has been 281 pounds per kilowatt-hour. When we bought this water—as we did for a few months—our water cost about twice as much as our coal. We have been, since November 21, 1906, pumping this from a very dirty brook by means of 2-stage centrifugal pumps, electric driven, and filtering through a pressure sand filter. This outfit has been entirely satisfactory and has given us no trouble. The suction lift is 12 feet and the pressure at the pumps 30 pounds.

The discharge of water from the gas scrubbers is very dirty, being full of floating lampblack, and is altogether too black to put back into our dirty brook. A sand filter basin 246.66 square feet in area and tile under-drained removes all the lampblack, so that we are turning back into the brook cleaner water than we take out.

Ignition.

Our ignition current is from 14-volt motor generators and a floating storage battery and we have no trouble with the outfit. The igniters are make-and-break, two to each cylinder. These igniters had originally platinum tips, which cost a great deal and gave considerable trouble. We have been running now four months without any platinum and with less trouble.

During the first months, back fires and pre-ignitions were much too frequent, occurring almost every day. Lowering the compression on one of the cylinders, changes in the igniters, and experience have reduced these troubles, so that we now go two or three weeks without a single one.

(Reliability and Efficiency).

This plant has proved absolutely reliable. It can be put into service any time in less than five minutes—much quicker than can our steam plants. It can carry good loads and do it continuously. Each unit has carried 450 kilowatts (652 brake horsepower) for an hour, with swings to 495 kilowatts (717 brake horsepower).

For the first seven months of this year this plant used 2,034 pounds coal per kilowatt-hour, while our steam plants averaged 3,477 pounds per kilowatt-hour—a saving of 41.5 per cent. One of our smaller steam plants, containing three 200-kilowatt compound condensing engines, used 4,414 pounds per kilowatt-hour; this gas station used only 46.1 per cent as much.

Conclusion.

Personally, I believe that a gas-engine plant, making its own producer gas, will operate at least as reliably as a steam plant and will use from 30 to 60 per cent less fuel; depending somewhat on the size of the gas plant, but principally on the size of the steam plant.

The drawbacks to the gas plant are, in my mind:

(1) Cost, approximating \$200 per kilowatt when rated so as to have a 33 1-3 per cent. overload capacity.

(2) Small size of units—the largest gas-engine now built being only of about 3,000 kilowatt capacity.

Below, marked "A" and "B," are copies of reports, which

summarize the log sheets of the Somerville power station for the weeks ending July 27, 1907, and August 3, 1907, respectively.

(A)—Week Ending July 27, 1907.

With the exception of the following incidents, the operation of the plant during the past seven days has been satisfactory.

No.	Eng.	Back fires.	Pre-ignitions.	Interruptions.
No. 1.....	0	0	0
No. 2.....	0	0	0

July 22.

Renewed No. 1 engine "A" and "B" upper igniters—general repairs.

July 25.

Renewed No. 1 engine "A" lower igniter—general repairs.

Repaired contacts on No. 1 engine, "B" lower igniter.

B. E. Ry. men finished rewinding No. 2 armature on July 20 and generator was put in service July 27, 1907.

Cubic feet of city water has been used as follows:

	*Small meter.	Remarks.	Large meter.	Remarks.
July 21, 570.....	670	Low tide.
July 22, 1,180.....	590	Low tide.
July 23, 1,050.....	0	.....
July 24, 880.....	0	.....
July 25, 1,110.....	0	.....
July 26, 920.....	0	.....
July 27, 630.....	0	.....

(B)—Week Ending August 3, 1907.

With the exception of the following incidents, the operation of the plant during the past seven days has been satisfactory.

No.	Eng.	Back fires.	Pre-ignitions.	Interruptions.
No. 1.....	6	8	0
No. 2.....	0	0	0

Pre-ignitions and back fires were due to carbonized oil in No. 1 A cylinder, July 28 and 29.

Aug. 1.

Repaired contacts on No. 1 engine, "A" upper igniter.

Aug. 2.

Repaired contacts on No. 2 engine "A" and "B" upper igniters.

Cleared ground and repaired contacts on No. 2 engine "B" lower igniter.

Cubic feet of city water has been used as follows:

	*Small meter.	Remarks.	Large meter.	Remarks.
July 28, 940.....	0	.....
July 29, 610.....	0	.....
July 30, 580.....	0	.....
July 31, 810.....	0	.....
Aug. 1, 510.....	0	.....
Aug. 2, 910.....	0	.....
Aug. 3, 680.....	0	.....

*Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 16, 1907

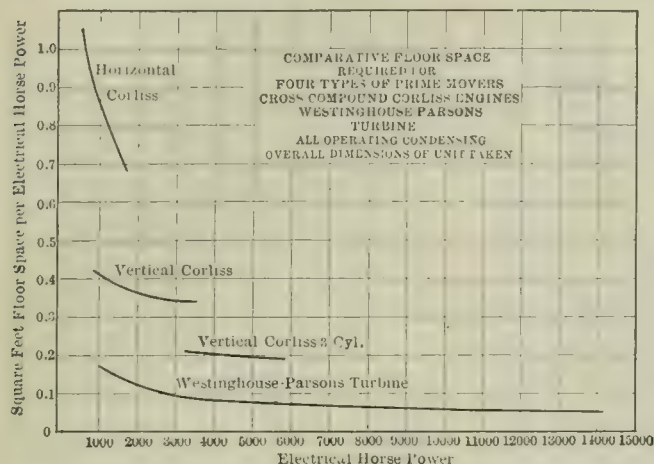
* Feed water for economizer boiler.

RECENT DEVELOPMENTS IN STEAM TURBINE POWER STATION WORK.*

With Special Reference to the Fort Wayne & Wabash Valley Traction Company Spy Run Station.

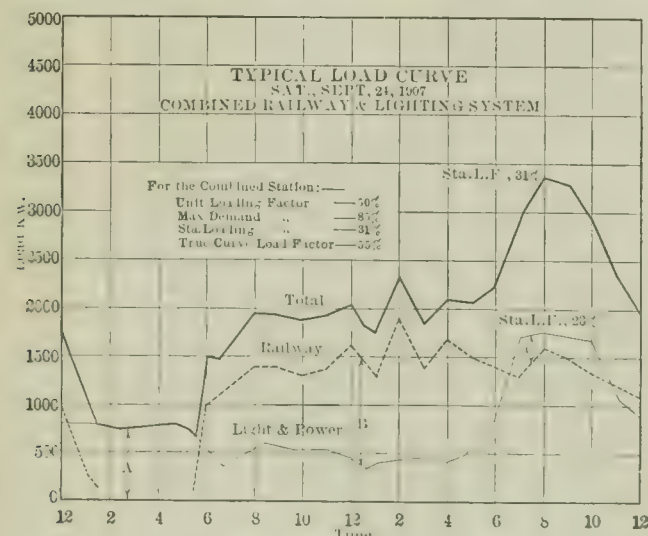
BY J. R. BIBBINS, ENGINEER, WESTINGHOUSE MACHINE COMPANY, EAST PITTSBURG, PA.

If any one feature may be said to characterize recent engineering practice in turbine power plant construction, it is that simplification of operating equipment which lowers in-



Development in Turbine Stations—Figure 1, Compact Floor Space of Turbine.

vestment, cost, labor and up-keep and the possibility of service interruptions, the while, preserving a degree of working economy commensurate to the service in view. The underlying object is, of course, the maximum commercial rather than physical efficiency. And this applies as much to auxiliary as to principal generating practice. A very important factor contributing to this desired simplicity of plant, is compactness of arrangement such as permits the subdivision or grouping of related apparatus more or less on the unit principle. Thus, in many modern stations, each unit is served by a certain group of boilers and an independent set of auxiliaries, so that in the event of trouble, the damage may be entirely isolated.

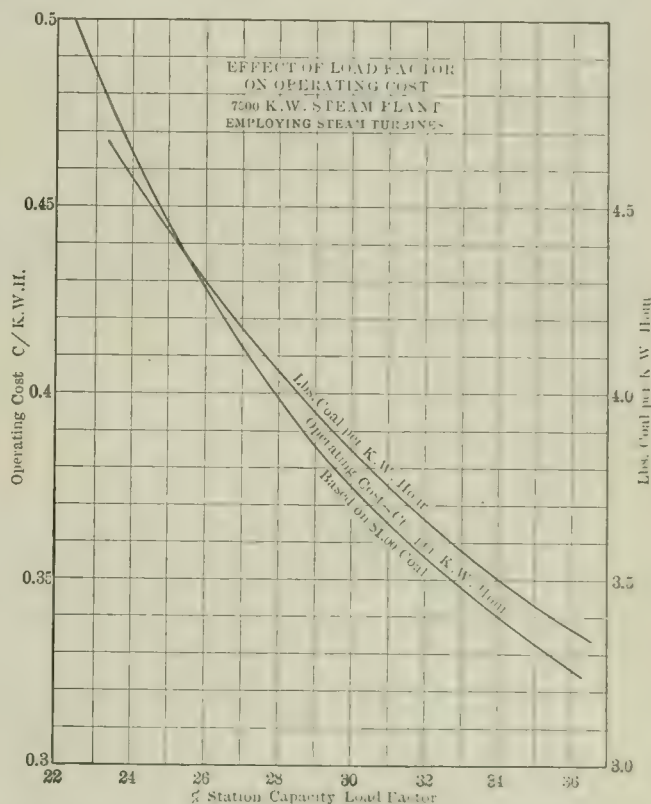


Development in Turbine Stations—Figure 2, Typical Load Curve.

In one plant (Carville), all auxiliaries are motor-driven, and at starting, all motors of a particular section, "pick up" load with the main generators to which they are connected. With this system, the absence of exhaust steam for feed heating, is made up by the use of economizers. In the case of the condenser, the old centralized plant has developed not only into individual units, but particularly condensers located directly

beneath the turbine. And, owing to the relative bulk of the surface type, this has again led to skeleton turbine foundations, and finally, to constructions of steel or reinforced concrete.

To what an extraordinary degree of compactness turbo-machinery has attained, is evidenced by Figure 1. Less than one-fourth of the horizontal Corliss, and less than one-third of the vertical, the turbines in larger sizes require but 1-20-square foot per generator horse power. This has further brought about radical changes in boiler plant arrangement. In place of the familiar square power house, divided equally between parallel boilers and generating rooms, the latter now occupies barely one-third of the total, and boiler batteries are arranged at right angles to the turbine room to provide for the otherwise cramped boiler capacity without unduly lengthening either building or steam piping; for example, Carville station, Newcastle (Eng.); Gould Street station, Baltimore; Commonwealth station, Chicago; Waterside station No. 2, New York City, etc. In many cases, the value and limitations of the site have even necessitated multiple-decked boiler rooms, such as Waterside No. 1 and No. 2; Lots Road station, Chelsea (London); Long Island station, Pennsylvania R. R., New York City; Kent Avenue station, Brooklyn, etc.



Development in Turbine Stations—Figure 3, Effect of Load Factor on Operating Cost.

Another important development has taken place along lines calculated to foster heavy peak and emergency overloads; in the generator, forced ventilation; in the turbine, auxiliary or secondary admission of steam to assist on overloads without detriment to the economy on normal loads; in the boiler plant, mechanical stokers; and mechanical draft auxiliaries to normal chimney draft; for example, Waterside station, New York; Kent Avenue station, Brooklyn; Neasden station, London; Carville station, Newcastle, Delray station, Detroit, etc. The equipment of these stations thus provides exceedingly valuable forcing capacity. At Kent Avenue, overloads of 75 per cent during peak, are not infrequently sustained on the turbines, and a similar machine of 7,500-kw. capacity at Waterside No. 2 sustained nearly 100 per cent. overload during emergency. Thus, an essential requisite of the modern turbine, is usually rugged construction, even at the expense, to a certain degree, of fine economies, obtainable at best only under extremely favorable conditions, which are seldom obtained and never maintained.

The vital necessity of security against total interruption has, in the most modern station, taken form in the provision of an auxiliary storage battery floating in the exciter bus. This battery comes into actual use perhaps only once or twice a year, being entirely idle during the rest of the time. But, on these few occasions, the importance of uninterrupted serv-

* Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 16, 1907.

ice usually far outweighs considerations of cost and maintenance. In the Gould street station, Baltimore, a recording chart of exciter bus voltage covering the period of exciter breakdowns, showed not the slightest fall of voltage, due to the instantaneous substitution of battery current.

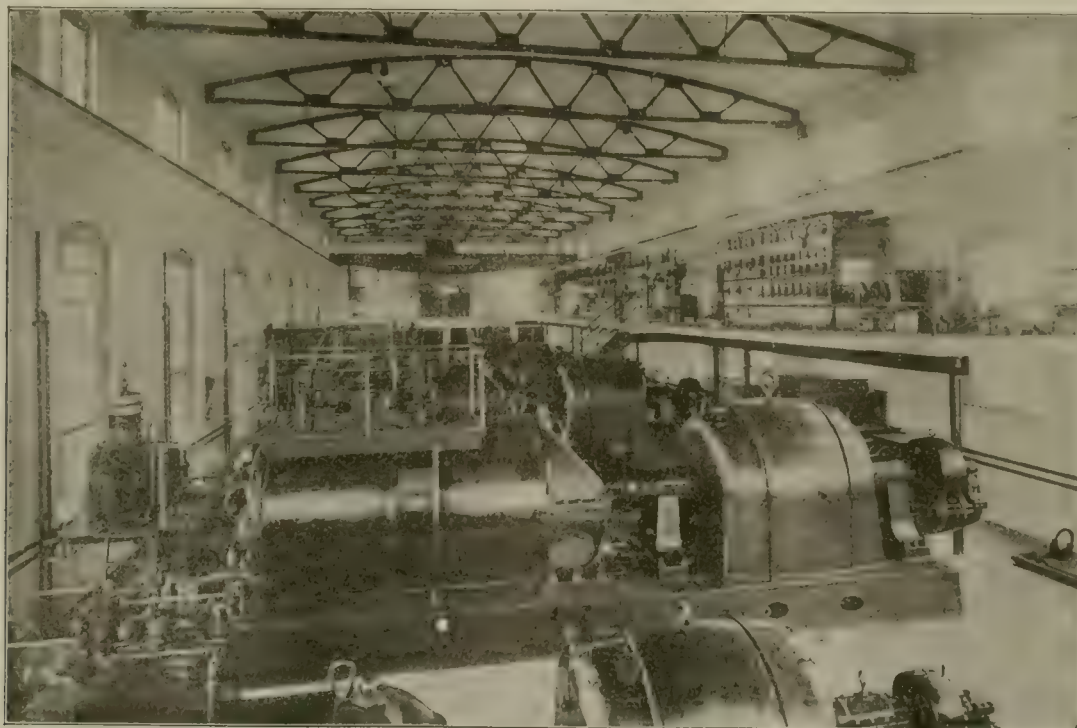


Development in Turbine Stations—Figure 4, General View Showing Coal Bunker.

A development of considerable importance, especially in the field of moderate sized power properties, is the combination of services of different characters in a single central generating station—such, for instance, as interurban railway and

This system possesses at least one important advantage—the more effective working of boiler capacity—perhaps the most fruitful field for effort toward the improvement of plant efficiency. In the generating room, the two systems are presumably independent electrically, unless interconnected through a frequency changer, which although complicating the equipment somewhat, might prove invaluable in emergencies. Steam, on the other hand, is generated to meet the average load of both systems, irrespective of frequency. This will be clear from a study of load curves, and the accompanying analyses, Table I—data taken from an actual system, such as the Fort Wayne, and of about the same size. The curves represent a Saturday load only, but are typical of other days. Note first the relative loading of generating units. For the lighting load, yielding a true loading factor (average maximum) of 39 per cent, which is high, the average unit loading is but 34.6 per cent of the rated capacity. But, the railway load gives a unit loading of 67.8 per cent rating; and combined, the plant operates at an average unit loading of 50 per cent, which is also high, considering the relative size of the units, 1000 kilowatts. This problem, of course, reduces to the question—whether two small plants can be operated at respective unit loadings of 34 per cent and 68 per cent more efficiently than a combined plant of 50 per cent unit loading—undoubtedly so. Figure 2 shows in a general way, how well the systems superpose. Thus, lighting load at (A) makes up for the early morning deficiency in railway load. During the day, the situation is reversed as at (B). In the evening railway load usually falls off as lighting load increases (C).

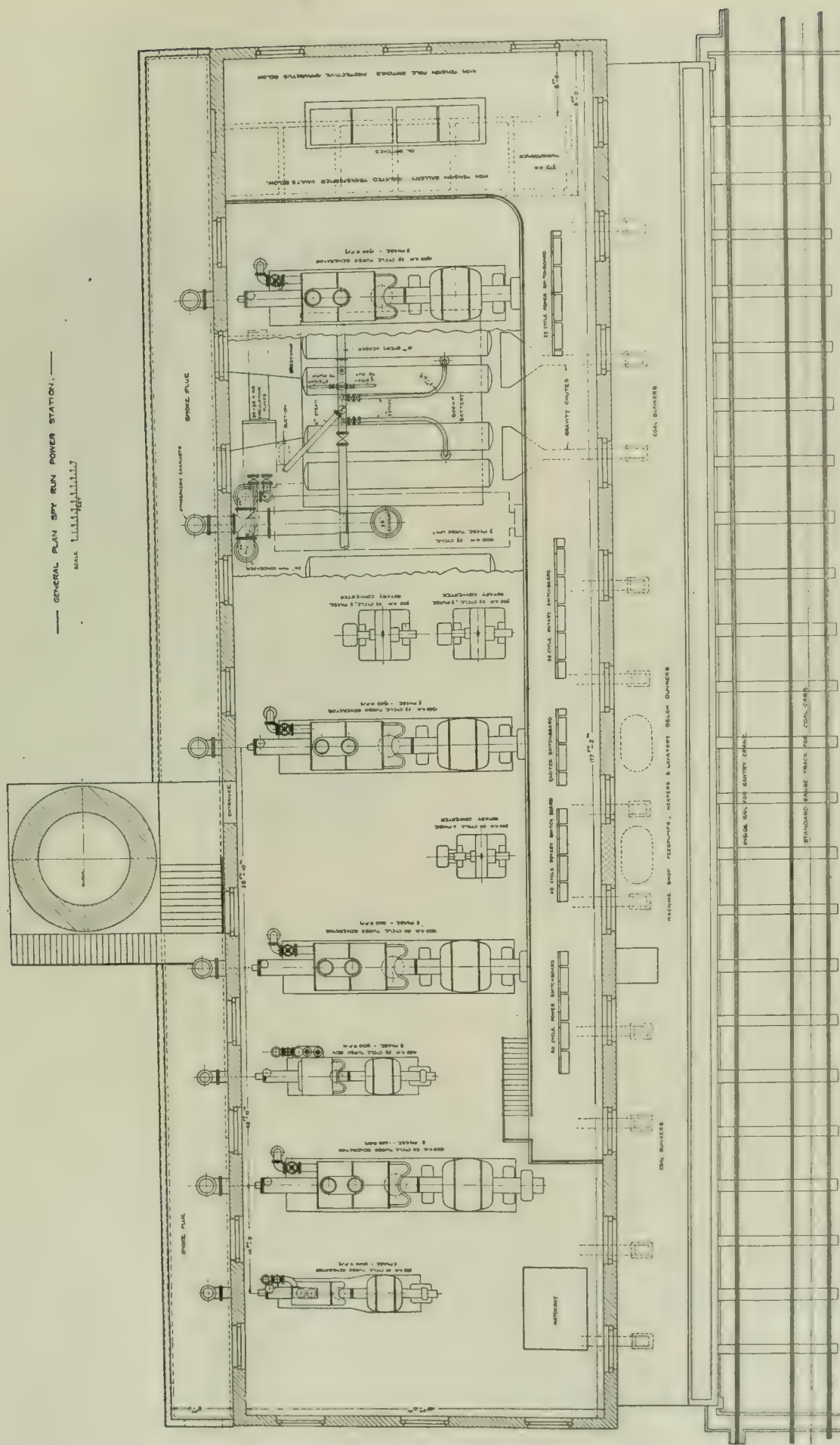
This question is, however, best answered by Figure 3 representing the variation of cost and efficiency with station loading factor average load station capacity for this same



Development in Turbine Stations—Figure 5, General View Upper Generating Room.

central station lighting. This, of course, has been common practice where same kind of current is distributed, but by no means general when the services have been kept distinct. A number of systems have been put into operation, or projected within recent years which embody this feature of combined service. Of these, the Fort Wayne system, later described, is typical.

system. It is notable that an increase in the lower loading factor brings the greatest increase in efficiency. From 25 to 30 per cent, the decrease in operating cost was 15.7 per cent; from 30 to 35 per cent, 9 per cent. This shows that considerably more is gained by increasing the lighting factor than is lost by decreasing the railway, which, together with the decreased boiler standby losses and the good effect of centraliza-



Development in Turbine Stations—Figure 6, General Plan of Station.

tion, represents the net results of the combination of operating systems. In the one case, 3.1 times the average day boiler capacity is necessary to carry the lighting peak; for the entire plant, but 1.8 per cent. This not only lowers standby losses, but also materially reduces the boiler capacity necessary for a given turbine output. Thus, at Fort Wayne, there is instal-

Table No. 1. Analysis of Load Curves—Combined Railway and Lighting Systems.

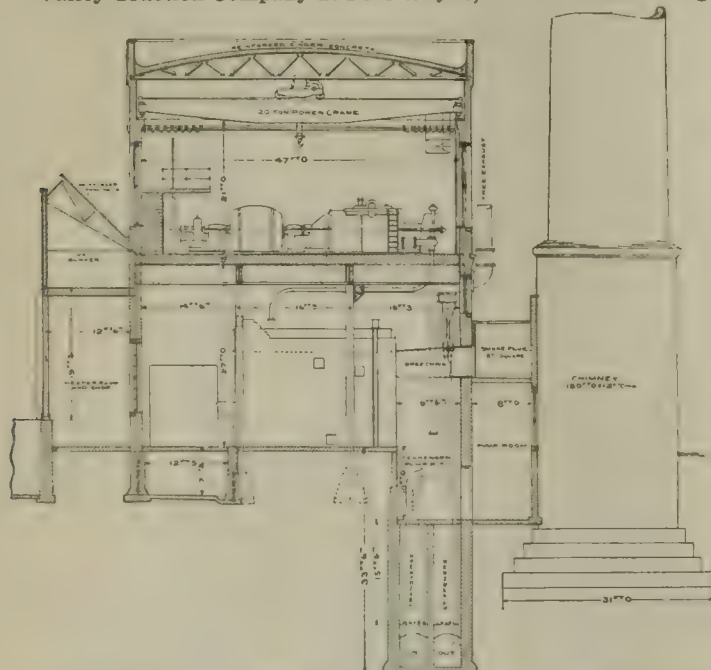
		UNIT.					
		Average 24-hour load.	Average load when running	(1) Loading Factor per cent. rating.	(2) Max. demand factor	(3) True loading factor.	(4) Station loading factor.
Saturday, Sept. 24.	Railway ..	1,058	1,355	67.8	95	56	35.3
	Lighting ..	692	.....	34.6	84	39	23.0
(Curves)		Station ..	1,850	.....	49.4	85	55
Sunday, Sept. 25.	Railway ..	921	1,034	50.2	75	61	30.6
	Lighting ..	471	.....	47.1	123	38	15.7
		Station ...	1,392	.....	53	88	53
Wednesday, Sept. 28.	Railway ..	1,050	1,230	61.5	75	70	35.0
	Lighting ..	634	.....	31.7	79	40	21.0
		Station ...	1,685	.....	45.4	72	58

- (1) Average load when running — capacity of unit.
 (2) Maximum demand from load curve — capacity running.
 (3) Average 24-hour load — maximum from load curve.
 (4) Average 24-hour load — station capacity, including one spare unit each 25 and 60-cycle.

led but slightly over 0.5 boiler horsepower per kilowatt, whereas, the usual allotment is 0.75 boiler horsepower and over.

The Fort Wayne Station.

These notes serve to introduce the principal subject of the paper—a consideration of the characteristic features of the new electric service stations of the Ft. Wayne & Wabash Valley Traction Company at Fort Wayne, Ind. Executed along



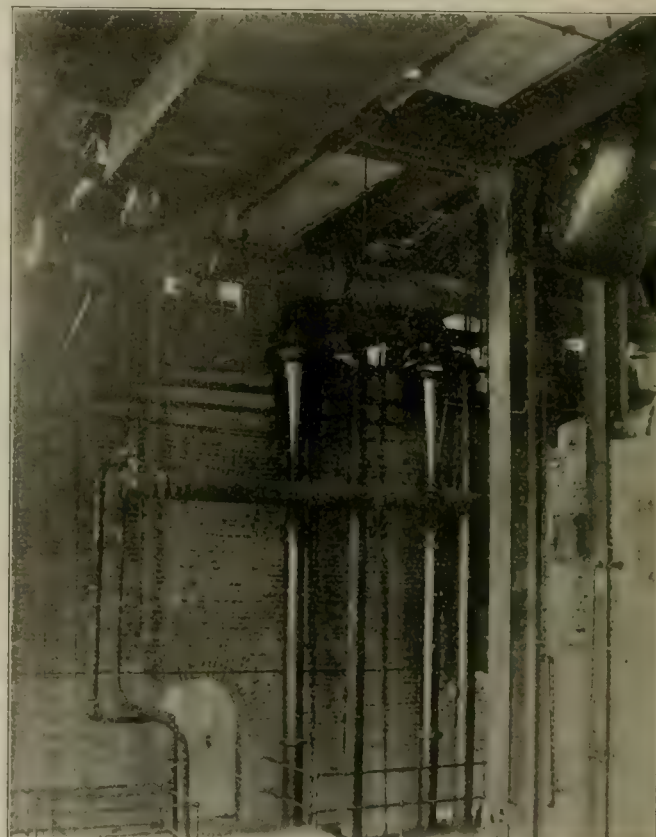
Development in Turbine Stations—Figure 7, Sectional View of Station.

decidedly novel lines, it presents an unusually interesting study of the engineering possibilities of turbine plant construction.

Service.

Like many other similarly situated railway concerns, The Fort Wayne & Wabash Valley Traction Company has adopted the policy of development light and power business in connection with its traction system—serving both traction and lighting systems from a central power station, as previously out-

lined. In the city of Fort Wayne, this business has assumed such proportions that nearly one-half of the new power station is devoted to 60-cycle lighting equipment—the remainder to 25-cycle equipment for traction purposes. High tension transmission lines parallel the railway from Fort Wayne to Lafayette—a total transmission distance of 112 miles from the source of supply. En route, the lines touch Wabash, Logansport, Huntingdon, Peru, and numerous smaller towns, in most of which considerable lighting business is available. Along this route are eleven rotary converter substations ranging in capacity from 200 to 500-kilowatts, totalling 3600-kilowatts, or



Development in Turbine Stations—Figure 8, Steel Supporting Structure and Condensers.

somewhat in excess of the present station generating capacity. But as the maximum demands from these substations do not superpose, owing to the distribution of cars, there results at the station an unusually uniform load for traction work.

The site chosen parallels a small stream—St. Joseph's river—from which the water supply is drawn for both feed and condenser purposes. Owing to the contour of the country, the 25 feet difference in level between river bed and station floor, was unavoidable. A lower location would not only have introduced difficulties in coal trackage, but also would have endangered the station at periods of excessive flood, to which the stream is liable.

Referring to the accompanying illustrations, Figure 4 is a general view showing the coal bunker ranging along the building wall with gantry service crane. Underneath this coal bunker, is room for machine shop, boiler auxiliaries and lavatory. In the distance is a tank serving to keep a constant head on the high pressure pumps.

A similar view on the opposite end of the building on the chimney side is the smoke flue extension with the pump room beneath; also, the free exhausts from the turbines and high tension transmission outlets.

Figure 5 is a general view of the upper generating room, with the various switchboards arranged along the side gallery, and high-tension switches and transformers at the further end. This view shows one of the incidental advantages of the double-decked arrangement in an exceedingly attractive and well-lighted turbine room. Figures 6 and 7 show the station in plan and section.

In Figure 8 an attempt is made to show the steel supporting structure for the turbine room and the condenser arrangement. This will be referred to later.

A steel air duct supplies air to the generators from a main longitudinal duct at the right over the boilers. The

hot air from the generators discharges through the flap door in the foreground. Equipment schedule appended covers the principal apparatus in the station. The principal features of the station may be summarized as follows:

- (1) A two-story, rectangular brick structure with side wings for the accommodation of auxiliary apparatus, coal bunker, machine shop and stores.
- (2) Generating machinery on second floor over boilers.
- (3) Structural foundations with concrete arch floor construction.
- (4) Independent barometric jet condenser—moderate vacuum.
- (5) Gravity conduit system for cooling water.
- (6) Independent, direct-driven exciters—common bus for each system.
- (7) Steam piping—simple, short and direct, with continuous upward slope from boiler nozzle to turbine throttle.
- (8) Sufficient superheater surface to maintain dryness, or moderate superheat at beginning of expansion in the turbines—100 to 125 degrees at the boiler.
- (9) Mechanical stoking with gravity fuel feed.
- (11) 6000-ton (two months') coal storage, served by gantry crane.
- (12) Steam driven auxiliaries for feed heating.
- (13) System of forced ventilation for turbo-generators.
- (14) Fireproof transformer compartments, with transformers mounted on rolling trucks to facilitate removal.
- (15) Remote control oil circuit-breakers with time-limit overload relays.

Essentially the station represents an attempt to produce a power property that will show to best advantage in the balance sheet with a medium price coal—one in which the absence of engineering "frills" for securing the highest efficiency is compensated for by lower capital cost. This should be borne in mind in the discussion of the operating results later noted.

Table No. 2—Data on Power House.

Dimensions of building, ground floor plan (47 ft. by 177 ft. 2 in.).....	8,340 sq. ft.
Dimensions of building, condenser room (9 ft. 6 in. by 177 ft. 2 in.).....	
Dimensions of building, pump room (8 ft. by 177 ft. 2 in.).....	1,419 sq. ft.
Dimensions of building, heater and pump room (12 ft. 6 in. by 173 ft.).....	2,160 sq. ft.

Total area of power house.....	11,919 sq. ft.
Total area of power house, single deck basis....	20,273 sq. ft.
Height boiler room, 28 ft. 6 in.; turbine room to crane rail, 21 ft. 7 in.	

Present capacity, 60-cycle, 3,500 kw.; 25-cycle, 3,500 kw.....	7,000 kw.
Ultimate capacity	8,500 kw.
Ultimate capacity, entire plant max. rated overload	12,750 kw.
Present sub-station capacity, 1,300 kw. ultimate	2,600 kw.
Present boiler capacity, ten 400-h.p.....	4,000 bo. h.p.
Ultimate boiler capacity, twelve 400-h.p.....	4,800 bo. h.p.

Relative Area.

Station, ground floor plan.....	1.39 sq. ft. per kw. ult.
Sattion, single floor plan.....	2.39 sq. ft. per kw. ult.
Operating room (floor plan).....	0.98 sq. ft. per kw. ult.
Operating room (exc. high-tension and sub-station equipment)....	0.722 sq. ft. per kw. ult.
Boiler room (net floor plan).....	1.74 sq. ft. per bo. h.p.
Boiler settings (24 ft. 8 in. by 23 ft. 5 in.)	0.725 sq. ft. per bo. h.p.
Relative boiler capacity, ultimate....	0.56 bo. h.p. per kw.

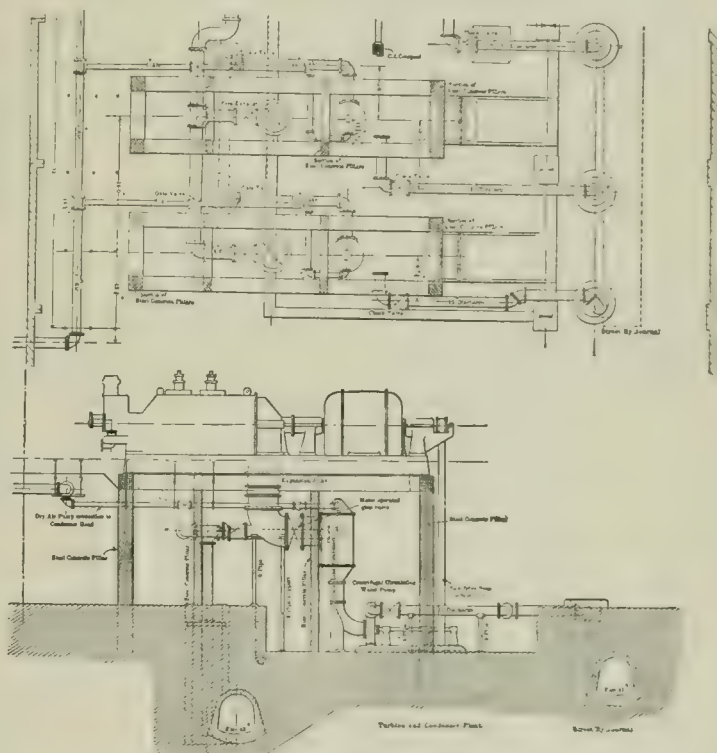
Building.

As previously pointed out, the building construction in turbine power plants is largely influenced by arrangement of boiler equipment. In this case it was apparent that a somewhat lower boiler capacity than usual would be required for the combined service. For moderate sized units a well-equipped boiler room requires from 2 to 25 square feet per boiler horse power; in some extremely compact arrangements, requiring as low as 1.5 square feet per boiler horse power. The Fort Wayne arrangement works out 1.75 square feet per boiler horse power. Assuming a capacity ratio of 0.6 boiler horse power per kilowatt, the floor area then works out slightly over one square foot per kilowatt for boiler room alone.

Now, for a fairly compact generating room in a station of this size from 0.75 to 1.15 square feet per kilowatt are re-

quired, as will be apparent from the comparative data on turbine stations, later noted. But for the Ft. Wayne plant some provision had to be made for the accommodation of direct current sub-station apparatus. Assuming one square foot per kilowatt as a reasonable area, we find that this practically coincides with the above boiler room area. The designer thus had two alternatives: First, a double-decked power station, or second, a building of twice the area with two equal sized operating rooms in parallel and under one roof, which arrangement would be preferable. From an investment standpoint, it is hardly open to question. As it stands, the building cost about \$12.50 per kilowatt, including additions, which is by no means excessive.

Inseparable from this building arrangement is the question of structural foundations, which are entirely justifiable in the cases of steam turbines, owing to the absence of cyclical movement arising from unbalanced parts requiring in the case of low speed reciprocating engine the most rigid foundations. Moreover, there was ample precedent for this type of foundation structure, notably the two turbine stations of the Philadelphia Rapid Transit Company (Street Railway Review, September, 1905). Figure 9 shows a cross section of the turbine and condenser arrangement relative to foundation. Here reinforced concrete columns 20 feet in height and 10 to 15 inches in section support the entire turbine floor, as shown in the drawing. These machines are 1,500 kilowatt capacity, spaced 14-foot centers.



Development in Turbine Stations—Figure 9, Plan and Cross Section of Turbine and Condenser Arrangement.

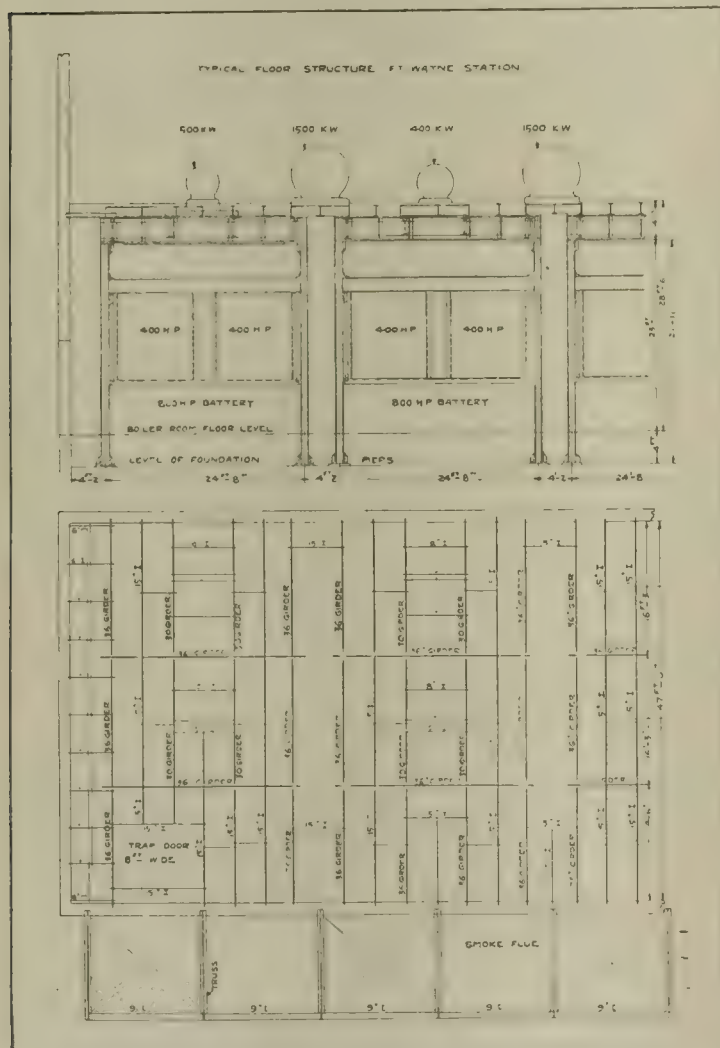
The floor structure of the Ft. Wayne station is shown in detail in Figure 10. It consists of individual pairs of transverse plate girders extending across the building under each turbine bed plate. Short cross girders serve to tie the longitudinal girders together at column intersections, the whole forming "bents" or cradles between the several generating units. Box columns divide the building width into practically three equal spans, these columns rising between the several boiler batteries. Thus the weight of the generating machinery is distributed between two building walls and two rows of columns. Only in the case of the smaller machines and rotaries does any of the weight fall upon the areas intervening between columns. In order to insure even settling, the precaution was taken of carrying footings for both columns down to practically the same level so as to encounter homogeneous strata.

Boiler Plant.

It is apparent from Figure 10 that the location of the large turbines was chosen so as to accommodate under each floor bent a single battery of boilers. With the small boiler units chosen, this, of course, provides a larger turbine room above than is necessary; but, by utilizing the excess floor space for sub-station apparatus, this disadvantage is largely

overcome. The floor plan drawing, Figure 6, shows to what advantage the space has been utilized. It is noteworthy here that with larger boiler units a far more compact arrangement would be possible with little increase in floor span between batteries. Figure 11 shows clearly the relative reduction in boiler area for units ranging from 500 to 2,000 h.p. The majority of these are the standard B. & W. type setting, with single tiers of tubes. In case of a special demand for stations of the Ft. Wayne type, it is quite possible that a boiler could be obtained giving a much narrower battery than with the standard setting, but with ample grate surface.

This relative disposition of boilers and turbines evidently permits of the simplest form of piping. Strictly on the unit principle, this would involve but two bends, as shown in the cross sectional drawing, Figure 7. The addition of an equalizing header running the length of the building then, complicates the piping only to the extent of extra valves, fittings and hangers, resulting in:



Development in Turbine Stations—Figure 10, Detail of Flow Structures.

- (1) Most direct path of steam from boiler to turbine. (2) Equalizing connection to compensate for variations in the rate of steaming of boilers in service. (3) Provision for most convenient distribution of boiler capacity to carry any load. (4) A cost of \$2.50 per kw. for steam piping, complete.

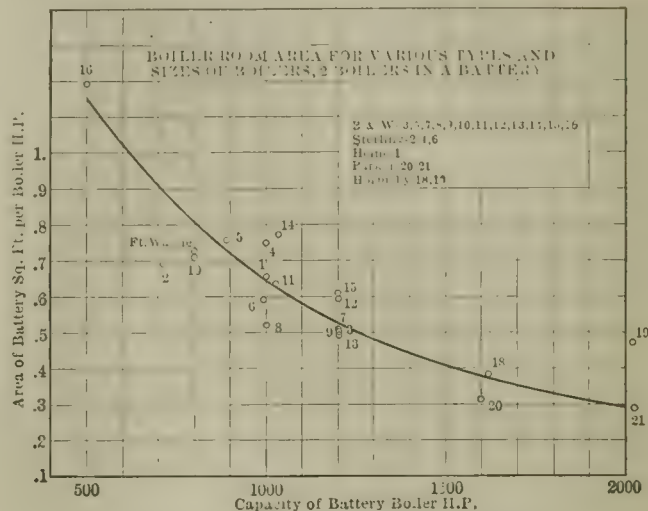
In the normal operation of the plant, effort is made to keep those boilers in service nearest to the turbines in operation, thus giving the minimum distance of steam flow. When occasion arises the plant may be operated on the unit system, valves in the header between the various risers being supplied for this purpose.

Superheaters were installed principally for the purpose of insuring thoroughly dry steam at the beginning of expansion in the turbine. Although the presence of moisture in the steam system is not encountered in normal operation, the precaution was taken of delivering steam from the boilers underneath and discharging it above the header, so that a continuous draining is provided from turbine throttle back to

boiler. This is likely to be an advantage in starting a section of the plant that has stood idle for a time.

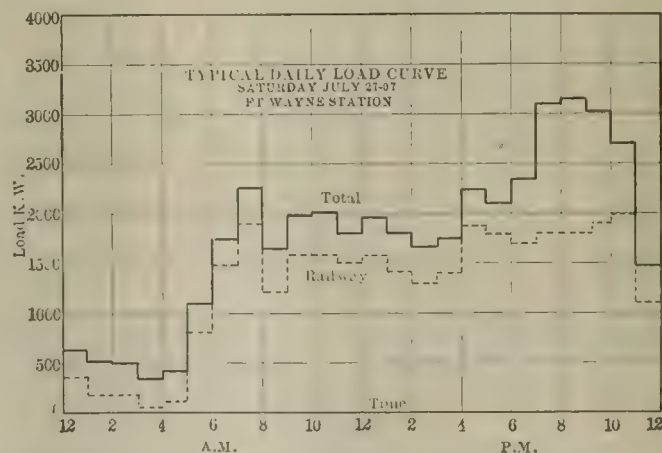
In the arrangement of the breeching the main smoke flue might have been run inside the boiler-room walls, thus avoiding the breech connection shown in Figure 7. This, however, would have necessitated locating the condensers outside of the building. With the present arrangement a 10-foot space back of the boilers is ample for all condensing apparatus, and the space under the external smoke flue is utilized as additional boiler-room area for small auxiliaries, oil filters, etc.

Superheated steam is provided direct from the main to all principal auxiliaries in the plant. This avoids an auxiliary



Development in Turbine Stations—Figure 11, Boiler Room Area.

steam main. According to customary practice, the auxiliary main draws its supply from opposite extremities of the steam system so as to avoid to the greatest degree possible a shut-down of auxiliaries. At Fort Wayne nearly the same security is provided by connecting auxiliaries directly into the steam main at different points. Thus boiler feed pumps are connected in duplicate to opposite sections of the steam main, each of which is supplied by at least four boilers. Similarly, condenser pumps are connected to the same section of the main as the turbines which they serve (See Fig. 6). If a turbine unit is disabled the pumps will not, of course, be needed.



Development in Turbine Stations—Figure 12, Typical Daily Load Curve.

The absence of economizers will be noted. These were not considered necessary with coal at \$2 to \$2.50 per ton. For feed heating auxiliary exhaust steam is entirely relied upon—all boiler, service and condenser pumps, also fan and stoker engines contributing heat through the medium of open heaters. Exciters are direct-driven, as later noted. Nevertheless, a feed temperature of 160 to 180 degrees is obtainable during the day and 200 degrees at night. This feed is drawn from the hot condenser discharge tunnel and delivered to the elevated tanks, shown in Figure 8, which provide a static head on the heaters and are of sufficient capacity to supply

the plant for three hours at full load. Similarly the heaters are elevated a few feet to insure a positive lift of feed pump valves. With this feed system, boiler cleaning is not necessary oftener than at monthly intervals.

Mechanical stoking was adopted not only to minimize labor cost, but also to provide ample forcing capacity for

the disablement of one side, to continue operation on the other than reduced vacuum. Long stroke reciprocating pumps were chosen for this purpose instead of high speed centrifugal pumps, as being best suited to the high lift—16 feet. With this type of pump a small air chamber will suffice to carry over the moment of reversal without any "dip" in

vacuum, which would otherwise accompany the non-uniform flow of injection water. This equipment without dry vacuum pumps yields a vacuum during warm weather of about 26.5 to 27 inches at full load (referred to 30-inch barometer). Its simplicity and ease of up-keep is apparent, especially in view of the low cost—about \$2.50 per kw., including pumps and piping, but no tunnel work.

Water is conducted to and from a screen house on the river bank entirely by gravity through a double-duct concrete conduit. At the river a double screen prevents debris from entering the intake, which is at right angles to the current, while the discharge is down-stream. This conduit system, of course, necessitated considerable excavation in the rear of the boilers. The two retaining walls were then reinforced at intervals by transverse stiffener arches sprung across the pit.

Coal Storage and Handling.

The Ft. Wayne plant uses normally about 100 tons of coal per day. In the provision for coal storage, an elevated bunker of relatively small capacity (400 tons) fulfils all requirements for gravity feed. Even this would tide the plant over a period of at least three days in case of failure of coal handling apparatus. The main storage yard will contain about 6,000 tons—sufficient for two months' supply, but only about 4,000 tons is ordinarily held in stock, except in case of impending fuel shortage. Figure 4 shows the gantry crane serving this storage yard. It combines the function of un-loader, crusher, elevator and distributor. Its efficiency is at-



Development in Turbine Stations—Figure 13, Typical Output

peak loads or emergencies. With Hocking Valley screenings three men can handle without difficulty ten boilers, or 1,330 boiler horsepower each. Hand firing for the same capacity would require 10 firemen and 2 water-tenders, or 400 boiler horsepower per fireman, a reduction of 60 per cent. Present boiler-room labor, averaging \$11.75 per 12-hour shift, would be increased to about \$28 per shift, providing 12-hour shifts could be maintained.

Condenser Plant.

The character of river water had, of course, an important bearing on the design of the condenser system. Although carrying considerable sediment at times, the water is extremely soft and develops no hard scale, even after many weeks of continuous running. This annulled the principal advantage of the surface condenser, viz., return of pure exhaust steam for feed water. The 25-foot difference in level between ground floor and low water made one of two condenser systems imperative:

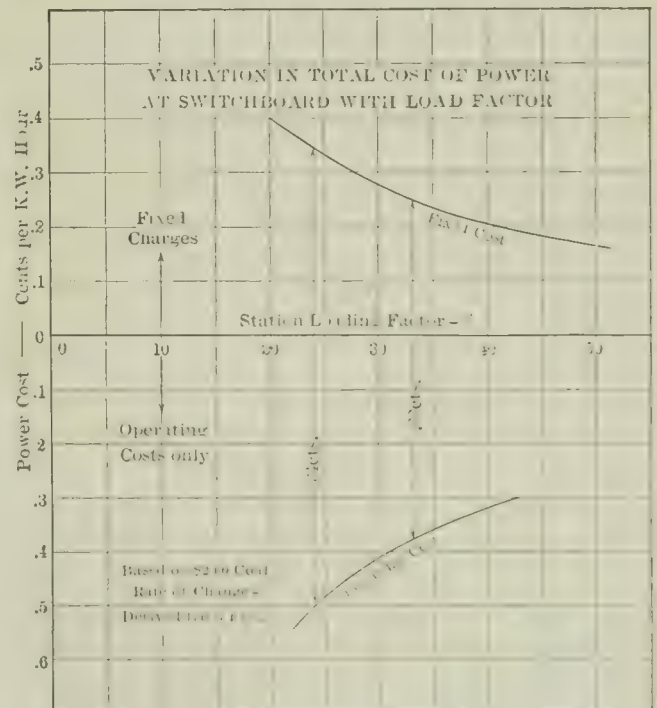
- Surface condenser with continuous pipe loop (balanced water column), with power-driven circulating pumps to overcome fluid friction.
- Barometric jet condensers mounted near the level of turbine exhausts with tail pipes extending downward to the normal river level, with power-driven circulating pump to overcome excess barometric head.

With the former, dry vacuum pumps would be imperative in order to prevent the condensers from becoming air-bound, or losing their vacuum altogether through air leaks in the water system, thus adding another auxiliary. Moreover, the surface type of plant is extremely bulky and would have seriously interfered with the "double-decked" layout.

On the other hand, the barometric type fits particularly well into the scheme. The condenser head may be suspended beneath the turbine where its most bulky part is out of the way. The tail pipes may then be carried down at any angle or turn sufficient to clear necessary obstructions. Thus the 9.5-foot area way which would ordinarily be provided in the rear of the boilers is conveniently utilized as operating space.

With the arrangement employed, as shown in Figures 6 and 7, a difference of about 47 feet exists between the condenser head and low water level. This, however, does not interfere with the operation of the condensers, as a partial void simply results in the upper part of the barometric column.

The use of twin condenser units permits the use of less bulky apparatus, and also makes it possible, in the event of



Development in Turbine Stations—Figure 14, Variation in Power Cost.

tested by the fact that, while its normal capacity is considered to be one 50-ton car per hour, the operators have unloaded a 40-ton car in sixteen minutes, and a maximum of eleven cars (500 tons) in a short working day. The crane is electrically operated from a single controller tower by one

Generating Plant.

The two sections of the generating plant, 25-cycle and 60-cycle, are, of course, separated electrically, and each therefore controlled by a separate switchboard. Two additional boards control the rotary converter output for both 25-cycle and 60-cycle systems, the latter consisting of a direct current power circuit for elevators and other intermittent power. A fifth board controls the exciters. With perhaps the exception of the exciters, the generating plant is quite standard throughout. In place of the usual steam-driven exciter unit, with motor-driven duplicate, each generating unit is provided with its own direct-connected exciter, all generating at the same voltage—125 volts. Each exciter has sufficient capacity to carry two generators. All may be

These direct-connected exciters add 26 per cent to the expense of the main generating unit. A detailed comparison of the total cost of the exciting plant, as compared to the cost of an inequivalent independent exciting plant, including reserve unit, shows some 20 per cent in favor of direct drive.

All the generators draw their supply of ventilating air from a sheet steel duct running the length of the plant above and in front of the boilers. This has served its purpose, but a positive pressure fan has been installed as an auxiliary to accelerate the air flow during certain prevailing winds when the required draft is more difficult to maintain through the long supply duct. This system of positive generator ventilation has the advantage of maintaining low generator temperatures the year around, while by means of the fan auxiliary a large excess of air can be supplied to any of the units that may be for any reason abnormally overloaded. In other words, the fan blast may be regarded as a generator auxiliary. It makes possible greater generator overloads.

Turbines.

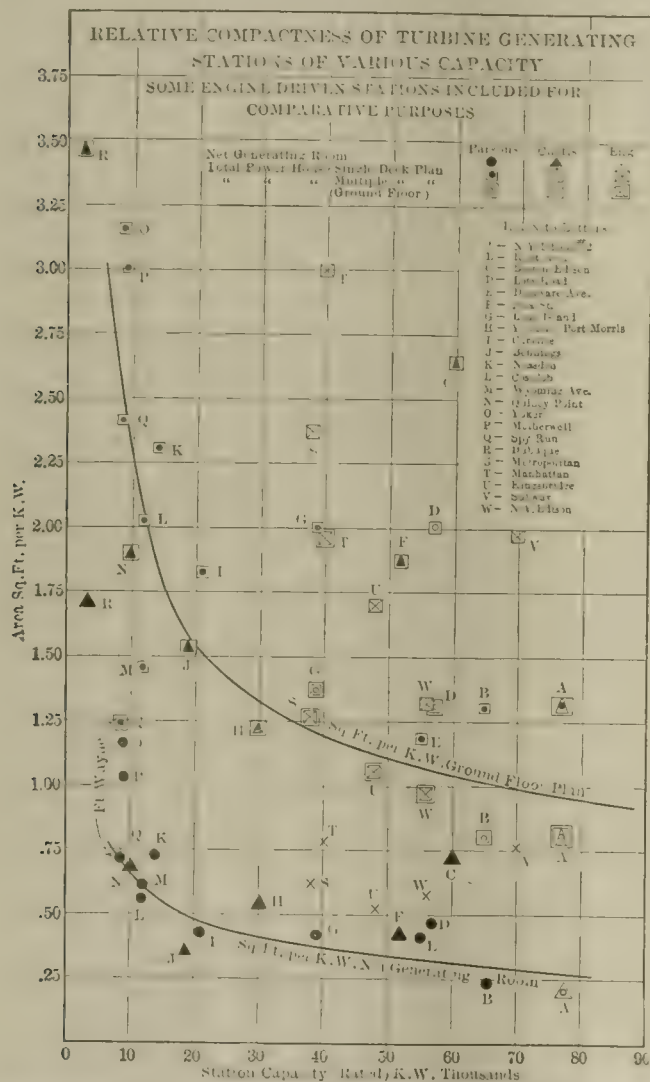
In some large turbine plants of recent design where considerable distance must necessarily intervene between switchboard operator and turbine throttle, it has been found desirable to control the running speed entirely from the switchboard by a small motor-driven mechanism connected to the governor. This system has undoubtedly advantages from an electrical standpoint in synchronizing and distributing load. Yet in compact stations such as Fort Wayne, it seems a better plan to commission the engineer in charge with entire authority over the mechanical equipment, as is the case. All speed adjustments are taken care of at the individual governors by the engineer or from the switchboard.

Designers of large plants also tend to concentrate in a continuous return cooling and filtering system, the usual independent oil system used on these turbines. At Fort Wayne, however, the independent system has been used, largely with the intention of isolating trouble in so important a function as the lubrication. Each turbine has its own oil pump, cooler and strainer reservoir, all of which apparatus is readily accessible from the engine-room floor. When desired, however, the oil may be entirely drained out of any of the machines into the filter below where it is screened, washed and returned by a small steam pump.

Operation.

Owing to the brief period in which the Spy Run station has been in operation, it is not possible to analyze very accurately either the operating efficiency or the operating costs. Moreover, considerable extensions are under way, which will materially increase the loading factor of the station. During the month of June, the Fort Wayne station turned out 24 per cent of its rated output. Figure 12 shows a typical daily load for Saturday, the loading factor from which is about 33 per cent of 24-hour capacity. The dotted line represents the railway load alone, and for uniformity, could hardly be improved. Combined with the lighting, the station is still loaded very efficiently, with the result that while there is but little advantage from the traction standpoint, by combined operation the lighting system is greatly improved. Here arises the greatest gain from the combined system. Following these load characteristics through the month, we find little change in the relative load from day to day. Figure 16 shows lighting, traction and total load for the month of June. It is noticeable that the regular drop in Sunday lighting load is usually made up by the increased Sunday railway load, which will generally be the case on all holidays.

Now, taking this month as a basis, we may predict with some degree of certainty, the change in operating efficiency and cost with the improved loading factor, by applying data from the similarly equipped and operated system previously noted in Figures 2 and 3. This data was obtained at a time when the system had developed to just about the same extent as the present Fort Wayne system. Assuming the average loading factor of a normal lighting system to be in the neighborhood of 23 per cent, this data shows a reduction in operating cost of nearly 30 per cent (to 0.35 cents per kilowatt-hour) by increasing the loading factor to 33 per cent of the output capacity of the station. Owing to extensions in city and suburban traction, a loading factor of 40 per cent at least, may be expected at Fort Wayne. It is, therefore, evident that an extremely low power cost may be anticipated. How much the various mechanical contrivances around the station have contributed to the low cost, is shown by the fact that the labor cost for the entire station, including coal handling, averages but \$34.60 per 12-hour shift, equivalent to 0.12 cents per kilowatt-hour at 33.5 per cent loading factor, which is considerably lower than the usual figure in steam plants. Even this could



Development in Turbine Stations—Figure 15, Curves Showing Element of Space Occupied.

connected to a common bus, as an emergency condition. Normally the 25 and 60-cycle exciters are separated to permit the use of independent voltage regulators.

Assuming the case of instantaneous fluctuating loads, the voltage regulation of a direct connected engine-generator-exciter unit, is not, of course, comparable with that of steam-driven exciters, due to cumulative drop in speed and voltage. Of the three systems (a) independent steam-driven exciter, (b) independent motor-driven exciter, (c) exciter-driven by prime mover, the first undoubtedly gives the best results. But with the use of the automatic voltage regulator the three are brought practically to an equality.

This subdivision of exciter capacity assures uninterrupted service to a degree quite impossible with the usual arrangement of independent exciters, and almost to the same degree as the standby storage battery quite frequently employed as an insurance against current interruptions. With half the exciters in the station inoperative, there would still be ample capacity remaining.

be reduced about 10 per cent, at the present, as several men, in training for outside service, are now maintained upon the regular station pay-roll.

Costs.

In the final analyses of the ultimate cost of power, fixed, or capital costs, of course, have an important bearing, and it is in this regard that the type of station exemplified in that

Table No. 3—Cost of Completed Power Station. 8,500 Kilowatts. No Substation Apparatus.

	Cost	\$=Kw
Building: Including general concrete and steel work, galleries, coal bunker, smoke flue, condenser pit, coal storage pit, etc.	\$93,217	\$10 97
Generating Plant: Including turbines, generators, exciters, cables, switchboards, transformers and ventilating ducts.	259,711	30 55
Boiler Plant: Including boilers, superheaters, stokers, piping, pumps, heaters, settings, breechings and tank	119,313	13 92
Condenser Plant: Including condensers, pumps, piping, free exhausts, water tunnels, and intake screen	33,790	3 98
Coal Handling Plant: Including gantry crane, crusher, motors, and track	7,990	0 94
Erection Superintendence, Engineering, and Miscellaneous	59,500	5 94
Total, excluding property and siding	\$563,520	\$66 25

previously described, exerts the strongest influence. In the preceding discussion, it has been the object wherein the double-decked station has made the greatest advance along engineering lines. Owing to the absence of many refinements, it is evident that the maximum possible efficiency could hardly be obtained. In compensation, we should look for a considerable reduction in the capital charges in order to bring the total cost of the power generated to as low a point as would result from the use of a more efficient plant. This proves to be the case with the Fort Wayne station.

Analyses of the total power costs from modern steam plants of 5,000 to 10,000 kilowatts capacity, show that the capital costs, including interest and depreciation, amount to

but including main line transformers—a total of \$66.25 per kilowatt generating capacity.

In this summary, the building cost is naturally high, owing to the large amount of structural material necessary. On the other hand, boiler and condenser costs are extremely low for reasons previously set forth.

Using as a basis the above costs, and the rate of variation with loading factor already shown in curve form, Figure 3, the ultimate total cost of power at different loading factors, may now be predicted; in other words, the total financial result of station operation. Figure 17 has been prepared along these lines. Fixed charges are dealt with entirely above the horizontal line, and operating costs below. The total power cost, at a given loading factor, is then represented by the total power cost, at a given loading factor, is then represented by the total vertical distance between the two outer curves. These fixed costs are based upon the following assumptions:

- (a) Bond interest and taxes..... 7 per cent.
- (b) Sinking fund, equivalent to 6.43 per cent depreciation* 4.2 per cent.
- (c) Total fixed charges on capital cost..... 11.2 per cent.

From these curves, Figure 14, the total cost of power at the present station loading factor, 24 per cent, is 79 cents per kilowatt-hour. At 33 per cent loading factor, the total cost would be 57 cents per kilowatt-hour, and at a possible maximum loading factor of 50 per cent, 41 cents per kilowatt-hour. This, the author ventures, is a result which it will be difficult to duplicate in any station of expensive construction burning the medium grade of bituminous coal at a cost in the neighborhood of \$2.25 per ton. It is the ultimate result that proves the correctness of the engineering principles involved in the design of the station.

Comparative Data.

As extreme compactness is one of the striking features of the Ft. Wayne station, it is instructive to note its relative position in this regard to other turbine stations, of both smaller and larger capacity, now in operation. To this end Table No. 4, Figure 15, has been prepared, the former comprising the principal data on the various stations. In the lat-

	A	B	C	D	E	F	G	H
NAME OF STATION	Waterside No. 2	Kent Avenue		Lots Road	Delaware Avenue	Fisk Street Station	Long Island	Yenkers & Port Morris
OPERATING COMPANY	N Y Edison	Brooklyn Rpd Tran	Boston Edison	Metropolitan District, London.	Philadelphia Rapid Transit	Chicago Edison	P R R	N Y N H & H R R
1 Capacity, ult kw a	77,500	65,500	60,000	57,700	45,000	52,000	38,000	10,000
2 Boiler capacity ult h p b	62,400	46,800	49,172	41,600	51,200	32,000	25,056	15,000
3 Boiler h p per rated kw	805	702	82	72	948	80	60	50
4 Sq ft per kw (Ground floor plan)c	818	817	2 64	1 31	1 206	1 88	1 17	2 28
5 Sq ft per kw (total single deck plan)d	1 31	1 306	2 64	2 063	1 206	1 88	2 005	1 228
6 Sq ft per kw (total generating room)	30	126	1 04	563	47	77	595	546
7 Sq ft per kw (net gen room exc switchboard)d	208	248	737	464	19	44	422	533
8 Sq ft per kw (boiler room, actual floor plan)	506	49	1 0	75	73	1 11	265	670
9 Sq ft per kw (boiler room total, single deck plan)	1 01	0 8	1 6	1 5	73	1 11	1 41	670
10 Sq ft per boiler h p, boiler room (single deck plan)	1 25	1 171	1 95	2 08	708	1 5	2 14	1 155
11 Prime mover, type and size	Parsons, Curtis	Parsons	Curtis	Parsons	Parsons	Curtis	Parsons	Curtis
12 Boilers—h p	B & W 650 super heat	B & W 650 super heat	B & W 512 super heat	B & W 512 super heat	Parker 800 super heat	B & W 500 super heat	B & W 620 super heat	B & W 925 super heat
13 Number boiler decks	2	2	1	2	1	1	2	1
14 Draft	Auxiliary fan	Auxiliary fan	Natural	Natural	Natural	Natural	Natural	Natural
15 Boiler firing	Roney stoker	Flat grate, Roney stoker	Roney stoker	Chain grate	Roney stoker	Chain grate	Roney stoker	Roney stoker
16 Condensers	Horizontal surface high vacuum	Horizontal surface high vacuum	Bise surface high vacuum	Vertical surface high vacuum	Surface high vacuum	Horizontal surface high vacuum	Horizontal surface high vacuum	Surface high vacuum
17 Economizer	No	No	No	Yes	No	No	Yes	No

a Capacity possible in present building.

b Based on standard rating, 10 sq. ft. per boiler h.p..

about 50 per cent of the total. For such high grade stations, with thoroughly modern equipment, we should expect an investment cost of from \$150 per kilowatt in the smaller, down to \$100 per kilowatt in the larger sizes. In a few very large stations, the investment cost has been less than \$100 per kilowatt, but for stations under 10,000-kilowatts, it very rarely occurs that the cost is below the above figure. The Fort Wayne station is thus unique in having set a new standard for power station cost which may well be emulated in cases where turbine machinery is applicable. The following table shows the cost of the complete station, exclusive of substation apparatus,

c Ground floor plan—dimensions of actual station building, inside walls.

d Single deck, equivalent to area all boiler room space on one level.

ter, the curves show principally the element of space occupied. The lower curve represents net generating room area exclusive of switchboard room; i. e., the actual space devoted to generating machinery and the necessary auxiliaries. It is instructive to observe that there is little to choose between the horizontal and vertical types of turbines, the facts pointing to the former if anything, as tending to secure the most

* Depreciation determined by summing the depreciation on the several parts of the plant, as follows: Building 3 per cent.; boiler plant and coal handling apparatus, 10 per cent.; condensing plant, 6 per cent.; generating plant, 7.5 per cent.; general average, 6.43 per cent.

compact construction. This is principally due to the fact that there is usually room for surface condensing apparatus directly beneath the turbine within the skeleton or structural foundations, while the vertical type turbine requires extra floor space for condensing apparatus and auxiliaries, except

The second curve shows the relative ground floor area of the total plant as installed, whether single, double or triple-deck. Here a great discrepancy appears, owing to the wide difference in arrangement of boiler rooms. In this respect the comparative data serves hardly more than a record.

		I	J	K	L	M	N	O	P
	NAME OF STATION	Carville	Benning	Neasden	Cos Cob.	Wyoming Avenue	Quincy	Yaker	Motherwell.
Col.	OPERATING COMPANY	Newcastle Electric Co.	Potomac Electric Wash.	Metropolitan Railway, London	N. Y. N. H. & H. R. R.	Philadelphia Rapid Transit	Old Colony Railways	Clyde Valley Electric Co.	Clyde Valley Electric Co.
1.	Capacity, ult. kw. a	21,000	19,000	11,000	43,000	11,990	10,000	9,500	9,500
2.	Boiler capacity, ult. h. p. b	9,100	14,400	8,020	8,400	11,600	7,500	6,160	6,160
3.	Boiler h. p. per rated kw.	435	758	578	7	97	75	648	648
4.	Sq. ft. per kw. (Ground floor plan)c	1.81	1.554	2.195	2.03	1.46	1.9	1.15	1.0
5.	Sq. ft. per kw. (total single deck plan)d	1.81	1.554	2.195	2.03	1.46	1.9	3.15	3.0
6.	Sq. ft. per kw. (total generating room)	65	411	995	.79	.83	.966	1.374	1.158
7.	Sq. ft. per kw. (net gen. room exc. switchboard)e	433	533	727	1.558	.62	.676	1.154	.97
8.	Sq. ft. per kw. (boiler room, actual floor plan)	1.16*	1.165	1.71	1.467	1.18	.966	1.72	1.72
9.	Sq. ft. per kw. (boiler room total, single deck plan)	1.16	1.165	1.71	1.467	1.18	.966	1.72	1.72
10.	Sq. ft. per boiler h. p., boiler room (single deck plan)	2.03*	1.538	3.1	2.097	1.25	1.286	2.65	2.65
11.	Prime mover, type and size	Parsons	Curtis	Parsons	Parsons	Parsons	Curtis	Parsons	Parsons
12.	Boilers—h. p.	Sterling 638; B. & W. 400 superheat	B. & W. 600 superheat	B. & W. 573 superheat	B. & W. 525	Parker 1000 superheat	A-T. B. & W. 750 superheat	B. & W. 400 superheat	B. & W. 400 superheat
13.	Number boiler decks	1	1	1	1	1	1	1	1
14.	Draft	Auxiliary fan	Natural	Auxiliary fan	Auxiliary fan	Natural draft	Natural draft	Auxiliary fans	Auxiliary fans
15.	Boiler firing	Chain grate	Roney stoker	Chain grate	Roney stokers	Box mech. stokers	Jones underfeed	Roney stokers	Roney stokers
16.	Condensers	Surface high vacuum	Base surface high vacuum	Barometric jet high vacuum cool tower	Surface high vacuum	Surface high vacuum	Surface high vacuum	Vertical surface high vacuum	Barometric jet high vacuum
17.	Economizer	Yes	No	Yes	Yes	No	No	Yes	Yes

c Area switchboard room based on floor plan only, not aggregate of all floors.

f With economizer and fans.
g Including sub-station.

when sub-base condensers are used. Even then the advantage is not materially greater. For instance, the Benning station, Washington, which seems to be relatively the most compact of its kind using base condensers, appears on the plot as not materially lower than the average station; while, on the

Here the Ft. Wayne station appears to the greatest advantage—showing the same relative compactness as stations some four or five times its capacity.

In many of these stations, economizers are provided for on the boiler floor; in others, on a separate floor or gallery

		Q	R	S	T	U	V	W
	NAME OF STATION	Spy Run	Dubuque	Metropolitan 96th Street.	Manhattan 74th Street.	Kingsbridge.	Rapid Transit 58th Street.	Waterside, No. 1.
Col.	OPERATING COMPANY.	Port Wayne & Wabash Valley	Union Electric Co.	Interboro Rapid Transit	Interboro Rapid Transit.	Interboro Rapid Transit.	Interboro.	New York Edison.
1.	Capacity, ult. kw. a	8,500	3,000	38,500	40,000	48,000	70,000	56,000
2.	Boiler capacity, ult. h. p. b	4,800	2,400	23,050	33,300	31,200	43,000	36,400
3.	Boiler h. p. per rated kw.	565	.8	599	.833	.65	.614	.65
4.	Sq. ft. per kw. (Ground floor plan)c	1.42	3.46	1.266	1.955	1.05	1.985	.958
5.	Sq. ft. per kw. (total single deck plan)d	2.4	3.46	2.36	3.01	1.70	2.8	1.336
6.	Sq. ft. per kw. (total generating room)	.986	1.71	.634	.884	.762	1.16	.658
7.	Sq. ft. per kw. (net gen. room exc. switchboard)e	.722	.71	.614	.784	.524	.76	.575
8.	Sq. ft. per kw. (boiler room, actual floor plan)	1.235	1.746	.55	1.063	.468	.823	.384
9.	Sq. ft. per kw. (boiler room total, single deck plan)	1.235	1.746	1.65	2.12	.936	1.64	.768
10.	Sq. ft. per boiler h. p., boiler room (single deck plan)	2.19	1.825	2.75	2.55	1.44	2.68	1.08
11.	Prime mover, type and size	Parsons	Curtis	Corliss vertical	Corliss vertical	Corliss vertical	Corliss vertical and horizontal	Corliss vertical
12.	Boilers—h. p.	B. & W. 400 superheat	B. & W. 400 superheat	B. & W. 205	B. & W. 520	B. & W. 520	B. & W. 600 h. p. superheat	B. & W. 650 arranged for superheat
13.	Number boiler decks	1	1	3	2	2	1	2
14.	Draft	Natural draft	Natural draft	Auxiliary fans	Auxiliary fans	Auxiliary fans	Auxiliary fans	Auxiliary fans
15.	Boiler firing	Roney stokers	Chain grate	Roney	Roney	Roney	Roney	Roney
16.	Condensers	Barometric jet medium vacuum	Surface high vacuum	Surface condenser	Jet condenser	Barometric jet central plant	Barometric jet	Surface
17.	Economizer	No	No	No	Yes	Yes	Yes	Yes

h Turbines over boilers.
i Switchboard very small, no dimensions.

j One condenser for four engines.
k Including upper boiler room floor for economizers and heaters.

other hand, Boston Edison, containing the same type of condenser, appears to considerable disadvantage, largely owing to the arrangement of the boiler and auxiliary plants. In this comparison the Ft. Wayne station easily approximates the average.

above. Hence, comparison can best be made on a single-deck boiler or generating plant throughout. In the diagram, all of the multiple-deck plants are also designated on the single-deck basis, and the results are at wide variance. But here again the Ft. Wayne station compares favorably with

(Continued from Page 562)

stations many times its capacity, so that from all stand-points, the constructive scheme employed seems well taken.

For purposes of comparison, a number of large engine-driven plants have been added to the diagram—Waterside station No. 2 appearing to be the most compact in spite of the triple-deck boiler room of the Metropolitan Station.

In the matter of boiler capacity allotted to a given generating equipment, the comparative table shows general practice to average about 0.75 boiler horsepower per kilowatt—in some cases running as high as one boiler horsepower per kilowatt, and as low as 0.6. In but one plant, however (Carville), is the ratio considerably below that at the Ft. Wayne station where the combined lighting and traction service occurs. To this, of course, may be attributed a large share of the cost reduction. From most standpoints, therefore, the station under description may be regarded as a distinct step forward in the field of electric power properties. It is, of course, possible that inherent defects will later develop, tending to offset the advantages otherwise secured, but experience alone will determine this definitely. Up to the present time no defects have appeared serious enough to occasion any fundamental change in plans, and the station may be regarded as an eminently successful experiment.

In closing, the author desires to acknowledge the courtesy and assistance of C. D. Emmons, general manager, Ft. Wayne & Wabash Valley Traction Co., and M. J. Kehoe, superintendent of power, in the preparation of this paper, and for the opportunity of place before you the details of design and data on the cost and operation of the Spy Run Power Station.

Appendix A—Equipment Schedule.

Railway System.—3-phase, 25-cycle, 33,000 volts transmission, 550 volts d.c. distribution from power station and substations.

Lighting System.—2-phase, 60-cycle, 2,300 volts.

Heavy Power Service.—550 volts, d.c. from 60-cycle rotaries.

Generating Units (Westinghouse).—2 1,500 kw., 3-phase, 25-cycle, 390-volt railway units—37.5 kw., 125-volt exciter; 2 1,500-kw., 2-phase, 60 cycle, 2,300-volt lighting units; 37.5 kw., 125-volt exciter; 1 400-kw. railway unit, 10-kw. exciter; 1 500-kw. lighting unit, 10-kw. exciter.

Boilers (Babcock & Wilcox).—10 400-hp. water tube, inclined header type drums 42 by 23-in. 4 in. tubes, 16 sections, 12 high, 200-lb. pressure; internal type U-tube superheaters in first pass—75 degrees superheat.

Condensers (Buckley).—4 pairs barometric jet for large units, 24-in. heads, 10-in. tail pipes; 1 7-in. and 1 8-in. single condenser for small units; no dry vacuum pumps.

Pumps (Boys-Porter).—Boiler feed, 2 20 by 12 by 30 "Yough" outside packed plunger type; Condensers 4 20 by 36 by 48 inside packed plunger type for large units; 2 12 by 20 by 48 for small units. General service pumps, 1 10 by 12 by 18 "Yough," 1 8 by 12 by 17 by 10, Laidlaw-Dun-Gordon duplex-compound.

Heaters (Platt Iron Works).—Two units, in duplicate, open heater type, with automatic float valves.

Steam Piping (Pgh. Valve & Fdy. Co.).—Designed for 200-lb., long radius bends, extra heavy fittings flanged and peaned, corrugated copper gaskets, 2-in. 85 per cent magnesia covering, 10-in. headers, 8-in. risers to turbines (5-in. for small machines), 6-in. feed water header.

Chimney (Alphons-Custodis).—12 ft. diameter, 180 feet high, radial brick construction, rotary damper operated in connection with automatic damper regulator.

Rotary Converters (Westinghouse).—2 500-kw., 3-phase, 25-cycle, for railway; 1 300-kw., 2-phase, 60-cycle for city power service, induction type starting motors.

Transformers (Westinghouse).—Railway, 7 375-kw. 390 33,000 vlt (one for reserve). Power, 2 150-kw. 2,300-390 volts.

Switching Apparatus (Westinghouse).—390-volt, 3-phase, 25-cycle railway board, 33,000 volt high tension board with distant control circuit-breakers, fuses and protection apparatus; 2,300-volt, 2-phase, 60-cycle lighting board; 60-cycle rotary power board; 125-volt exciter load for both systems, automatic voltage regulator, independent feeder voltage regulators, main and auxiliary buses to permit exchange service between 25-cycle and 60-cycle system. Automatic circuit breakers on generators, and time limit overload relay of railway output.

Coal Handling (Fairbanks-Morse Co.).—Gantry traveling crane, clamshell bucket, with crusher delivering into elevated bunker, motor-driven, capacity 50 tons per hour.

morning I feel should be aided and abetted in every way possible by the street railway men in this country. There is nothing too good in the way of mental and technical equipment that a man can have who is to direct the work of those public utility corporations. And the rule of thumb, while most advantageous and helpful at times, needs to be broadened out to embody theoretical ideas to a very great extent, as I take it, in the progress and growth of those companies.

W. H. Evans (International Railway, Buffalo):—I would like to refer to one point that has not been brought out in the paper by Professor Norris. It occurs to me that this scheme would fail entirely, or at least in part, if we had but one apprentice at a time. If the road were sufficiently large to have several, I think very much better results would be attained. That comes from an experience I had early in my career, when I had charge of an establishment where I used to have from 25 to 30 apprentices, and we frequently found it necessary, in order to stir up the lagging fellow, to put the other ahead. If you simply appointed a man who was to be railroaded through this course to the general manager's office, he might reserve his best efforts until he reached the general manager's office. Very much, indeed, depends upon the personality of the apprentice himself. I have made use, and very recently, of some very valuable assistants, as I have had only this summer as many as four in the shop. But those apprentices will fail in the first step unless they get down to the level of those with whom they associate. They must disabuse their mind of the fact that they are there to gain all and to give nothing, because Jack and Bill and Mike and Tom are not going to unbosom themselves to a fellow who impresses them with the idea of his great superiority. It seems to me that this is a very important point with apprentices.

President Beggs:—I wish to endorse every word that Mr. Evans has said, from my experience with a lot of these apprentices. They thought they were so above the men that they were thrown in to work with, they would not put on the overalls, and they were a little bit careful of their hands, and object to their garments getting greased. As soon as they do that they had better be transferred to some other department, and that is one of the things that these professors in the colleges should impress upon these apprentices when they go out.

J. W. Corning (Boston Elevated Railway):—I should like to second the remarks of Mr. Evans, because I started in this way myself, and have seen the different results attained by men who started in the same way as I did. Some of them started with the idea that they were headed for the general manager's office, and they stepped on the high places en route. Others seemed to think that they would do the best they could and give the best that was in them in each position in which they were put, and that brings me to an idea which I think it would be well for the technical schools to impress upon the students. Some men seem to think they are not to accept responsibility, that this apprentice course is something which is mapped out for them and that by passing through it, by some hocus pocus, they come out on top and are ready to accept responsible positions when they are through. A fairly large number of men seem to have that idea and have failed to measure up to what is expected of them.

W. Caryl Ely:—There is an idea prevalent, I think, from my own observation and touch with men who are practical in the street railway business, and especially the older of us, that men who are technically educated have to be taken down a peg in some way in order to make them accustomed to the things that they would come in touch with in the shop or in the practical department. I want to say that there could not be a more erroneous idea, based upon the things that one sees at Cornell and the different institutions where men receive instructions in mechanical arts, engineering, etc. Why, they work hours and hours. I have known men to do sixteen hours of laboratory work per day at Cornell when I was a student there; students in the mechanical arts, and the overalls and grime and dirt and dinner pails are their regular daily vocation throughout the four years of their course. It is a mistake to think that a man has to be born with a red flannel shirt on him in order to enable him, if he has been through a course of instruction, to get down to good, hard, common work that greases his hands and smuts his face.

President Beggs: We have more professors here than we used to get an opportunity of talking to, and I desire to improve the opportunity, because any one who knows me knows I have always taken a great deal of interest in training a great number of young men. One of the difficulties I have had has been that too frequently these young men, who

are necessarily started at a low rate of compensation because they are simply beginning the most valuable part of their practical education and continuing their schooling, and very often they are put to work with men and under men to whom they consider themselves rather superior because of their technical training and the four years that they may have had in some engineering course in college, and that these men of coarser grade are receiving much higher pay than they are. I have known it to come to me that they felt they were not doing all they could do but were doing all they were paid for doing. I think the sooner we get rid of that class of men in any organization the better it will be for them, and likewise for the institution that is attempting to train them. It is a mistake to measure the output of their work by the amount of their compensation, and if these professors here and the various colleges would impress that upon these men, it would be valuable to them in all their future years.

C. L. S. Tingley:—In listening to Prof. Norris' paper, it appeared to me that too short a period of time was allotted to the man in my department, the accounting department. One of the greatest difficulties that the accounting department has is the inability of some of our technical men to grasp the importance of giving us any account of what they are doing, and unless a man has a turn of mind which lends itself to the grasping of accounts and accounting methods, two months is entirely too short a time to give him an insight into the details and working of a very important part of our business. Therefore it will greatly facilitate the man's education and also his efficiency when he passes out into the larger field if he is allotted a little longer time.

A man in this apprenticeship course should not be passed on from one department to another until the head of the department in which he is working has certified that he is competent or that he has done the allotted work, the same as you would not pass him in a school until he had done satisfactorily the allotted work of his course.

Professor Norris:—It was while working four months under the auspices of this association that I got the inspiration to prepare this paper. My experience bears out that of Mr. Richey. There are more students in our railway course than in several others put together. Some years ago, when the association was re-organized with the consent of the director of our college, the laboratories of Sibley College were placed at the disposal of the association, and I think every other technical school in the country would be glad to do the same thing. Regarding the brevity of the courses, of course the amount of time allotted to each, in each department, is very small, and possibly eighteen months is too short. I think the steam railway companies require four years. My suggestion was made simply as an individual and not as a representative of any committee or anything of that sort, and it was made simply to get the matter before the association for discussion. Our schools appreciate the course which Mr. Wyman has described. Mr. Wyman's company sends a representative to Cornell to talk to the men, and it is difficult to find a room large enough to hold the men who want to listen to that representative.

Ralph Sweetland then presented his paper on "The National Fire Protective Association and its work in the Street and Interurban Railway Field."

H. N. Staats (Cleveland):—In the first clause of Mr. Sweetland's report I notice that he mentions a great many leading associations which are members of the National Fire Protective Association, and then in the last clause he says practically every insurance association of importance throughout this country and Canada. That is covering some of the greatest underwriting institutions in America. I have reference to the Associated Factory Mutual Fire Insurance Company of England, and it should have been emphasized in this report, except that possibly the report comes from the stock insurance end of that line. Then I might add to this a stock insurance company, the American Railway Insurance Company, which was the first organization to take steps towards promoting the interests of the electric railway and lighting companies. That company, as you probably know, is practically made up of the electric railway and lighting companies and you will probably hear more from that under the report of the chairman of your "Insurance" committee. I have the honor to be a member of the "Power House" committee of the National Fire Protective Association and work in conjunction with Mr. Sweetland, so that you see a mutual man and a co-operative man and a stock man can work along the same lines if we have a general understanding.

I am very glad to see the old line companies and their representatives coming a little nearer to the members of this association. I think that eventually it will prove a benefit. The last feature to which I would make reference is the absence of anything that the National Fire Protective Association might offer in the way of reduced cost of insurance

after all these appliances which it so strongly recommends have been introduced.

Mr. Sweetland:—I would like to reply to Mr. Staats. It is true that I mentioned no insurance organizations other than the National Board of Fire Underwriters. I did not wish to mention some and not others. This was not a time to describe any particular form of procedure which would be gone into in order to reduce the insurance rate on a fire hazard of a particular device, and in my remarks it was simply to interest the American Street and Interurban Railway Association and its members in the broad subject of fire prevention. The question of the matters which Mr. Staats brought up would naturally come up in the discussion of the construction and equipment of a particular device.

The paper by H. J. Campion and William McClellan on "The Influence of the Design of Railway Structures on Economy of Operation" was read by title, and the meeting then adjourned to meet at 9.30 a. m. on Thursday in the Sun parlor on the Steel pier.

CLAIM AGENTS' ASSOCIATION.

The Claim Agents' association was called to order at 2:30 p. m. by W. F. Weh, claim agent of the Cleveland Electric Railway, the third vice-president.

C. B. Hardin, claim agent United Railways Company of St. Louis, St. Louis, Mo., read a paper on "The Claim Department, and what Should be Done to Make it Effective." Then a paper on "Instruction of Employees in Accident Work" was read by F. W. Johnson, assistant general claim agent Philadelphia Rapid Transit Company. Both papers were followed by discussion. The papers will be found in another part of this issue.

H. R. Goshorn, the new president, was then introduced. Mr. Goshorn made a brief address in which he said:

There are many things which should be done, but probably the most important to which the attention of this association has been directed is a system of exchange of records and interchange of information, with reference especially to fraudulent claimants. The man who will devise the simplest, most comprehensive, least expensive and most practical method of doing this, will be entitled to the gratitude of the street railway owners of the United States. It means much to all of them and it is up to the claim men to produce such a plan. You all have a chance to make good. Think it over. Your idea may be the very one that will commend itself, but if you fail to give it expression it can never be known. One of the various systems now in operation may be found to answer all purposes, but your executive committee will consider all of them, together with any plans proposed by members of our association, as per instructions given yesterday by resolution of this body.

President Goshorn then announced the appointment of the following committees:

Executive Committee—Peter C. Nickel, New York City Railway; Charles B. Hardin, United Railways of St. Louis; E. C. Carpenter, Indiana Union Traction Company; Eugene R. Roberts, Knoxville Railway & Light Company.

Employment Committee—B. B. Davis, Columbus Railway & Light Company; H. V. Brown, Public Service Corporation; T. B. Donnelley, West Penn Railways Company.

Ways and Means Committee—William Tichenor, Indianapolis; M. S. Rausch, Milwaukee; Louis Lipphardt, Wheeling, W. Va.; H. K. Bennett, Fitchburg, Mass.

The meeting then adjourned sine die.

BRAKE SHOES MADE BY ANALYSIS.

Making brake shoes by analysis, and from carefully selected materials has a strong tendency to produce shoes uniform, of satisfactory strength, long life, and of high efficiency. The Columbia Brake Shoe and Foundry Company, 1310 Traction Building, Cincinnati, has been in the brake shoe business for four years, starting by manufacturing exclusively brake shoes for steam and electric railways. By careful attention to the production of a shoe of the correct analysis, of the exact shape required, and possessing the essential elements of friction and long life at a reasonable price, a very satisfactory business has been developed. The growth of the business has been steadily increasing until, at the present time, upwards of 40,000 pounds of brake shoes are made daily. Plain metal shoes, shoes with inserts, shoes with chilled ends and re-enforced shoes in large variety are made to suit special conditions. A new shoe with a steel back is a recent invention which this company is placing on the market.

ACCOUNTANTS' ASSOCIATION.

President C. L. S. Tingley called the Accountants' association to order at 3 o'clock yesterday afternoon at the Hotel Chalfonte. An amendment to the by-laws recommended at the morning session of the American association, constituting past presidents members ex-officio of the executive committee, was referred to the incoming executive committee to be formulated, and in order that due notice may be given that the amendment will be considered at the next annual meeting.

William M. Stuart, chief statistician for the census of Manufacturers' bureau, addressed the association on the census to be taken next year. Copies of tentative schedule were presented.

Mr. Stuart said that the information furnished by each company would be considered by the census bureau as absolutely confidential. The data will be used only for the statistical purposes for which it is furnished and no publication will be made whereby the financial operations of any company can be identified. The form of accounting promulgated by the Accountants' association will be used in collecting the financial statistics. Mr. Stuart added that he was very much disappointed, however, at the last census to find that probably not more than 15 or 20 per cent of the companies used the form.

F. E. Smith, auditor for the receiver, Chicago Union Traction Company, then read his paper on "Mechanical Devices and Other Office Appliances."

The committee on "Standard Classification of Accounts and Form of Reports" made its report. The discussion was not finished at 6:00 o'clock and the meeting adjourned to meet again at 9:00 o'clock this morning, when the discussion will be resumed.

C. Griffith Young, construction manager of J. G. White & Co., Incorporated, is representing the Manila Electric Light & Railway Company, P. I., at the convention. Mr. Young is one of the pioneers in electric railway work and has been identified with J. G. White & Co. for over 15 years. He has been prominent in the development of that company and probably built more miles of trolley road than any other man. His extensive travels around the world, through South America, the Philippines and the West Indies on engineering, reporting and construction work have given him most valued opportunity for investigation and comparison of both the construction and operation of properties of similar nature throughout this country. Mr. Young is a firm believer in the good results derived from attendance on these conventions and expressed himself as particularly gratified with the present tendency of the associations to adopt standards in equipment and rails and believes that standards should also be adopted for all parts of both track and overhead construction, cars, equipments, etc. He believes that the savings to operating companies and manufacturers who now carry a vastly diversified assortment of material and parts due to lack of standards would be measured in millions of dollars and it would further demonstrate to capitalists that electric railway properties are in the hands of capable managers and engineers and therefore safe investments.

A very interesting exhibit of engine and lubricating oils, heavy greases, and boiler compounds is that of the Dearborn Drug & Chemical Works. The exhibit consists of samples from its line of boiler compounds, engine oils and greases. Many samples of scale removed from boilers, heaters and pipes are shown. A large new reinforced concrete factory has recently been erected at Chicago, giving room for its rapidly growing business. The increased space afforded makes possible a more satisfactory handling of orders. The variety of oils, greases and compounds can only be appreciated by an examination of this very complete exhibit.

ENGINEERING ASSOCIATION—WEDNESDAY AFTER-NOON SESSION.

Vice-President Simmons called the meeting to order at 3:15 o'clock. The first item on the program was a paper, entitled "A Year's Experience With Gas Engines," by Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company. Mr. Winsor, unfortunately, could not attend the meeting, and Mr. Charles Hewitt, of Philadelphia, read the paper. This paper will be found elsewhere.

Vice-President Simmons: Some one from the Boston Company can probably answer that question.

J. W. Corning (Boston Elevated) thought 3.477 pounds of coal per kilowatt hour was the average of all but one plant, which was used only on peak loads. It was a very old plant, running non-condensing.

J. R. Bibbins (Westinghouse Machine Company): I had in mind two plants that were giving practically the same figures; one was the gas power plant of the Norton Company at Worcester, Mass., 500 horsepower output, and on the regular 10-hour day load it averages about 2 pounds per kilowatt hour, including coal for all purposes, building fires, etc., and furthermore this economy was obtained with an engine-load factor of about 73 per cent. It corresponded quite closely with Mr. Winsor's figures, 83.3. This was one of the recent plants put into service, using horizontal double-acting type of engine, and the results seemed to compare very closely with those given by Mr. Winsor.

A paper, entitled "Some Practical Points in Steam Turbine Construction, with particular reference to the Parsons Type," by St. John Chilton, engineer of the Allis-Chalmers Company, Milwaukee, Wis., was next read. This will be found elsewhere.

The next paper was on the subject of "Curtis Turbines in Railway Service," and was presented by its author, August H. Kreusi, engineer General Electric Company, Schenectady, N. Y. Following this paper was an interesting discussion on the adaptability of turbines for railway use and the choice of auxiliaries, including condensers and pumps.

J. R. Bibbins, engineer, Westinghouse Machine Company, East Pittsburg, Pa., then presented in abstract a paper entitled, "Recent Developments in Steam Turbine Power Station Work." This paper will be found elsewhere.

The election of officers was next held and resulted as follows:

Officers.

President, F. G. Simmons, superintendent of construction and maintenance of way, Milwaukee Electric Railway & Light Company, Milwaukee, Wis.; first vice-president, Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company, Boston, Mass.; second vice-president, F. H. Lincoln, assistant general manager, Philadelphia Rapid Transit Company, Philadelphia, Pa.; third vice-president, W. H. Evans, master mechanic, International Railway Company, Buffalo, N. Y.; secretary and treasurer, J. W. Corning, electrical engineer, Boston Elevated Railway Company, Boston, Mass.

Executive Committee.

The officers are: W. J. Harvie, electrical engineer, Utica & Mohawk Valley Railway Company, Utica, N. Y.; William Roberts, superintendent of motive power, Northern Ohio Traction & Light Company, Akron, O.; E. O. Ackerman, engineer, maintenance of way, Columbus Railway & Light Company, Columbus, O.; John J. Murphy, electrical engineer, Chicago Union Traction Co., Chicago, Ill.

The first yachting party, given Tuesday afternoon by The Ohio Brass Company, of Mansfield, Ohio, was a huge success. All who went declared they had a very enjoyable time. Owing to lack of breeze the party scheduled for Wednesday morning was canceled. To-day there will be a yachting party at 10 A. M. and 2 P. M. Railway delegates and their ladies desiring to go are requested to call at the booth of the Ohio Brass Company for tickets for either morning or afternoon sail.

Conventionalities

For exchange—one hat initialed R. C. H. Call or telephone Room 17 Dennis.

W. H. Forsyth, of the Curtain Supply Company, Chicago, arrived Tuesday evening.

A photograph was taken on Tuesday afternoon of the members of the Claim Agents' association.

Charles Booth, of the Chicago Pneumatic Tool Company, spent yesterday with his friends at the conventions.

W. E. Ludlow is meeting his many friends. He represents the Cleveland Armature Works of Cleveland, Ohio.

W. L. Arnold, of the Arnold Company, Chicago, was circulating among his friends at the convention yesterday.

Mathias-Hart Company, the new railway supply company in Boston, is represented at the convention by Robert Mathias.

It isn't even necessary to ask for a flower at the booth of the Buckeye Engine Company, just wear an expectant look and wait your turn.

M. R. Burrows, New York agent of the Buda Foundry & Manufacturing Company and Paige Iron Works, is attending the convention.

The Universal Railway Supply Company of Baltimore, Md., is represented at the convention in the person of George W. Smith, president.

Charles S. Ayres, manager of the Electric Railway Equipment Company of Philadelphia, dealers in second hand cars, is attending the convention.

E. M. Hamlin, formerly general manager of the Lord Electric Company, New York, is attending the convention and shaking hands with his many friends.

J. E. Duffy, Superintendent Syracuse Rapid Transit Railway Company, arrived Tuesday evening with his wife. They are stopping at the Marlborough-Blenheim.

William Knight, of Los Angeles, California, Pacific Coast agent for Lord Electric Company, is attending the convention and will spend some time in the East.

W. K. Archbold and R. L. Allen, of the Archbold-Brady Company, engineers and contractors, structural iron and steel, of Syracuse, N. Y., are attending the convention.

C. N. Duffy has missed only one convention of the Accountants' association since the organization of the association. Mrs. Duffy is with Mr. Duffy at Atlantic City.

The Electric Railway Equipment Company, Cincinnati, O., is not exhibiting this year, but it is represented at the convention in the person of John G. Kipp, sales manager.

Jilson J. Coleman is now on the manufactures side of the fence and is attending the convention as a representative of the Bridgeport Brass Company of New York. This company is not among those that exhibit this year.

To G. S. Richardson, of the United States Graphite Company, is due credit for finding on the boardwalk and restoring to its owner the badge lost by a member of the executive committee of the Manufacturers' association.

A. Stuart Pratt, of Boston, Treasurer of the Stone & Webster Companies, is here with 25 assistant treasurers of various companies controlled by Stone & Webster. The party will leave for Boston on Thursday evening.

The great demand for magnesia blocks given out at the Phillip Carey Manufacturing Company's exhibit has demonstrated a number of new uses for this product, namely, cleaning ladies' white canvas shoes, shirt waists, hats, etc.

The exhibit of the Rooke Automatic Register Company has been moved to spaces 419-21 on the Steel pier, where Mr. Rooke, the inventor of the most ingenious register or fare-collector bearing his name, is assiduously showing it to numerous interested visitors.

FOUND.—A gold locket with a large ruby setting in the back, and inscribed "Chas. Currie." Owner please call upon C. F. Roberts, master mechanic of the Easton Transit Company, of Easton, Pa., who will be at the Hotel Jackson until today at noon, after which time he can be reached at Easton, Pa.

FOUND.—A gold locket with a large ruby setting in the back and inscribed "Chas. Currie." Owner please call upon C. F. Roberts, master mechanic of the Easton Transit Company of Easton, Pa., who will be at the Hotel Jackson until to-day at noon after which time he can be reached at Easton, Pa.

It is a long ride from Cleveland to Atlantic City by automobile, but Fred J. Baird, of the Homer Commutator Company, and W. H. Wherry, of the Forest City Electric Company, made the trip with a party of friends and arrived Tuesday. They will run up to Boston from here and thence back to Cleveland.

H. B. Logan, president of Dossert & Company, is at his desk again after two months' absence through illness. Mr. Logan was one of the victims of the recent epidemic of typhoid fever attributed to impure water supply on board a steamer plying between Buffalo and Duluth. Mr. and Mrs. Logan made the trip during the latter part of July in company with two Buffalo friends, and out of the party of four only one escaped the typhoid infection. Through an investigation set on foot by the New York Herald over seventy-five cases were traced to the same source.

Many votes have registered during the week in the contest which the New Departure Manufacture Company has

been conducting to determine who is the most attractive lady attending the convention. The prize is a handsome French gray silver loving cup lined with gold and suitably inscribed. The cup is 15 inches high when mounted on the base. Every street railway man is entitled to a vote and there are no restrictions as to the definition of "most attractive." The balloting will close at noon today, so that those who have not yet voted are urged to do so early this morning in order to have their votes counted.

F. W. Brazier, superintendent of car equipment of the New York Central, and former president of the Master Car Builders' Association, spent Tuesday at the convention, and in



New Departure Prize Cup.

view of the extensive scale on which the New York Central is interested in electric railway operation, found much among the exhibits to interest him.

The booth of the Western Tube Company is the headquarters for the Kewanee Union Club, an organization in which only good-looking persons are eligible, but as all those

in attendance at the conventions meet these requirements, the membership is growing rapidly. Each member is given a numbered badge, and on Friday at 10 A. M. a drawing is to be held to determine the lady who is the best-looking member of the club and the gentleman who is the handsomest. The lady holding the lucky badge number will be given one of Lamponi's finest gold belt buckles. The lucky gentleman will receive a pigskin toilet case. Although a large number of members were enrolled yesterday the membership books are still open.

Ladies' Trolley Trip.

Special cars will leave the boardwalk and Virginia avenue at 2.30 P. M. sharp for Ocean City. The trip which all convention ladies are invited, by the entertainment committee, to make is via the Short Fast Line and one which should prove very attractive. Aside from the scenery the equipment of the Shore Line, which is a modern high speed electric line, will doubtless be of interest.

THIRD ANNUAL VAUDEVILLE PERFORMANCE.

The annual supply men's vaudeville and theatrical performance originally scheduled for Wednesday evening will occur without fail to-night at Young's Pier theatre. Last year's performance was such a success that all of those at Columbus will surely be on hand this evening. The programme is one which even the theatrical trust would covet for one of its houses in the leading cities. While several of the numbers have been given before they are of such merit as to warrant repetition and have been introduced again by special request. The programme is as follows:

PROGRAMME.

Overture—

Manufacturers' Quartette

By Courtesy of

John H. Thomas, First Tenor.....Phillip Cary Mfg. Co.
F. H. Shipe, Second Tenor.....Standard Paint Co.
F. F. Vandewater, First Bass.....Standard Paint Co.
John Lloyd Wilson, Second Bass.....The Burnet Co.
What I Know of Some One of Us (unter unt).....Dwight B. Dean
By Courtesy of The J. G. Brill Co.

Humorous Musical Artist.....Clinton E. Weston
By Courtesy of W. E. Baker & Co.

Monologist.....A. H. Atkinson
By Courtesy of Sprague Electric Co.

Colonel Carteret, V. C. (By request)

A Dramatic Sketch in One Act by Seth Cook Comstock.

CAST:

Col. The Hon. Sir Robt. Carteret, V. C.....Jacob Wendell, Jr.
Sir John Middleton, M. P.....Walker Marcus Dennett
Lieut. Robt. Carteret, 1st Hussars (Bobbie).....Chas. G. Bush, Jr.
Billings (Col. Carteret's Butler).....Harold W. Gould

Scene—Room in Col. Carteret's House, London.
Time—During the Boer War.

Produced by Courtesy of Mr. Jacob Wendell, Jr., of Wendell and MacDuffie.

What Lew Dockstader might have been....Joseph McKenna
By Courtesy of The Pantasote Co.

Impersonations.....Robt. E. Russell
Son of the late Sol. Smith Russell
By Courtesy of General Electric Co.

Reminiscences of the late Chas. H. Hoyt....John Lloyd Wilson
The Garlock Wizard.....E. Clinton Adams

"If you are satisfied with being mystified you will be mystified until you are satisfied."

By Courtesy of Garlock Packing Co.

That Same Quartette.....In a Grand Closing

The performance is scheduled for 8.30 p. m., and admission will be by official badge only.

Among the Exhibits

The Samson Cordage Works has a fine line of trolley and bell cords but the samples are now delayed in transit. As last reported there was hope of the shipment arriving today. Delegates may well stop at the company's exhibit booth and examine this line of cordage even if it is somewhat late in arriving.

The Whitmore Manufacturing Company, Cleveland, O., sole manufacturer of the Whitmore gear protective composition is booking orders at its booth on the Steel Pier, for immediate delivery. S. W. Whitmore, president and manager of the company, is anxious to meet all the delegates attending the convention who are having difficulty in getting satisfactory wear from the gears on their cars. He is anxious to supply those not familiar with his firm's product with a free sample sufficient to lubricate the gears of one or two cars. By allowing the railway man to make the test under his own supervision Mr. Whitmore believes the results will be very convincing. At the exhibition booth two G. E.—81 motors are shown under working conditions. The case of one is lubricated by protective compound while the other is lubricated with another compound. The demonstration is to clearly illustrate the high lubricating qualities of the former. A large number of railroads have obtained working tests of the Whitmore gear protective compound and are very enthusiastic over the results.

Arthur d'Romtra, electrical engineer for the Cape May, Delaware Bay and Sewell's Point Railroad is loud in his praise of the Liberty trolley harp, made by the New Departure Manufacturing Company of Bristol, Conn., having had it in use for the past year. Mr. d'Romtra says that with one of these harps he used less than 10 wheels, while under similar conditions with old style rigid harp, covering the same period of time, he found it required more than 80 wheels, a saving certainly worth consideration. Call at the booth and learn more fully about this new harp.

The Kalamazoo Railway Supply Company, which is exhibiting the Root track scraper, is distributing its latest catalogue to railway men visiting its booth. The catalogue is a handsome leather bound handbook of track and railway supplies.

The Pressed Steel Car Company has ordered of Dossert & Co. 120 junction boxes fitted with Dossert two-way connectors. These junction boxes are to be used in the equipment of new passenger cars now being built by the Pressed Steel Car Company, McKees Rock, Pa.

The International Register Company has on exhibition a very complete line of its products. Double and single registers are shown with dials removed, displaying all working parts. A particular feature of motive is the absence of castings. All parts are of cold rolled steel carefully machined and perfectly interchangeable. The interchangeability is such that a part of any register may be inserted in any other register of the same pattern with the assurance that the operation will be perfect. No pains have been spared in the manufacture of the registers and every known means for their perfection has been introduced. In addition to the complete line of single and double registers, there is the new International double recording register, which makes a very complete record of the work done in the car. This register supplies the auditor and conductor with a trip sheet and has a reserve stock of paper sufficient for 30 to 60 days' records. The machine gives a complete record of the receipts and cash fares, numbers of trips, conductor's number and register number and date. It also shows the direction of the car travel and it is believed fills a

decided need for a register of this type. The International standard of simplicity and quality is seen throughout the register. The exhibit also includes a complete line of International trolley and register cord, International punches, Heeren badges, International rod fittings, both detachable and solid. The company is represented by John Benham, vice-president; A. L. Tucker, secretary; W. G. Kirchhoff, superintendent, and A. L. Loper, who installed the company's exhibit.

The Trolley Supply Company of Canton, O., manufacturer of the Knutson trolley retrievers, climax headlights and supplies, has an exhibit in the booth of the Electric Service Supplies Company. The retrievers and headlights made by this company have been in use on many railways for a number of years, and the service they have given has been remarkable. J. E. McLain and Joseph Hollis are explaining the many good qualities of the devices shown.

Harry De Steese, who has been connected with electric traction work for a number of years, is at the convention, representing the International Timber & Preserving Company of Chicago. Mr. De Steese will look after the company's interests in the east.

E. L. Post & Company, of New York, is represented at this convention by F. O. Ketcham, general manager of the railroad department. "Zero Metal" made by this company is largely used by railroads for locomotive driver bearings, and it also makes a superior motor bearing.

Many of the large roads of the country are now using Heeren badges, a very complete line of which may be seen in Music Hall exhibit of the International Register Company. These badges resemble marble mosaic and embody all the qualities of neatness, beauty and durability. They are made in many different styles and colors. The enamel is very durable, the letters being separately inserted and the whole welded solidly to the background, which is then mounted in a neat German silver frame and backed with aluminum.

The Crocker-Wheeler Company has recently issued its bulletin No. 82 Z, describing the line of direct current railway generators. These generators are designed especially for heavy, sudden overloads and high efficiency; they have ample cooling surface, low armature reaction and excellent commutation characteristics. They are so constructed as to run in multiple with each other, or other like machines, taking their proportionate share of the load. All machines are carefully tested before shipment and covered by a very broad guarantee. The bulletin also illustrates a number of interesting installations.

If you expect to have any change left after convention time you should visit the Recording Fare Register Company's exhibit and get one of its very practical souvenirs. Mr. Yates or Mr. Kennedy will be glad to see you.

Those "Keep Smiling" cards given out by the Newman Clock Company are as usual much sought after.

The International punches to be seen at the Music Hall exhibit of the International Register Company on the Pier merit careful inspection. The small parts which have in the past given trouble have been amply provided for. Attention is being called to the volute spring used in these punches. This spring is made of a V-shaped piece of steel coiled upon itself similar to the wrapper of a cigar. The inner convolutions are coiled on the latter so that it is impossible to bend the spring out of alignment. The jaws and eyes are of special construction and embody strength and neatness.

One of the booths on Steel Pier that is attracting the attention of delegates from every department of electrical

railways is that occupied by the General Fireproofing Company, Youngstown, O. The reason this booth is of unusual interest is because of the universal use in the supplying of all departments with a fireproof, dry and sanitary roofing. The exhibit of the company consists of a completed section of concrete roof, reinforced by the company's "Trussit" sheets. The roof as shown has no seams, cracks or joints and is a fair example of the leading characteristics of the metal sheathing that is rapidly being adopted as standard for the roofs of car houses, office and other buildings occupied by electric railway companies. The representatives in charge of the exhibit are E. N. Hunting, M. E. Murray, F. P. Kafka, W. R. Fowler.

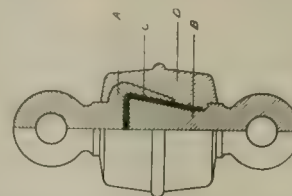
Philip S. Justice & Co., 421 Chestnut street, Philadelphia, manufacture the Justice spring power hammer, which is particularly adapted for general work in the blacksmith shop. It is designed so as to require merely nominal repairs for maintenance, and accordingly, is both efficient and economical.

Mr. Coakley and Mr. Whiting, of the Samson Cordage Works, are showing at this company's exhibit space a variety of trolley cord and bell cord and explaining the economies of these goods. If necessary they are prepared to sell you a ton or two or more or less for trial.

If anybody wants to know why the conductors break so much trolley cord and bell cord and register cord, he can get an answer at the booth where the Samson Cordage Works has some of the "real thing" to show.

NEW STRAIN INSULATOR.

Attention is drawn to a new type of strain insulator which is exhibited at the booth of The Ohio Brass Company, Mansfield, O. This insulator, as shown in the accompanying illustration, consists of a cup casting (A) compressed on a metal cone (B) with a heavy section (C) of formed sheet mica between the cup and cone on all sides. The device is finally covered entirely with a body (D) of "Dirigo" insulation as a weather protection. Mechanically this new strain insulator is very near perfection. Tests made upon the sample insulators before the "Dirigo" composition is put on, show that the elongation between the eyes is not measurable even when the load is run up beyond the breaking strength of the largest steel cable with which the insulators could be used. This construction, therefore, removes all strain from the insulating compound, placing the strain directly upon the sheet mica and distributing it over the entire bearing surface between the cup and cone. A pressure of over 60 tons is used in compressing the cup, hence it is evident that the mica can not be further compressed by any load which could be applied to the ends of the insulator. A number of samples are on exhibition showing heavy steel cable attached to the insulators, these cables



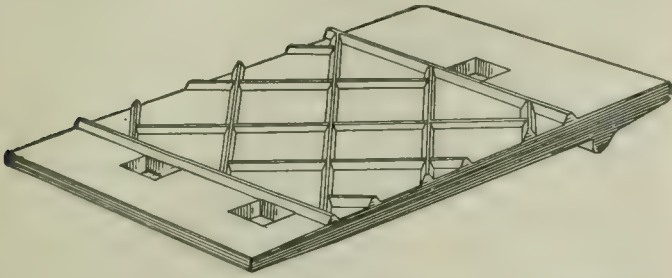
Section of New Strain Insulator.

having been broken without in any way injuring the insulators. Electrically the insulator leaves nothing to be desired. The best obtainable grade of sheet mica is used in sufficient thickness to insure against puncture under any and all operating conditions. The "Dirigo" composition serves perfectly as a weather protection. Under test these insulators generally arc over before the puncture occurs, proving their great electrical strength.

More than 18 months have been spent in demonstration and test work on these insulators, so that in placing them upon the market at this time The Ohio Brass Company does so with entire confidence that they will meet fully the most severe requirements.

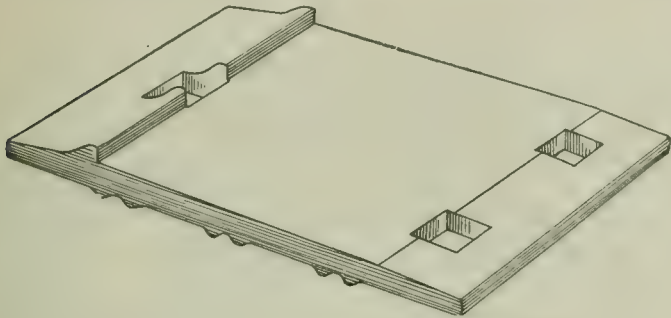
THE SELLERS TIE PLATE.

It may be said that there are two things worthy of particular consideration in connection with tie plates. First, the design of the plate, which should be such as to protect the tie from cutting and abrasion and resist as strongly as pos-



Sellers Tie Plate—Bottom View Showing Corrugations.

sible the tendency of the track to widen. Second, the material of which the plate is made, in order that a maximum of resistance may be offered to the deteriorating effects of the atmosphere and weather as well as to the effects of service. It is necessary that the strength of the tie plate be maintained at all times.



Sellers Tie Plate—Top View Showing Shoulder.

The Sellers anchor bottom tie plate, which is made and sold by the Sellers Manufacturing Company, Western Union Building, Chicago, is designed with due consideration to these points. As will be seen from the accompanying engravings, the bottom of the plate is provided with diagonal corruga-

steel and is better able to stand the effects of the weather and atmosphere and abrasion in service. The manufacturer advances the following argument as to the superiority of wrought iron over steel with respect to abrasion:

"There is a constant movement of the rail on the tie plate: First, caused by expansion and contraction by varied temperatures, and second, by the creeping of the rail under a moving load, causing a waveline of deflection moving ahead of the load and moving backward as the load passes. It is an axiom in mechanics that when two metals of the same physical structure are brought in contact under motion, abrasion precludes their use, hence the use of brass or softer metal for bearing boxes in all journals. Steel in the rails and steel in the tie plates conduces to most destructive wear. Iron being fibrous and the fibre running in the direction of the longitudinal motion reduces this abrasion to a minimum and precludes the tie plate from wearing up into the rail, as it is most likely to do when the two identical metals are brought in contact."

The Sellers company also manufactures a flat bottom shoulder tie plate which can be secured to the tie with either screw spikes or the ordinary railroad spikes.

The Sellers tie plate is made in any size, weight and thickness desired, and punched for any size rail with two, three or four hole punchings. The manufacturer agrees to guarantee that the plate when properly applied will not buckle and will hold the track to gauge on the sharpest curves and under the most severe conditions. It is the usual method when installing the plate to insert it under the rail and spike it to gauge. The weight of a train is considered sufficient to seat the plate and the spike may then be driven home. The plate is used by many of the leading railroads and electric lines throughout the country, though more particularly in the West and we are advised that very favorable reports are being received of their performances.

INTERPOLE MAGNETS FOR YARD USE.

The illustration herewith presented was made from a photograph taken at the shop of the Cleveland Electric Railway and shows an interpole magnet engaged in shifting track material in the yard. The magnet which was recently placed on the market by the Cleveland Armature Works, has been in successful use in the yards for several weeks and has been put to devious uses with gratifying results.

As is shown in the illustration, the magnet is suspended from the end of a boom projecting from the staff of one of the standard wrecking cars owned by the company, but may be used to advantage on any temporary boom which is supplied with block and tackle or revolving drums.



Interpole Magnet Engaged in Shifting Track Material.

tions, which offer maximum surface to resist track spreading. A shoulder is provided to insure against the shearing strain on the outside spikes. It is claimed that the corrugations on the bottom compress and engage all the top fibres of the tie, but do not cut into the tie in such a manner, as to allow water and other substances to enter the tie and cause rotting. The corrugations cross the fibres, the theory being that though they firmly grip the tie, they do not enter into the fibres of the wood parallel to the fibres, or in other words, in the direct line of the lateral pressure, which causes track widening.

The plate is rolled from wrought iron because it is believed this material affords fully as great strength as rolled

Since the device was installed at the Cleveland shops varied tests have been made, and, according to those having the tests under supervision the magnet is a valuable addition to a railway's construction and maintenance equipment.

The uses to which the magnet may be put are limited only by the lifting capacity, of the magnet, which is about 12 tons. The manufacturers make the magnets in two types. One, known as the bell magnet, is concave on the under side and is designed especially for handling ingots and large irregularly shaped pieces of metal as well as pig, scrap and small pieces of iron and steel. The other magnet, which has a flat under surface, is designed for handling pieces of metal whose outer surface is regular. The magnet shown herewith in the act of lift-

WESTINGHOUSE SINGLE PHASE EQUIPMENT.

The most striking thing in the exhibit of the Westinghouse Electric & Manufacturing Company at the conventions is the large single phase electric locomotive which is half of a complete unit. It represents the type of apparatus supplied by this company for heavy railway service, either freight or passenger, and shows the sort of locomotive used on the New York, New Haven and Hartford for pulling trains into New York City. The compactness of the locomotive is the point that impresses one most, for by comparison with a steam locomotive of equal power this seems like a dwarf. The careful attention given to working out the details of the interior equipment also demand consideration and impress upon the mind that every means has been taken to make the control equipment as accessible and as intelligible as possible.

In addition to the complete equipment there are individual parts arranged for more minute inspection than is possible on the locomotive. There are several of the single phase motors which may be carefully examined. The commutator, brushes and brush holders and entire design are of ample and rugged construction.

The control equipment is also exhibited apart from the locomotive showing the method by which the voltage is reduced on the car to the amount suitable for the motors, as well as the method of varying the voltage applied to the motors so that every notch is a running notch, no resistance being required.

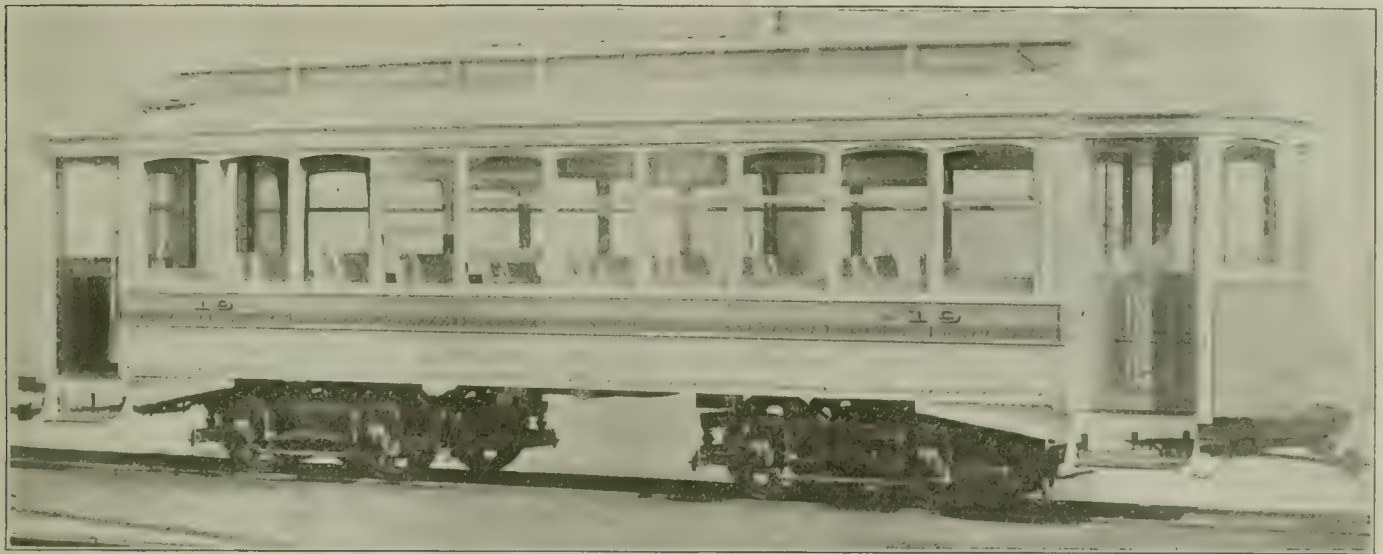
The catenary line construction used on the single phase roads is also shown suspended as it appears when actually

In addition to the above there are several standard direct current railway motors. More interesting than this are the two interpole railway motors which make use of the auxiliary poles to improve the commutation. Interpole motors have been used with perfect satisfaction for variable speed service, but are new in the field of railway work. They have, however, been tried sufficiently to prove that their use materially improves the commutation, and hence increases the life of both commutator and brushes, so that much is expected of them in the future.

In conjunction with the Westinghouse machine Company a steam turbine generator set is displayed on the first floor for inspection. This is a unit capable of delivering 500 kilowatts at normal rating, and represents a most compact and reliable machine for the development of power by steam. Its remarkably small size for so large an output is the feature which appears to impress most persons. Its smooth running under full load and the absence of the usual troubles which result with a steam engine, as well as its low steam consumption, make all those who have installed this type of equipment most enthusiastic over it.

NEW SEMI-CONVERTIBLE CARS FOR DANBURY.

The car illustrated is one of the semi-convertibles which the J. G. Brill Company shipped in September to the Danbury & Bethel Street Railway Company, Danbury, Conn. More cars of this type than any other are built by this company, the majority of them being of the size of the one



Semi-Convertible Car for Danbury, Conn.

installed. This method of suspension is finding such favor on the single phase roads that its use is contemplated for direct current equipments. Strain insulators and other line material are on exhibit, as is also the substation meter equipment required.

The pantograph trolley is shown set up on the floor connected to a compressed air supply so that the trolley may be raised or lowered exactly as in the complete equipment, by the air supply. The trolley is arranged so that the shoe comes in contact with a trolley wire. There is shown also direct current line material, as well as the control used in the cars. Full repair parts for the direct current motors are also included.

One portion of the exhibit contains the complete unit switch control used in the control of electric trains operated either by alternating or direct current. This is set up and connected for operation so that the various actions and operations which occur as the motorman moves the controller may be fully observed. The various movements are directed from a very compact master controller which governs the action of the various magnets. These operate valves controlling the supply of compressed air to small plungers which are thus caused to move and open or close switches in the motor, but the arrangement also does away with much cumbersome wiring, as the controller handles only the very small low voltage current required for the magnet, and has no electrical connection with the motor circuits. This provides a very compact controller, which is very small compared with the usual direct current controller used on street cars.

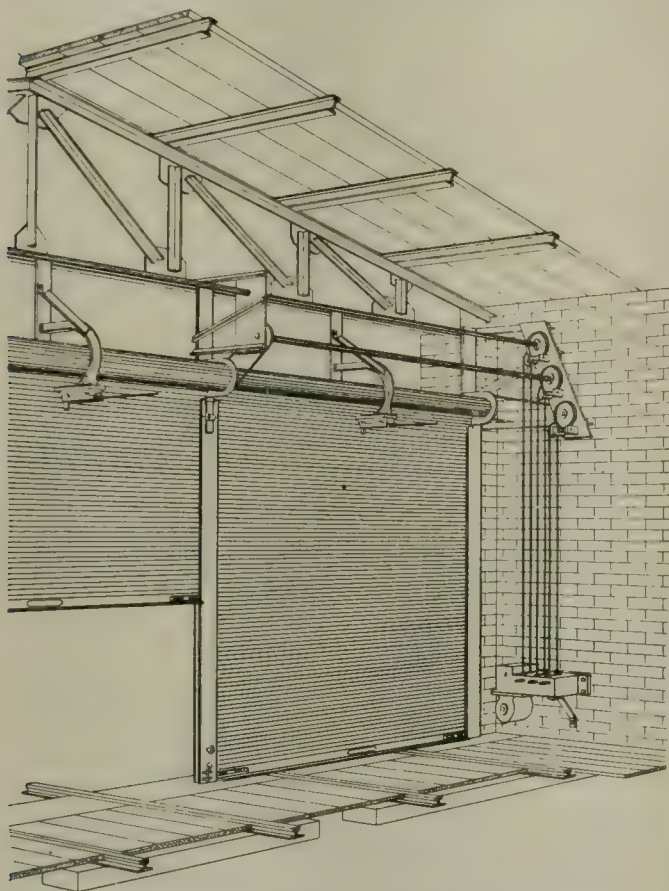
illustrated, namely, 28 feet over the body. Visitors to the convention are probably already familiar with the semi-convertible cars on Atlantic Avenue which run from the Inlet to Ventnor and Longport and the same type of car is also much in evidence on the Atlantic City & Suburban line running from Atlantic City to Pleasantville and Somers Point. Perhaps the most delightful trolley ride out of Atlantic City is that to Ocean City via the Fast Shore Line which is also equipped with Brill semi-convertible cars built by the John Stephenson Company. Those who are not familiar with the workings of the semi-convertible window system would do well to pay a visit to the Brill exhibit on the Steel Pier where a section of the car may be seen and fully explained. The Danbury & Bethel cars contain numerous specialties which are familiar to street car men, namely, "Dedenda" gongs, "Retriever" signal bells, angle iron bumpers, etc. The seats are also of Brill make and the trucks are the builder's No. 27G1 type with 4-foot 6-inch wheel base.

The Pennsylvania Steel Company manufactures track work for street, interurban and electric railways. One of its specialties is the Manard steel center for steam railroad frogs and street railway switches, mates and frogs. The rapid renewable hard centers in street frogs, it is stated, can be removed and replaced within 15 minutes without disturbing the pavement. The "big pin" switches, with Manard steel centers and tongues, are designed to prevent excessive wear of the heel and also to prevent the movement of the tongue during the passage of cars.

MODERN STEEL ROLLING DOORS FOR CAR BARN.

Without entering into a discussion of the relative merits of an open or closed terminal the effective closing of the one or more entrances follows immediately on the design of track layout within the building.

In the accompanying picture which shows the Edmondson avenue car barn in Baltimore, each doorway serves three or more tracks which diverge before entering the building, a track plan requiring an extraordinary width of entrance.



Electrically Operated Car House Doors.

The modern steel rolling door renders this opening possible with the least obstruction, the greatest certainty of rapid operation and a minimum cost for repairs. These doors were made by the James G. Wilson Manufacturing Company, 3 West Twenty-ninth street, New York. One of the recent improvements patented by this company is the reciprocating shaft. This is a device attached to the gear which throws the shaft outward and away from the door frame as the door is rolled up. Being mechanically positive in its movements it presents the longitudinal surface of the increasing diameter of the rolled door always vertical to the grooves in the door frame. This certainty of action prevents friction between the door and the top of the grooves as the door emerges from or is lowered into them. While a single door may be operated by a galvanized endless chain attached to the gear and raised or lowered in twenty seconds by hand, where doors are in a series one or all of them may be opened at once by a small electric motor as is shown in the illustration. This is a worm and link-belt gearing. The usual considerations with regard to fireproof construction are maintained in this door equipment. In another illustration the spring release automatic fire-closing shutter for street car houses is shown. At a given degree of heat the fusible link shown above the trolley connection melts and releases the springs holding the door. When released the door falls about two-thirds the height of the opening and then sinks more slowly to the floor. The particular advantage of this lies in the fact that no damage is done to the castings and helical springs within the shaft by the violent descent of the heavy door and it is not necessary to get into the shaft and reset the spring after the device has been in action. The door is ready for immediate use.

The illustration also shows the method of passing the trolley current through the wall and arrangement of the trolley wire at the door frame.

WESTINGHOUSE SME BRAKE EQUIPMENT.

The Westinghouse Traction Brake Company's SME equipment is designed to meet the requirements of a service where the speeds are moderate, the stops frequent, and when the conditions require single car operation normally and trailer service or two-car trains intermittently. For such operations certain features of the straight air form of brake control possess distinct advantages, chief among which are: (1) Simplicity of construction; (2) Ease of manipulation; (3) Freedom from defects.

For single car operation only, it is often stated that the simplest form of straight air brake is the most satisfactory. But conditions may often arise in single car operation, especially where two or more cars are run together as a train, when it becomes necessary to provide some protection in the brake apparatus itself, whereby it shall operate in case of a burst hose or ruptured pipe and apply the brakes and cause them to remain applied instead of permitting the entire loss of braking power on the vehicle, as would be the result in such a case with a straight air brake only.

This protection is secured in the SME equipment, without dispensing with any of the advantageous features of straight air operation, by the use of the emergency valve in connection with a brake pipe or emergency line in which pressure is normally maintained.

This valve is inoperative during ordinary service operation, which effect is secured by means of the brake valve in the usual way, and differs in no essential features from the service operation of any other ordinary straight air system.

But in the case of the bursting of the air hose or piping or an emergency application made by the motorman, the sudden reduction of pressure in the brake pipe or emergency line thus brought about, causes the emergency valve to operate in a manner similar to a triple valve. The exhaust from the brake cylinder to the atmosphere is automatically closed, and the communication from the air storage reservoir to the brake cylinder opened, thus applying the brakes with full power and holding them applied.

As intimated above, the brake valve is a very simple, straight-air brake valve, of the rotary type, and mounted on



Edmondson Avenue Car House, Baltimore.

a pipe bracket to facilitate removals without breaking any pipe joints. One of the chief advantages of this equipment as exhibited lies in the fact that it can be applied to any car already equipped with straight air brakes by simply adding the emergency valve.

For the particular service as outlined, and where two-car trains, either with two motor cars or with a motor and trailer car, are not exceeded, the SME equipment is well fitted, in that it combines all the advantages of straight-air operation for this class of service with the essential protective feature of the automatic brake.

Electric Railway Review

DAILY EDITION

PUBLISHED BY THE WILSON COMPANY

IN HONOR OF THE ANNUAL CONVENTIONS OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AND OF ITS ALLIED ASSOCIATIONS OF ACCOUNTANTS, ENGINEERS, CLAIM AGENTS AND MANUFACTURERS, AT ATLANTIC CITY, N. J.

Subscription in advance, including regular weekly issues and daily editions published from time to time in places other than Chicago, postage free; one year, \$2.00; foreign, \$5.00; Canada, \$3.50; single numbers, 10 cents.

PUBLICATION OFFICES: 147-151 North 10th Street, PHILADELPHIA

BUSINESS OFFICES: 160 Harrison Street, CHICAGO; 150 Nassau Street, NEW YORK; 129 Williamson Building, CLEVELAND.

Application made at the Philadelphia (Pa.) Postoffice for entry as second-class mail matter.

EDITORIAL OFFICES: The Steel Pier, ATLANTIC CITY, N. J.

VOL. XVIII

PHILADELPHIA, PA., OCTOBER 18, 1907

No. 15e

The committee on the promotion of traffic, with W. E. Harrington as chairman, has again presented a valuable report.

How to Make the Park Profitable.

To electric railway companies just starting service on new roads there usually arises a doubt as to whether or not an amusement resort would be a profitable venture. In its report the committee includes suggestions of value to any management considering the feasibility of a park investment. While success in such a venture is largely dependent on the shrewdness of the park management, there are controlling features cited by the committee which, if adopted, would materially assist in winning success. An important one of these is that every effort should be made to interest the children and thereby gain an attendance during the middle of the day when the crowds are usually small. The maintaining of good order assists this task materially, but probably the most resourceful way of attracting the park crowds is by plentiful and judicious advertising. It is a trait of human nature to "follow the crowd," so when once a good park patronage is gained, on the shrewdness of the management only will depend its future success.

==

An interesting experience was related in the Tuesday afternoon session of the Engineering Association while the subject of controllers was being discussed.

Adjusting Controller Resistances.

J. W. Corning, of the Boston Elevated, cited some personal observations in connection with a necessary adjustment of controller rheostat steps that had been required on

account of uneven acceleration. One of the officials noted that on a certain few of the cars the acceleration was very uneven, and therefore current curves were made with a recording ammeter, which curves very plainly showed some instances of a pretty bad setting of resistance connections. With the GE-58 motors, two to a car, and K-10 controllers, it was found that the last step in parallel drew a peak current of about 325 amperes when accelerating on a five per cent grade. It is needless to say that there was much trouble. It displayed itself as flashing of motors, blowing fuses and short circuits in the controller box and it also was found that the average current when running in multiple with the controller as first wired was much larger than the average current per motor when in series. After the current curves as drawn by curve drawing ammeter had been studied, the resistances were readjusted and the peak of the current curve brought down to about 185 amperes, where heretofore, as stated, it approximated 325 amperes. It is interesting to note that one of the causes contributing to the poor service offered by the equipment as originally wired was that the motormen were afraid to turn the controller to the last notch. These platform men had found that when the controller was thrown full-on the fuses often blew. For this reason most of the men ran their cars with the controller on the next to the last notch, and therefore, in a short time there occurred many cases of burned-out rheostats. Mr. Corning, in explaining the reason for this improper condition of rheostat connections, said it seemed that different car house foremen had made connections that suited

their own judgments and that no standard plan of connections had, in the early days, been followed. This experience seems to offer an example through which other roads may profit. Undoubtedly the most important conclusion that can be drawn from Mr. Corning's experience with misplaced rheostat connections is that on an electric railroad, and especially a large one, instructions for all details should emanate from one center and be of a standard nature for all similar duties.

==

The election of H. R. Goshorn of Philadelphia as president of the Claim Agents' association is a timely indication of the regard which Mr. Goshorn's associates have for his character and work. Because of the unwholesome combination of illegal influences against which the Philadelphia Rapid Transit Company has been contending

The Claim Agents' New President.

through its claim department, the action of the association in showing its loyalty to the representative of the Philadelphia road is especially appropriate. In thanking the delegates and in outlining briefly his ideas for administration of the office, Mr. Goshorn spoke sensibly and earnestly. He asked the assistance of his hearers in making the year notable in the work of the claim agents and said that he would make only the promise to do his best to promote the good of the organization and to secure results. But whether this promise means the accomplishment of much or little, necessarily depends, as Mr. Goshorn said, upon the extent of the co-operation of those who are in the association. Carrying further his idea of co-operation in order that the efficiency of the claim agents may be improved, Mr. Goshorn added that if those who had ideas for the advancement of the cause would let him know about them, he would see that every member secured the benefit of them; if an idea had helped one it would doubtless help nearly every other man in the business.

==

The paper presented on Wednesday before the American Association by Messrs. Campion and McClellan on "The Influence of the Design of Railway Structures on Economy of Operation," may profitably be read in conjunction with the report presented earlier in the week to the Engineering association on "Open versus Closed

Terminals for Car Houses." This is not to say that they cover the same ground, but quite the contrary, since one may reasonably be considered the complement of the other. Terminal facilities of all classes exert an important influence on the cost of handling and maintenance of equipment and any improvements that can be made in this direction should effect satisfactory returns. It is only recently that much attention has been given to the lay-out of shops, but on the same theory that controls the movement of cars, that the time between terminals is governed not so much by the actual running speed as by the number of stops, so the percentage of cars kept in actual revenue service depends not so much on the time consumed in inspection and repair as upon the convenience of handling them before, after and between the several operations. The decision as to the use of the open or closed terminal for car storage affects, aside from the question of

cost, both the matter of convenience in handling and the cost of repairs. Whether the increased ease of handling at terminals and the less cost of the open terminal is an offset to the unquestionable increase in expense of maintenance is a matter that must be decided upon the basis of the conditions surrounding each particular case, and the committee appears to have acted wisely in giving the arguments for and against and leaving its conclusions open. With reference to the paper, however, there can be but one general conclusion. The various facilities provided as adjuncts to the operation of equipment and for its maintenance must be arranged in accordance with some well-defined plan in order to secure anything like efficiency and economy. It is possible for the small plant to be made to show nearly as great proportionate efficiency as the larger if proper attention is given to the matter of location and arrangement.

====

TECHNICAL GRADUATES AND RAILWAY SERVICE

Professor Norris, in his paper presented yesterday before the American association, was extremely felicitous in his characterization of the three classes of employers encountered by the young technical graduate in his first start in actual business. Briefly, the three classes are: Those who place too high an estimate upon what the schools should do in the way of practical training; those whose estimate is too low; and those—probably few in number—whose estimate is correct.

The first supposes a full-fledged engineer and the young graduate sometimes thinks that he is. The second doesn't care for book knowledge, anyway, and throttles the ambition of the candidate for future promotion by giving him no opportunity to show what there is in him. The third class need not be considered at great length; usually those graduates who are so fortunate as to fall under the supervision of correct estimators of their capacity have "arrived" or are in a fair way to do so. They do not stand in need of the same consideration as their more unfortunate fellows—of perhaps equal ability and attainments—who have been as seed sown on stony ground or upon a soil choked with weeds. But because of the more rapid growth of those whose capacities have been correctly estimated, it is pleasant to note that both the first and second classes are rapidly growing fewer in numbers, and we believe that Prof. Norris' recommendations afford at least a tentative basis upon which the work of utilizing the product of our technical schools may be carried to its legitimate ends. The manufacturing industries have thus far absorbed the greatest and best portion of this product; but there is a wide field for the technically trained young man in the electric railway field.

There is one point upon which it seems possible to take issue with Prof. Norris' position. Expressing some surprise at the comparatively small number of technical graduates who find their way into the electric railway business, the author of the paper cites the fact that of the more than two thousand graduates of Sibley College, probably not more than fifty are engaged directly or indirectly in this line, while of this number quite a proportion are in the supply business. The same or similar statistics have been given so frequently with reference to students who have received a training which would presumably fit them for steam railway service that for several years past the situation has ceased to arouse surprise and has scarcely evoked comment. The explanation is simple, and it is hardly, as suggested in the paper, that other lines have been so much easier to enter that they have attracted the bulk of the graduates. It is not because the outer door to the railway industry is harder to enter that deters the technical graduate from knocking at it, but the uncertainty as to how long he will be compelled to stand and cool his heels in the vestibule.

There is another point. Whether it is in recognition of the fact that the managing officials of a railway, whether the

motive power is steam or electricity, are so accustomed to dealing with subordinates to whom the advantages of a technical training have been denied, and that for that reason their attitude toward the graduate is such as to place them in the first of Prof. Norris' three classes; or whether it is to multiply the chances which the graduate may have to make something out of an employer of the second class; it is true that technical schools of the present day are required to give a smattering of so many subjects that, as one of the best known educators in this line said of his students only a few days ago, "We have no time to make them learn how to think." In other words, education has given place to instruction, using the two words in their strict meaning, and the student is forced to accomplish more of his education after he has left school than should be required of him at once. Unquestionably the industrial field affords more opportunities for doing this under conditions satisfactory to the graduate of average ambition. The inner door of the vestibule opens with less waiting. In most industries a man's capacities in some line will be recognized even though he may have been steered in the wrong direction at the start. In railway lines if he is a failure in the field which he first enters he may as well quit the business. Most of the bright young men do. Hence a different explanation of the situation from that given in the paper in question.

It is in recognition of the situation just suggested and also of the fact that the educational process must be continued if not accelerated from the moment of taking up a professional career such as that undoubtedly afforded an electrical engineer in railway service, that some such course as that suggested by Prof. Norris is heartily approved. As outlined in the paper, a period of one and one-half years should determine definitely, under an observant supervision, what particular branch of the service the candidate is best fitted to follow. If it does not appear during that time, it is most likely that the subject has mistaken his vocation and the decision may be reached without prejudice to his instructor in the engineering school. If capacity in a certain direction is developed, it is certain that the period spent in the technical school, whether under educational or instructional treatment, will not have been wasted. The benefits will accrue, in more or less even degrees, alike to the graduate and to his employer.

One difficulty always arises in the practical application of the apprenticeship theory. It is two-sided. On the one hand, the employer expects a present equivalent for the amount of wages paid, whether to an apprentice or to a journeyman; the apprentice expects to receive a living wage during the period of instruction, whether he earns it or not. Confidence on either hand is an essential to the working of any apprenticeship scheme. Each party discounts the future. If this fact were fully recognized and the same care were taken in the placing of investments, either in employer or prospective employe, as would be done in any other investment involving only a fraction of the value here represented, much of the nebosity surrounding the uses of the technical graduate would be cleared away.

Charles H. Robertson, superintendent of the East Shore & Suburban Railway Company, Richmond, Cal., has been looking over the exhibits since Tuesday. Mr. Robertson is a native son of California and this is his first trip to the Eastern States. Before returning home he will spend a few days in New York City.

Hon. J. J. Foy, K. C., attorney general of the Ontario legislature, spent Wednesday looking over the exhibits. He is stopping at the Marlborough-Blenheim with a party of which J. Bruce McDonald, of Toronto, is sponsor. Mr. Foy was much impressed by the magnitude of the space occupied by the exhibits.

EXECUTIVE COMMITTEE MEETING AMERICAN ASSOCIATION.

A meeting of the executive committee of the American Street & Interurban Railway Association was held at the Marlborough-Blenheim hotel on Tuesday afternoon, October 15. There were present John I. Beggs, president; C. G. Goodrich, first vice-president; Arthur W. Brady, third vice-president; C. L. S. Tingley, president of and representing the Accountants' association; H. H. Adams, president of and representing the Engineering association; Henry C. Bradley, acting president of and representing the Claim Agents' association, and B. V. Swenson, secretary. Past President Caryl Ely was also present.

After discussion of business affairs, in which the report of the secretary-treasurer for the fiscal year ending October 1, 1907, was considered, President Beggs pointed out the necessity for a larger office staff, and as a means to secure the revenue with which to provide such a staff he suggested that the office of secretary of each of the affiliated associations should be made an honorary office; that all the clerical work in connection with the affiliated associations should be performed in the office of the American association. He also advocated the employment of a competent man to assist the secretary in gathering information relative to the work of the association and to aid in the carrying on of any investigation which might be desirable in the interests of the member companies. President Beggs laid particular emphasis on the fact that the members should be encouraged in every possible way to make the office of the association a clearing house in the dissemination of every possible form of information which they might desire relating to the street railway business.

The question of revising the present scale of dues was discussed at some length, and the opinion was expressed that the scale of dues for the small companies was too small; that these companies were really getting the greatest benefit from the work of the association, and that the present financial condition of the country is such that some of the larger companies were inclined to consider \$600 as too large a sum for membership.

As a result of this discussion, a committee of three, consisting of Messrs. Goodrich, Brady and the secretary, was appointed to consider the revision of the scale of dues and report at a meeting of the executive committee to be held before the close of the convention.

The president and other members of the committee spoke at some length upon the desirability of maintaining the interest of the past presidents in the association work. It was felt by all that their influence and experience must necessarily be of great value to the association, and that efforts should be made to secure their active co-operation in the work of the association at all times.

As a result of this discussion, the following resolution was passed:

Resolved, that the executive committee recommend to the association that paragraph A of article VI of the By-laws of the American Street and Interurban Railway Association be amended to read as follows:

"The entire charge and management of the affairs of the association shall be in the hands of an executive committee, which shall consist of the president, the vice-presidents and one member appointed by each of the affiliated associations, and all the past presidents of the American Street and Interurban Railway Association and its predecessor, the American Street Railway Association, these past presidents to be honorary members of the executive committee, but without the power to vote at meetings of the committee. The executive committee shall make arrangements for carrying out the objects of the association."

It was also voted that all past presidents be given a special invitation to be present at all meetings of the executive committee and of the association and that they be provided with a special badge with the words "Past President" thereon.

The question as to what disposition should be made of the test car "Louisiana" was then considered by the committee. Mr. Ely stated that the test car was accepted by the American Street Railway Association upon the distinct understanding that the Electrical Railway Test Commission was to turn over this car to that association complete in all its component parts, and that the car was to be housed and cared for by Purdue University without expense to the association and to its successor, the American Street and Interurban Railway Association.

The secretary reported that up to the present time the car had not been made complete and that both the manufacturing interests which supplied the component parts and the officials of Purdue University desired that some disposition be made of this matter at an early date.

On motion of Mr. Goodrich, seconded by Mr. Bradley, the secretary was directed to inform the secretary of the Electrical Railway Test Commission that inasmuch as the commission has not secured up to the present time the permanent loan of all apparatus and equipment forming the component parts of the test car "Louisiana," the American Street and Interurban Railway Association considered that it is no longer obligated to accept the test car "Louisiana" from the commission according to the agreement made by the executive committee of the American Street Railway Commission at the meeting of the executive committee held in February, 1905.

President Beggs brought up the proposition which had been made by Mr. Bell, representing the Hotel Men's Association of Atlantic City, to make Atlantic City the permanent meeting place of the association and to construct a new pier with all possible facilities and accommodations for the holding of the exhibition of street railway appliances.

No action was taken on this matter and it was decided to bring the proposition before the convention.

On motion, the meeting adjourned.

ANNUAL MEETING OF THE MANUFACTURERS' ASSOCIATION.

The annual meeting of the Manufacturers' association was held in Casino Hall at 11 o'clock yesterday morning with a large membership in attendance. President Beggs of the American association delivered an address in which he expressed on behalf of his own association as well as on behalf of himself personally the feelings of appreciation which are entertained towards the manufacturers, and he thanked them for the coöperation and assistance which their work during the past year had afforded to the general purposes and work of the parent association. Mr. Beggs closed his address with a warm expression of thanks to Mr. Whipple, of the "Entertainment" committee, for the satisfactory and efficient way in which the committee had presented what he termed the most interesting and complete series of entertainments that had ever been presented to the annual gatherings of the street railway associations. This commendation of President Beggs was further emphasized by a rising vote of the meeting just before adjournment, expressing the sentiments of the Manufacturers' association not only with regard to the work of Mr. Whipple, but also with regard to that of C. C. Peirce at this and previous conventions.

President McGraw made a report of the work of the executive committee for the year just closing, which was received with satisfaction. The report of the treasurer, J. R. Ellicott, indicated that there would be added to the surplus of the association after paying all expenses about \$1,500, making a total surplus of about \$5,500.

A nominating committee was appointed by the chair to bring in nominations for members of the executive committee to succeed the five members whose terms had expired. The nominating committee was composed of John W. Nute, chairman, C. K. Knickerbocker, W. M. McFarland, R. L. MacDuffie

and S. M. Kerwin. The committee reported nominations as follows:

W. H. Heulings, Jr., of the J. G. Brill Company.
A. S. Partridge, of St. Louis.
E. M. Williams, of the Sherwin-Williams Company.
H. F. Martin, of the Pennsylvania Steel Company.
Otis Cutler, of the American Brake Shoe & Foundry Company.

These nominees were unanimously elected.

The executive committee for the ensuing year is therefore composed of the foregoing members, together with the following who hold over:

James H. McGraw, McGraw Publishing Company.
Frank C. Randall, Allis-Chalmers Company.
Jos. R. Ellicott, Westinghouse Traction Brake Company.
Henry C. Evans, Lorain Steel Company.
K. D. Hequembourg, Franklin Car Heating Company.
Chas. K. Knickerbocker, Griffin Wheel Company.
Chas. C. Peirce, General Electric Company.
A. H. Sisson, St. Louis Car Company.
Hugh M. Wilson, The Wilson Company.

An amendment to the by-laws with regard to badges was offered by A. L. Whipple, and on motion the amendment was referred to the executive committee for consideration with instructions to take a letter ballot on the proposed amendment.

A vote of thanks to the local and long distance telephone companies for the free service which has been extended to those in attendance at the conventions was unanimously passed.

On motion of Mr. Peirce, the executive committee was instructed to appoint a sub-committee of three to confer with the proper officers of the Railway Supply Manufacturers' Association, (an association allied with the Master Mechanics' and Master Car Builders' organizations), with a view to co-operative measures so as to develop such identity of interest as there may be between the steam railway and street railway associations in convention affairs. The sub-committee appointed under this instruction is composed of J. H. McGraw, C. C. Peirce and J. R. Ellicott.

PROCEEDINGS OF THE ACCOUNTANTS' ASSOCIATION—THURSDAY SESSIONS.

The entire morning session was taken up with the consideration of the tentative report of the committee on "Standard Classification of Accounts and Form of Report." The consideration of this matter was concluded at the afternoon session and the following resolution was adopted:

Resolved, That the tentative classification of operating expense accounts submitted by the committee on "Standard Classification of Accounts," in its formal report, be approved as amended and referred back to said committee for final revision with power to act.

In the absence of J. H. Neal, auditor of disbursements, Boston Elevated Railway, his paper "Where Maintenance Ends and Depreciation Begins" was read by W. F. Ham of Washington, D. C.

In the discussion of this paper Mr. Ham agreed with the writer of the paper, that it was by picking out individual instances that a proper idea of depreciation could be reached. He further thought that the trouble in the past had been that the question had not been looked at from that standpoint.

F. R. Henry thought that the point instanced by Mr. Ham could be further illustrated by looking at the question of replacing storage batteries, which was a specific item with a specific cost and on which a very close estimate as to its life could be made. He saw no reason why the rate of depreciation could not be determined for other items.

W. B. Brockway said that he wished that Mr. Neal had stated which of the seven plans mentioned in his paper he favored. It seemed to the speaker that the greatest safety lay in method No. 2, erroneously headed No. 3 in the paper. He said there were methods other than the seven enumerated for arriving at the total amount to lay aside each month or each year, and asked that Mr. McDole would explain the method employed in Cleveland, based on the car-mile plan.

W. G. McDole said they had gone back for ten or twelve years and compiled the cost of maintenance, and on this basis,

on track and equipment, for instance, charged out so much per car-mile, and on the power houses so much per kilowatt-hour output.

President Tingley said he thought that was the right principle, and that he had been making some studies himself along those lines.

W. H. Forse, Jr., Indiana Union Traction Company, emphasized the differences in properties with relation to depreciation. One property would be upon an established operating basis, such as most city lines, and another would be building in a new country.

The president appointed the following committee, pursuant to action taken at the first session, to confer with the National Electric Light Association on a common form of reports for both railway and lighting companies, and also to confer with the Public Utilities Commission of New York for the second district next week; this committee to be constituted from the "Standard Classification" committee:—W. F. Ham, C. N. Duffy and F. R. Henry.

The following officers were then elected:—

President, F. R. Henry, auditor United Railways Company, St. Louis, Mo.

First vice-president, R. N. Wallis, treasurer Fitchburg & Leominster Street Railway, Fitchburg, Mass.

Second vice-president, W. H. Forse, Jr., secretary Indiana Union Traction Company, Anderson, Ind.

Third vice-president, S. C. Rogers, treasurer and auditor Mahoning & Shenango Railway & Light Company, New Castle, Pa.

Secretary and treasurer, E. M. White, treasurer Birmingham Railway Light & Power Company, Birmingham, Ala.

Executive Committee:—The officers and C. L. S. Tingley, second vice-president American Railways Company, Philadelphia, Pa.; A. L. Linn, Jr., general auditor Rochester Railway Company, Rochester, N. Y.; A. R. Patterson, general auditor Savannah Electric Railway Company, Savannah, Ga.; H. E. Wells, secretary and treasurer, Tri-City Railway Company, Davenport, Ia.

The convention then adjourned.

PROCEEDINGS OF THE AMERICAN ASSOCIATION—THURSDAY MORNING.

President Beggs called the meeting to order at 10.10 o'clock and announced the appointment of the "Nominating" committee to comprise as many of the past presidents as were present at the convention with W. Caryl Ely as chairman, and C. S. Sergeant, of Boston; A. E. Lang, Toledo, and any other past presidents as members. The chair said his idea in appointing past presidents as the members of this committee was that they had no aspirations for office and could not be charged with promoting their own interests; also they knew the requirements of the association and the responsibilities which devolve upon the officers.

The report of the committee on "Rules for the Government of Motormen and Conductors," of which E. G. Connette, of Worcester, is chairman, was presented as follows:

Your committee reports that data sheet No. 18 was sent out to the various members of the association, as well as to companies which are not members, asking for the following information: (1) Company. (2) City. (3) State. (4) Urban or interurban system. (5) Have you read the report of the Standard Rules committee which was submitted to the convention at Columbus, Ohio, October, 1906? (6) If so, have you adopted these rules as standard on your lines? (7) If you have not adopted these rules as standard, would you kindly give the committee your reason for not doing so? (8) If you have not read the report of the committee, will you please send for a copy of the report to the secretary of the association? (9) Have you any suggestions for the consideration of the committee relative to the report submitted at Columbus? (10) Remarks.

A large number of these data sheets were filled out and returned, and your committee is pleased to report that a large number of the members of this association have adopted the standard rules, with such additions as local conditions required. A few companies have used the standard rules as a basis, but have not followed the recommendations of the committee in regard to preserving the integrity of the numbers, etc., as recommended in the report submitted at the Columbus convention. Three of the larger companies report that they have not adopted the standard rules; one of which does not give any reason. Another gives as a reason that it has its own book of rules. Another says that it has a supply of rule books on hand and considers that its rules are suit-

able for local conditions, but that it favored standard rules as far as practical. Another company reports that it has not adopted the rules, because they do not provide for a joint use of tracks by steam and electric trains. This, of course, is an unusual condition, which the committee has not yet considered.

Very few suggestions have been submitted for consideration. The committee, therefore, can only report progress as to further recommendations and that the matters now under consideration be taken up by the committee for the ensuing year.

Mr. Connette then continued:—There is one concern, which controls a large number of properties, which has its own book of rules, and that book of rules has been adopted on all its properties. Then there is another holding company which controls perhaps six or eight different properties. They are members of this association, but they have adopted their own book of rules, and do not seem inclined to change. The Central Electric Railway Association has taken our standard rules practically as a basis for its rules and has used them as far as it saw fit, but it has a book of its own, claiming that there are a great many conditions existing with its companies which our rules do not cover. The New York State Railway Association has practically adopted our standard rules, and they are in effect in nearly all cities in the state of New York. Now, it seems to me that the work of this committee perhaps for the ensuing year will be to make an effort to have a conference with representatives of these two concerns I spoke of, and also with the representatives from the Central Electric Railway Association, and see if there is not some ground upon which we can reach a conclusion that will result in one book of rules for the use of all these different companies.

President Beggs:—I would like to supplement what the chairman of the committee has said. While he did not refer to the companies represented by the president of your association, he may have had them in mind. I am president of two large systems and likewise the president of a number of independent smaller companies in various sections of the country, and while urgently desiring a set of standard rules, we have not adopted these rules, nor have we had any new rules printed for the last two or three years, anticipating just such a result as Mr. Connette has now stated. It is a very serious matter if a company has a printed code of rules that has been put in effect, in a short time has to change them, perhaps radically. I have felt that the rules were not in such condition that we could adopt them in their entirety, and I have been waiting until we might possibly have these rules more thoroughly digested. When that conference suggested by Mr. Connette is held, I will be glad to have the companies I am responsible for represented, and to have the opportunity either in person or by some one knowing my views, to participate in such a conference.

The paper on "Light Freight Handling by Electric Lines," by P. P. Crafts, general manager, Iowa & Illinois Railway Company, Clinton, Ia., and general manager, Joplin & Pittsburg Railway Company Pittsburg, Kan., was then presented.

Mr. Crafts added that the reduction of 20 per cent in the tariff required by the railroad commission of Iowa on interstate business has resulted in a very appreciable increase in the amount of freight carried which had to a great extent overcome the reduction in rates. He said that of his receipts from freight, 71 per cent was from local traffic and 29 per cent from joint traffic.

Replying to a query by Mr. Hippel, Mr. Crafts said the reduction of 20 per cent applied only on two locals. It did not apply to a continuous shipment.

Mr. Crafts also described the forms used in conducting the freight business. The expense bills were of a form differing considerably from the general run of forms found on steam railways. The one used was that of the Chicago & Northwestern Railway, which although it looked complicated, was easy to handle. The company had adopted, at the suggestion of the Chicago & Northwestern, a delivery ticket which was a very

valuable feature. Not a single thing was allowed to go out of the freight house without the driver or other person taking it signing the delivery ticket, whether or not the expense bill was there. This certainly prevented a large number of claims.

The paper on "Freight Service on Electric Railroads," by H. H. Polk, president Inter-Urban Railway Company, Des Moines, Ia., was then presented.

President Beggs: The papers by Mr. Crafts and Mr. Polk are now before the association for discussion. I have an engagement to appear before the Manufacturers' association at its annual session, and I will therefore ask the third vice-president, A. W. Brady, to take the chair until I return.

Vice-president Brady in the chair.

C. Loomis Allen (Utica & Mohawk Valley): I have listened with a good deal of interest to the papers which have been read. My experience in the handling of express or freight has been confined to what is known as package or light freight. We do not apply the term freight in our business; we call it electric express.

At a meeting of the Street Railway Association of the state of New York, held last month at Kingston, a committee was appointed to collect from the roads in the state complete data as to the classes of goods which are transported, and the cost of conducting the transportation; and we hope to have before another year passes some results that will be tabulated that I am sure will be valuable information to those of us located in this territory. I know of but two roads in Central New York that are handling the freight business in carload lots, and one of these properties I am familiar with and I know that for every dollar which comes in as receipts on this class of business it is spending one dollar and a half to get the business.

C. D. Emmons (Ft. Wayne & Wabash Valley):—We must all realize in starting out in a business of this kind that it is a business which must be developed. We have been in the business for the past two years, and have had to increase our facilities largely. We started in with earnings of from \$5 to \$10 a day for running a car a short time, until at present the receipts from our freight cars in service are averaging between \$75 and \$100 a day for ten hours' service. Our last year's expense account, in which we have had itemized the investment, proportion of track labor, and everything, according to the mileage made by the cars, shows as about 60 per cent of the gross receipts from the business.

We have recently been forced on account of business presented to us to attach a trailer car, and we feel by the development of the trailer business we will reduce the percentage of operating expenses. In our territory we feel that the freight business is a large factor in the development of our properties, especially among the farmers along the line who are beginning to ask for sidings. We feel a large development will be made in that line.

E. F. Peck (Schenectady Railway):—The Schenectady Railway Company is operating a freight and express business through a separate corporation, and we have thought that we are making money. All items of expense in connection with our freight business are charged independently, and not mixed at all with our passenger expense. We certainly intend to continue in that line of business as we have been very successful.

J. H. Pardee (J. G. White & Co.):—From the experience that I have had in the operation of express and freight service, I have come to the conclusion that it is a matter dependent considerably on the locality. I believe that if the electric railway operating the freight service is in competition with good service on a steam road, the electric railway is at a great disadvantage in competing for heavy and bulky and carload freight. There are exceptional conditions under which that kind of freight can be hauled at a very handsome profit, but I think those are individual cases and cannot be covered by any general rule. The steam railroad hauls freight in comparatively inexpensive cars in which they have not a large investment, and the electric railroad attempts to compete with the steam railroad and hauls the freight in a car costing at least seven or eight times as much; so that if we look at the interest on the investment and the depreciation of these cars in which this heavy freight is hauled, I think you will have to correct some of the operating reports, and that is lost sight of in the ordinary operating report—the interest and depreciation from the heavy investment in the cars used for transporting the freight.

I do believe there is a profit in the express business, and that that profit depends very largely upon the classification and that the classifications of the steam roads and of the old line express companies should not be followed, but that each road or each class of road operating under similar conditions must work out its own salvation in its classification, and if that is

properly worked out, then there is money in the business.

The reason that a great majority of the shippers ship by electric express instead of steam express is that the electric railway company delivers the goods quicker and better and that the service is more satisfactory. A large percentage of the shippers are willing to pay more money, and an electric railway with an express business and quick delivery can get the business at a higher price. I have changed from the views which I held a year ago. I thought at that time it was necessary to cut below the steam railroad rate. I do not now think it is necessary to do so, and the business can now be had at a rate on which there will be a profit, but a very large part of the freight business on electric railways, except in special cases, at the present time are not showing any real profit.

C. Loomis Allen:—The papers under discussion, as I understand it, refer to the carrying of freight. I do not think there is any doubt in the mind of any one who has had experience with the electric express—and by that I mean to pick up and deliver express packages, including transportation—but that it can be made successful. But when it comes to handling freight the steam lines use cars costing \$1,000 each, hauled in trains of fifty or more cars. Considering the transportation of the same freight at the same rate per ton mile, in a car costing \$10,000, including two or three men to a car, it certainly must be apparent that we cannot produce the same net results.

I am a great believer in electric express. We have for five years tried to see what results can be produced in operating what is known as electric express, but the results produced from hauling freight, on most of the roads which have undertaken this service have not been what these roads were led to expect.

George W. Parker (Detroit United Railway) said the Detroit United Railway system has been in the electric express business since 1891. At first the company adopted tariffs along steam railroad lines, but after experience had made changes in those tariffs. It had given attention more particularly to the high class traffic.

Mr. Polk:—My paper was on carload freight, and that freight is handled in box cars, without any motor equipment whatever, which are drawn by an electric locomotive. Now, I claim, when you can make \$15 to \$25 and \$35 a car and haul eight or ten cars in the train, you are making money. Our freight department is kept entirely separate from the passenger department, and our line is made entirely on private right of way. We are not bothered in any way by any franchise restrictions, and we are permitted to handle freight with any kind of equipment. Regarding rates, we started out to use 85 per cent of the Iowa distance tariff, and we have got recently the same rate that is charged by the steam railroad and are getting more business than we had before.

Mr. Hippee (Inter-Urban Railway, Des Moines, Ia.):—I think the statement that this matter is one depending on local conditions is to some extent true; but it is true to a greater extent with almost every man that is to-day interested in interurban roads as a passenger man. I am judging from my own experience. When you first suggested freight, I thought there was nothing to it, but as the freight business develops it shows that there is more to it. For heavy freight traffic, as Mr. Polk has said, there is no investment in rolling stock to haul that freight. The cars are furnished us by the steam railroads. The cars are loaded and delivered to the steam railroads. We can go into competition with steam railroad lines with which we have no through rates and give our business to the lines with which we have rates. Our express business is handled on the Iowa distance tariff. If the steam railroads can develop their freight business, why cannot we? I would rather have the freight business, two to one, than the passenger business, if for no other reason than the question of hazard.

W. S. Dimmock (Puget Sound Electric Railway):—We have in service between 300 and 400 freight cars. We are operating some 12 to 14 freight trains per day on one line. Some of those trains haul as high as 700 to 800 tons per train, at a speed of 15 to 18 miles per hour. Other lines are operated with cars that are equipped with motors and are run singly. The amount of business has increased so fast that we wish we had about 200 more cars to take care of it. It has grown so heavy that the state railroad commissioners have now considered that we were on a par with steam railroads as to the business carried and the importance of it, as has also the interstate commerce commission.

We are carrying between Seattle and Tacoma some 2,000 to 3,000 gallons of milk, which is picked up through the valley and taken into Seattle each morning on a special train. We have two or three trains per day, each of 10 or 12 cars of coal—60,000 pounds capacity cars—pulled with a locomotive consisting of an ordinary box equipped with four 125-horse-power motors. We also have a refrigerator line. The cars

operated on those trains are built on purpose for the hauling of beef, which is hung into the cars as halves. Between Seattle and Tacoma we also operate two local freight trains out of each city per day.

The expense of this freight will, I think, without definite figures, run about 45 to 48 per cent, probably 50 to 52 per cent, including the depreciation of the cars. I have heard some remark in regard to the cars costing so much money. We find we can get very desirable flat cars for anywhere from \$450 to \$550 delivered on the coast.

We have some twelve miles of sidings on our suburban lines, where we are hauling lumber in trains of five and six cars, in many places over 5 and 6 per cent grades. The siding is generally built at the expense of the man owning the ground or the timber. We load heavy standard steam cars with lumber, shipping it into the middle west over such lines as the Northern Pacific and the Great Northern, they furnishing the cars.

Mr. Crafts: I would like to ask Mr. Dimmock two questions. Have you steam railroad competition?

Mr. Dimmock: Yes, we have two lines paralleling our line between Seattle and Tacoma, and a strong competition on the boats.

Mr. Crafts: Does the operation of your freight trains interfere in any manner with your passenger traffic?

Mr. Dimmock: No; we do not permit that to happen in any way, shape or form.

Mr. Crafts: You have a modern dispatching system?

Mr. Dimmock. We dispatch our trains under the standard rules of the steam roads with telegraph operators and station agents.

Mr. Crafts: I would like to submit a few more details in connection with the light freight handled as to operating expenses, rates, etc. We are doing what in comparison with Mr. Dimmock and Mr. Polk is a very small business. It is not strictly package freight. We started in to call it express. We changed our minds, and have since termed it freight. As to the rate, we take the standard classification distance tariff as permitted by the Iowa railway commission. Compiling some figures from certain representative periods during the last year, we have averaged in almost all weeks approximately 550 individual shipments, of which sixty per cent, or 333, were local shipments. The commission allows us to charge 25 cents as a minimum. Of the local shipments 50 per cent of them are minimum shipments, for which we get 25 cents each. It might be a package of 10 ounces, or it might be a package based on the rate of 300 or 400 pounds. We put that freight in a \$10,000, 38-ton car and fill it day in and day out. I think that shows a profitable return on that class of a car. As to our expenses, here is what we charge to freight operating expenses: A solicitor of whose time a small portion is devoted to developing passenger traffic; an extra clerk at each end of the line; rent, light and telephones that are required outside of the passenger business; all books, stationery, etc. We also charge off three per cent of the gross for damages and claims, etc. We charge to the car the same power cost per car mile that we charge to the passenger coaches, and the same proportion of expense of maintenance from the roadway and cars.

A storekeeper in a small town, if he is wide awake, abandons the sale of fancy articles and keeps nothing but staples. The farmer drives in and puts the horse in a livery stable or a shed. He and his family get on a car and go to Davenport and buy their fancy articles, and come back to the small town. We get the passenger fare. The storekeeper is enabled to carry a very much smaller stock of goods because he is certain that he can get a supply at almost any time within two or three hours of the time he notifies our agent to send in an order; his carrying cost is reduced, and our receipts increased. Although the steam railways which we parallel, of which two companies operate over one track, and there is also a line on the opposite side of the Mississippi, making three roads in all, they do very little package freight business between the termini. We had boat competition for two years which absolutely was the meanest I ever saw. They cut the rate to almost nothing. We maintained our rate and the boat is now out of business.

On motion the Accountants' association was requested to take up the matter of accounting in freight matters in connection with its general question of accounting on interstate matters.

The paper on "A Department of Publicity," by J. Harvey White, publicity manager, Boston Elevated Railway, was then presented.

President Beggs: I would announce that it is desired to have the executive heads of the member companies—those charged with the laying down of policy and the executive management—meet in the west solarium of the Marlborough-

Blenheim Hotel, at 3 o'clock this afternoon, where we can have a more private and a quieter place to meet than here. This meeting is an executive session at which no one will be permitted to be in attendance except executive officers of the various companies.

The paper on "Advertising from the Street Railway Standpoint," by A. W. Warnock, general passenger agent, Twin City Rapid Transit Company, was then presented.

There being no discussion offered on these papers the next paper on "Problems of a Small Road," by H. S. Cooper, manager, Galveston Electric Company, Galveston, Tex., was presented.

President Beggs:—The admirable paper by Mr. Cooper is before the association. If there is no discussion the paper will be received and printed in the annual proceedings of the association. I think it is an admirable paper, containing a great deal of meat for thought.

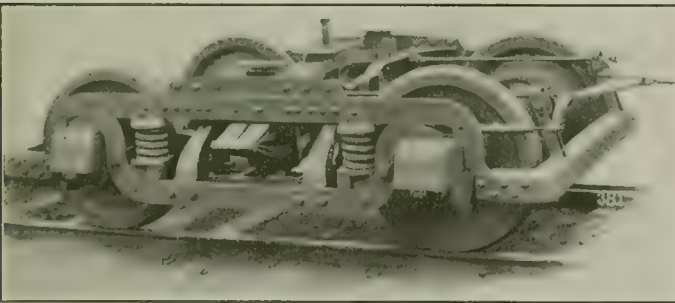
President Beggs then read an invitation from the Jamestown Exposition to the members of the association to visit the exposition.

On motion the paper on "The Use of the T-rail in Cities," by C. Gordon Reel, vice-president, Kingston Consolidated Railway Company, Kingston, N. Y., was made the first order of business for Friday morning.

The meeting then adjourned until Friday morning at 9.30 o'clock.

STANDARD MOTOR TRUCKS.

The heavy interurban truck shown in the accompanying illustration is of the type of which 24 are being supplied to the Pittsburgh Harmony Butler & Newcastle Railway Company. This truck is designed for a speed of 70 miles per hour. The wheels are 36 inches in diameter, of rolled steel mounted on 5-inch axles, having journals 5 by 9 inches. The weight of the truck is 10,000 pounds, and it has a carrying capacity of 30,000 pounds to each king-pin. Among the notable features



High-Speed Heavy Interurban Truck.

of this truck might be mentioned the fact that there are no welds in the truck frame, the side frames being forged from a bar of open hearth steel under a heavy hydraulic press. Another feature is the rigid connection of the journal boxes through the equalizer bars. The brakeshoes hung on the rigid equalizer are maintained at a fixed height regardless of the load on the truck. This minimizes the brake cylinder piston travel and makes possible a less frequent adjustment of the brakeshoes. A detail that assists in making the action of the truck very satisfactory is a friction device which retards the side swing of the car and brings the bolster back to the center without shock. Each truck will be equipped with two GE-100 motors.

The Climax Stock Guard Company of Chicago is exhibiting a new expanded metal cattle-guard. Some of the claims in addition to that of being a very cheap metal guard, are that it combines the principles of both surface and pit guards. For these reasons it is very effective in turning small stock. The guard complete can be shipped for about one dollar to any point in the U. S.

THE EVANS-ALMIRALL HOT WATER HEATING SYSTEM.

For fifteen years Evans-Almirall & Company, of New York, have devoted a great deal of their time to the perfection of their system of hot water heating by forced circulation, with the result of its adoption by many large manufacturing plants, institutions, buildings and central heating plants.

By this system the water is circulated through a system of flow and return mains, coils and radiators; these latter being similar to those used in an ordinary steam heating system. In order to accelerate the natural circulation due to difference in specific gravity between hot and cold water there is used in the circuit a centrifugal pump, which may be driven either by direct connected engine or motor or by belt from line shaft. This insures a positive rapid and controllable circulation in all parts of the system.

The exhaust heater is the heater through which the exhaust from the engines passes either on its way to the atmosphere or to the condenser. This heater is similar in construction to a surface condenser or closed type of feed water heater. The arrangement of the tubes is such that the exhaust steam has a free passage through them and thence to the atmosphere (or, when running condensing, to the condenser) so that absolutely no back pressure can be placed on the engines. There is no connection between the water and steam spaces. The water is circulated in a space around the tubes where it absorbs the latent heat of evaporation in the exhaust steam, condensing it. The condensed steam is returned to an open feed water heater or tank and used as feed water for the boilers.

In addition to the exhaust heater there is used a live steam or auxiliary heater. This heater is similar in construction to the exhaust heater, and is for use at such times when there is insufficient exhaust steam. Live steam is taken direct from the boiler and passed through the tubes of the heater, where it gives up its heat to the water circulating around the tubes. The condensation from this heater is returned directly to the boiler at a temperature corresponding to the pressure; by gravity when the heater can be placed high enough, and at other times by a return trap or pump.

The above are the essential features of the system; its operation is as follows: Starting from the pump, the circuit of the water is first through the exhaust heater, absorbing the latent heat from the exhaust steam and condensing it. From the exhaust heater the water goes to the auxiliary heater, where, when necessary, additional heat may be supplied by live steam.

The water is then circulated through the flow main to one or more buildings and through the coils or radiators. The returns from these are joined together into one main pipe which connects to the suction of the centrifugal pump, thus completing the circuit. This circuit being a closed one, the static pressure (head of water) on both the suction and delivery sides of the pump is the same and the only work the pump has to do is to overcome the friction of the water in the pipes. The same water is used continuously, being circulated over and over again, and gives up just enough to keep the building at the required temperature.

In central station heating plants certain fundamental facts must be borne in mind: 1. That heating alone is not profitable; that it is only profitable when the wastes can be utilized (i. e. the exhaust steam). 2. That steam systems are not profitable unless in closely built up cities, and even then the losses through condensation and of the condensed steam keep dividends down. 3. That the hot water system must be properly designed and installed. Evans, Almirall & Company have installed an interesting and attractive exhibit on the Steel pier and their representatives, Douglas Sprague and Benjamin Kauffman, will take pleasure in explaining the advantages of this system of heating.

Conventionalities

J. C. Griffith, superintendent of railway, Little Rock Railway & Electric Company, arrived at Atlantic City on Wednesday and will remain during the convention.

George Weston, assistant chief engineer of the board of supervising engineers of the city of Chicago, arrived at the convention Wednesday and was an interested inspector of the display on the Steel pier. Mr. Weston was joined yesterday by B. J. Arnold who arrived in the afternoon.

John K. Walbridge, a prominent citizen of Saratoga Springs, N. Y., arrived in Atlantic City yesterday. Mr. Walbridge is at the convention for the purpose of looking the ground over in contemplation of a proposition which Saratoga expects to make with a view to inviting the street railway associations to meet at that place next year.

The winners of the loving cup offered in the ladies' clock golf contest at the Country Club of Atlantic City Wednesday afternoon were Mrs. Glenn of Atlanta, Ga., whose score was 11, and Mrs. Herbert Warren whose score was 13. There were about 175 at the club and the affair was one of the pleasantest of the entertainment features of the week.

W. H. Heulings, Jr., of the J. G. Brill Company, is receiving the congratulations of his friends upon his early and successful recovery from a protracted illness that resulted in the necessity for a capital surgical operation. Mr. Heulings is looking better than he has looked in years, and it is a source of great satisfaction to his many friends that so good a fellow is enjoying a measure of the good health to which he is entitled.

The Westinghouse Electric & Manufacturing Company got points in Wednesday's Atlantic City Press on their Pennsylvania electric locomotive now on exhibition in Atlantic City. Few people have realized what a wonder this machine is. The following from the Press is worth quoting just to show what a vivid imagination and contact with unusual facts will do for the reporter: "The Westinghouse Electric Company, of Pittsburg, Pa., is exhibiting a brand new fifteen-cylinder high-speed electric locomotive, which is likely to revolutionize the railroad traffic throughout the world. The electric locomotive is constructed for overhead wires and is a glowing monument to the progress of electrical inventions. The locomotive is equipped with four motors, of a maximum horse power of 800 each, totaling the entire maximum horse power to 3600. It is 31 feet high and 14 feet 4 inches wide, with a tractive effort of 36,000 pounds. The locomotive is constructed upon modern ideas throughout, and is a contracted mass of electrical machinery. It carries a voltage of 1100 on the trolley wires and 275 on each motor."

The winner of the voting contest which has been conducted by the New Departure Manufacturing Company during the week was won by Mrs. W. N. Qualey of Brooklyn. The silver loving cup which was the prize will be presented to Mrs. Qualey at the New Departure booth at two o'clock this afternoon.

The ladies afternoon and clock golf contest at the Country Club of Atlantic City was one of the pleasantest affairs of the week. The loving cups offered as prizes in the putting match were won by Mrs. W. K. Glenn of Atlanta, whose score was 11 and by Mrs. Herbert Warren whose score was 13. Mrs. F. C. Donahoe was tied with Mrs. Warren at the end of the first six rounds, but Mrs. Warren won with a score of 12 on the play-off. There were about 175 ladies at the club and a thoroughly enjoyable afternoon was had. Tea was served by Mrs. Richard McCulloch, Mrs. John W. Nute, Mrs. A. L. Whipple, Mrs. C. C. Castle and Mrs. D. B. Dean.

A very enjoyable dinner party was assembled in one of the private dining rooms at the Marlborough last evening. The occasion was a dinner given by the representatives of

eight members of the Manufacturers' Association to the delegates representing a number of southern railways who are in attendance upon the conventions. The hosts on this occasion were the following:—F. L. Markham of The J. G. Brill Company; J. L. Thurston of the Hildreth Varnish Company; Frank Gregg of the Adams & Westlake Company; Frank Archibald of the National Lock Washer Company; W. M. Bisel of the National Brake & Electric Company; J. E. Slimp of the Ohio Brass Company; J. L. Stayman of the Gold Car Heating Company and N. B. Trist of the Schoen Steel Wheel Company. The following is a list of the guests invited to the function:

J. H. Wilson, president, Mobile Light & Railroad Company, Mobile; S. W. Huff, general manager, Virginia Passenger & Power Co., Richmond; H. N. Hurt, general superintendent, Georgia Railway & Electric Co., Atlanta; A. M. Moore, master mechanic Georgia Railway & Electric Co., Atlanta; T. B. Ogle, superintendent, Norfolk & Southern Railway, Norfolk; R. D. Apperton, president, Lynchburg Traction Co., Lynchburg, Va.; A. B. Skelding, general manager, Consolidated Railway Light & Power Co., Wilmington, N. C.; E. D. Latta, Jr., general manager, Charlotte Electric Railway Co., Charlotte, N. C.; W. C. DeVane, master mechanic, Savannah Electric Co., Savannah; Percy Warner, president, Nashville Railway & Light Co., Nashville; W. A. McWhorter, master mechanic, Birmingham Railway & Light Co., Birmingham; Theo. Passailaigue, superintendent, Charleston Consolidated Electric Railway & Light Co., Charleston, S. C.; D. J. Duncan, manager, Chattanooga Electric Railway Co., Chattanooga; John R. McGivern, purchasing agent, New Orleans Railway & Light Co., New Orleans, La.; R. W. King, manager, Lookout Mountain Railway Co., Chattanooga, Tenn.; E. A. Longmire, master mechanic, Norfolk & Portsmouth Traction Co., Norfolk; F. J. Duffy, manager, Beaumont Traction Co., Beaumont, Tex.; T. H. Tutweiler, president, Memphis Street Railway Co., Memphis, Tenn.; E. C. Hathaway, general manager, Norfolk & Portsmouth Traction Co., Norfolk; J. W. Leadley, manager, Pensacola Electric Co., Pensacola, Fla.; Chas. Doerr, purchasing agent, Birmingham Railway Light & Power Co., Birmingham; D. C. Frost, general superintendent, Lynchburg Traction Co., Lynchburg; S. M. Coffin, master mechanic, Mobile Light & Railroad Co., Mobile; Wm. Glenn, Georgia Railway & Electric Co., Atlanta; A. D. McWhorter, master mechanic, Memphis Street Railway Co., Memphis.

Friday Evening's Entertainment.

The entertainment committee has provided an informal affair for this evening in the Solarium at the Marlborough-Blenheim. There will be music for dancing from nine o'clock to twelve and between the dance numbers the Knickerbocker Male Quartette of New York City, which has demonstrated its entertaining abilities, will provide amusement. Though the affair is to be entirely informal it is believed that it will be one of the most enjoyable evenings of the week and it is hoped that none will leave for home this afternoon because of lack of entertainment this evening.

Golf Finals.

During the week a number of golf enthusiasts have turned in qualifying scores in the golf tournament which has been in progress at the Country Club of Atlantic City and this afternoon at 1.30 p. m. the sixteen men having the lowest scores will be paired off in two classes and play 18 holes match play for the two handsome loving cups which have been offered as prizes. The players with the eight lowest scores will be paired for the right to play for the first prize and the remaining eight will play for the second prize. There is also a handsome prize for the lowest qualifying score.

In case any who care for golf have thus far failed to enter, and would like to, it may be said that the qualifying rounds may be played any time before noon Friday at the Country Club of Atlantic City.

RIDGWAY ENGINES AND GENERATORS.

It is always of first importance to the operating department of a street railway system that there be no interruption in the service and, indeed, "Old Faithful" in any power plant, is always an object of affection on the part of engineers, superintendents and managers.

Reliability is one of the strong features of the apparatus built by the Ridgway Dynamo & Engine Company of Ridgway, Penn., and this quality has often helped a Ridgway plant to carry the "peak" without interruption to the service, where a less dependable equipment would have failed.

The McEwen engine has plenty of metal where it is most needed and all materials used are of the very best. The journals and bearings are liberal and, with the generous lubrication provided, can be depended on to run cool and with minimum wear.

The Thompson-Ryan generator is unique in design as it is the only generator which employs the Ryan balancing-coil winding for preventing the various disagreeable consequences

THE TWIN CITY EXHIBIT.

The accompanying picture gives some idea of the advertising exhibit made by the Twin City Rapid Transit Company of Minneapolis and St. Paul in the sun parlor on the pier. As stated in a previous issue of the Daily Review, this exhibit forms the main decorative feature of the sun parlor and measures 36 feet long by 13 feet high. The map in the center is a perspective view of Minneapolis, St. Paul and vicinity, showing in detail the lake-region around the Twin Cities as well as their many other attractions. An interesting collection of photographs of the "Twin City Lines" and the large posters are specimens of the publicity used by the company in promoting its parks, lakes and resorts. Of course this picture cannot do the subject justice on account of inability to reproduce colors, but the wide ivory frames, with mahogany trimmings and beautiful gold lettering, as well as the electric lighting effect, make an attractive exhibit of a character that has never yet been given at any previous convention. The speaker's stand is directly in front of the center



Twin City Rapid Transit Company's Advertising Exhibit.

of armature reaction. The designers of this line of generators, believe that prevention is better than cure and have very effectively met the problem upon such grounds. By preventing the trouble before it occurs, these generators may be safely called on for very unusual overloads even from the standpoint of railway requirements and this is a quality which has made these generators as well as the engines just spoken of, very popular for power plant equipment.

The manufacturers of these lines of power machinery have a distinct advantage over many others, in being able to furnish complete units which have been built, assembled and tested under the same roof and are glad to accept the entire responsibility which this entails.

Descriptive bulletins are being distributed at the booth of the Ridgway Dynamo & Engine Company in the exhibition hall at the outer end of the pier.

map and the entire exhibit forms a sort of drop curtain for the convention hall which is most effective.

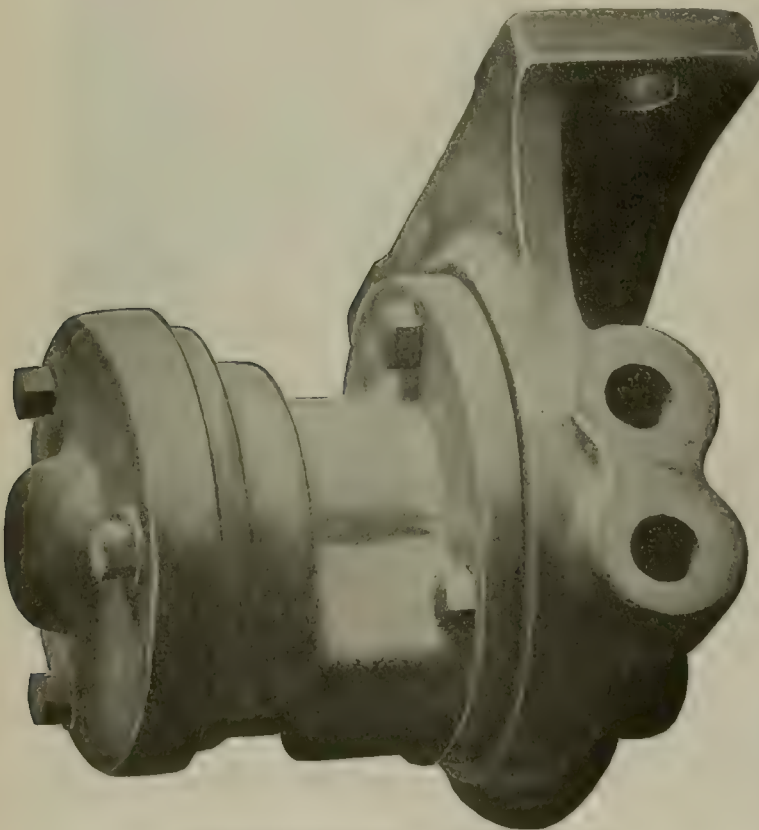
Many of the exhibitors at the convention made the acquaintance of C. M. Keegan, and retained his services to decorate and furnish their exhibit spaces, and for the first few days there was considerable curiosity as to why Mr. Keegan had been able to serve them so satisfactorily not only as to prices, but in every other respect. Finally an explanation was secured. It seems that Mr. Keegan and Secretary Keegan of the Manufacturers' association met up with each other and after a heart to heart talk discovered that they were from the same part of Ireland, which accounts for it all.

Henry Gulick, Jr., of Gulick-Henderson & Co., inspecting engineers, Pittsburg, Pa., is attending the convention.

ALLIS-CHALMERS TYPE J EMERGENCY VALVE.

The principal advantage of the straight air brake system lies in its simplicity and in the fact that the brakes may be applied and released gradually. It formerly had one serious defect, for, when two or more cars are run in a single train having this equipment, if the train should break apart the brakes would not be applied automatically. Moreover, in the ordinary straight air system the control of the train is in the hands of the motorman alone, whereas with the automatic system the brakes can be applied by the conductor in case of emergency from any one of the cars in the train.

The Allis-Chalmers straight air emergency valve is designed so that it is now possible, by using the emergency valve, to equip with straight air, trains of two to four cars which will have all the advantages of the simplicity and positive action of that system, and, at the same time, possess the automatic safety features to be applied in case of a break in couplings or hose connections.



Allis-Chalmers Type J Emergency Valve.

The application of this emergency valve to straight air brake systems adds to the equipment of the emergency device only, which is simpler in design and construction than any plain triple valve. The working parts of the emergency valve are few in number, consisting merely of a slide valve operated by a piston and a release spring moving in the air chamber. The train pipe is required as a part of the equipment only in cases where the motor car pulls trailers on which there is no controlling apparatus. Where two or more motor cars or the motor and the trailer car are provided with a controlling device, no additional hose connections are required, as in such cases it is only necessary to connect all reservoirs by means of an auxiliary hose in addition to the one provided for the straight air brake train pipe. The manner of applying the straight air brake, when equipped with the emergency valve, remains unchanged, since there is an unobstructed opening between the straight air train pipe and the brake cylinders when the emergency valve is in released position.

A passage between the main reservoir and the emergency line is provided to maintain, throughout the train, pressure in

the latter equal to that in the main reservoir, while pressure is being raised in the main reservoir by the compressor. An additional orifice between the main reservoir and the emergency line, connecting the latter to the slide valve chamber, while being in direct communication with the auxiliary reservoir, also keeps the auxiliary reservoir charged to the same pressure as the emergency line and main reservoir.

Operation of the Emergency Valve.

Should a conductor's valve be opened or the train become disconnected, air is allowed to escape to the atmosphere from the emergency line. The escape of air causes a rapid reduction of pressure on that side of the piston towards the emergency line and thus unbalances the pressure, the result being that the greater pressure in the auxiliary reservoir forces the piston and slide valve to the extreme length of their travel. This causes the emergency valve to effect the following combinations:

1. The reservoir is disconnected from the emergency line and is connected directly to the brake cylinder through a large orifice, which results in an equalization of the pressure in the brake cylinder and the auxiliary reservoir, thereby causing maximum brake pressure to be applied almost instantaneously, since the supply of air from the auxiliary reservoir has a much shorter distance to flow to reach the brake cylinder than is the case when it must travel from the main reservoir through the main air pipe, as in regular straight air brake systems.

2. The opening from the main reservoir to the emergency line is closed by the piston when it has travelled the full length of its stroke, which permits no escape of reservoir air through the open emergency line.

Construction of the Emergency Valve.

The Type J emergency valve, illustrated herewith, consists of a cast iron body having a brass bushing with ports communicating with their respective pipe connections. The body is machined to receive the piston and the slide valve. A regulating spring is located inside of the piston chamber, resting against a compressing pin, which in turn is secured by cap. A suitable cap, provided with a leather gasket, encloses the working parts. This cap is secured to the body by three bolts. All working parts are rendered easily accessible by removing the cap from the body.

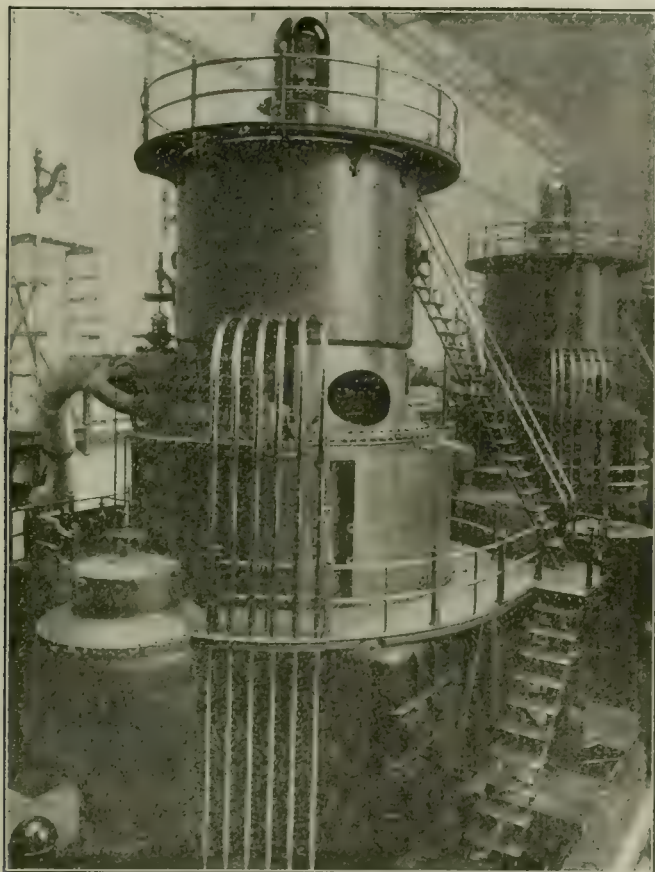
The Chicago Pneumatic Tool Company is showing a most ingenious and effective portable vacuum cleaning plant. The company is manufacturing this apparatus in several sizes and it is susceptible of operation either by electric motor or by gasoline engine. The company has one plant for city use installed on an automobile. This is now in operation in Chicago. The second, or middle, size is for use around railway yards for cleaning cars, and the third size is still smaller for such use as may be required in limited space. The system employed in this vacuum cleaning process is different from that hitherto used in similar devices, as it has an attachment for scrubbing as well as for absorbing the dirt from rugs, carpets, etc. The scrubbing is done first through a brush charged with soap and water, which slightly dampens the surface of the carpet, after which the vacuum cleaner is passed over the carpet and absorbs all of the dirt, leaving the carpet perfectly clean, and this without dampening it in such a way as to take out the sizing.

At the booth of the MacDonald Ticket & Ticket Box Company the visitor who is interested in cash receipts and hat checks can find M. McDonald, the manager, ready to talk the subject over. The products of this company have acquired an enviable position in the railway field, but are only partially receiving the support they are deserving. The box, which is designed for the use of conductors, is substantial and reliable. It is now in use on many railways.

CURTIS TURBINES IN RAILWAY SERVICE.*

BY AUGUST H. KRUESI, ENGINEER GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

Less than fifteen years ago the severity of street railway loads called forth much discussion as to the design of steam-engines for this work, the loads being compared to those arising in rolling mill service. To-day we have to deal with a repetition of loads of the same nature as regards variability in connection with interurban and heavy traction systems operating small numbers of heavy cars on infrequent headway, but



Curtis Turbines in Railway Service—8,000-Kilowatt 750-R. P. M. Curtis Turbine-Generator, with Surface-Condenser Base.

engines have been all but superseded, in new plants, by steam turbines which are so peculiarly adapted to these requirements that their behavior has called forth little or no discussion with reference to variation in load. Nowadays dis-

ject to the full pressure and superheat, where superheat is used, strainer, throttle valve, valve chest and valves are made of cast or rolled steel. The process of expansion to the pressure in the wheel casing, which seldom exceeds 50 pounds, reduces the temperature of the steam to approximately that of saturation at the latter pressure, and it is the general experience that when difficulties in operation do arise from high temperature the turbine causes less concern on this account than any other steam apparatus in the plant.

Steam Consumption.

Figure 1 represents tests made by the Edison Illuminating Company of Boston, on a five-stage 5,000-kw. turbine of recent design. Table I gives results of individual tests:

Table II.* gives the results of tests made by the Commonwealth Edison Company, of Chicago, on a five-stage 9,000-kw. 750 r.p.m. turbo-generator. The very high vacuum obtained in these tests is noteworthy and is probably due in a large measure to the surface condenser being placed in the base of the turbine. It is probable that the figures given in this table represent the highest attainment thus far reached in the generation of power from steam.

Table II.—Tests of 9,000-kw. Curtis Turbo-Generator at Chicago.

Turbine 5-stage, condenser base, 750 r.p.m. generator 4-pole, 9000 volts, 3-phase, 25-cycle.

Load in Kilowatts.	Gage pressure lbs.	Vacuum inches.	Superheat degs. F.	Water rate lb. per kw-hr.
5,374	182	29.43	133	13.15
8,070	179	29.35	116	13.0
10,186	176	29.47	147	12.9
12,108	182	29.34	148	13.05
13,900	198	29.31	140	13.6

Curtis Turbine.

Figure 2 shows the results of acceptance trials on a 2,000 kw. 4-stage 810 r.p.m. turbine, with a 6,600 volt 27 cycle generator for the Westville power house of the West Jersey and Seashore Railroad Company. The tests were made at Schenectady for representatives of the purchaser. The overload test required some correction for vacuum on account of the condenser being defective. The other tests were made under contract conditions.

These tests indicate that the hourly steam consumption from no load to a point considerably beyond rated load follows a straight line when plotted to load and that the total consumption of steam includes a fixed amount (this being the amount required to maintain the machine at speed without load) plus an additional quantity proportional to the load. A high economy at light loads requires that the fixed amount required for no load shall be as small as possible. In the tests on the three machines referred to above, it is found that this constant is about 12.5 per cent, 7.1 per cent and 14.2 per cent of the steam consumption at full load respectively and the economy curves are correspondingly flat over a wide range in load. A first-class steam-engine and generator under similar conditions would probably have no load steam consumption of not less than 15 per cent of that required at rated load. The additional quantity of steam per kilowatt over and above this fixed amount at no load is 12.1 pounds per hour in the case of the Boston Edison tests. Steam at the pressure and

Table I.—Results of Tests on 5,000-kw. Curtis Turbine.

Installed November, 1906, oil step, hydraulic valve gear, condenser base, generator 10-pole, 720 r.p.m. 60 cycles, 3-phase, 6,900 volts.—(Boston Edison Company.)

Date, 1907.	Feb. 12.	Jan. 29.	July 1.	Feb. 12.	Feb. 12.	Feb. 13.
Duration, hours	1.00	1.17	1.00	.33	.33	1.00
Kw.-load	2,558	5,195	7,526	2,523	2,382	5,104
Total water per hour	38,997	70,492	103,353	41,445	41,820	78,483
Steam pressure, gage	173.0	173.7	167.7	171.0	173.5	172.2
Steam temp. (throttle)	526.1	519.0	509.0	535.0	536.0	539.4
Superheat deg. Fahr	149	142	134	159.5	159.3	163.3
Barometer	30.11	30.48	29.95	30.12	30.12	30.43
Vacuum inches Hg.	28.98	29.30	28.60	28.25	27.68	27.51
Water lb. per kw-hr.	15.24	13.57	13.73	16.45	17.58	15.38

cussion of power house operation generally deals with the behavior of the newer types of apparatus which turbine has called into existence, such as superheaters and piping for superheated steam, condensers, etc. Hence some reference to these features may not be out of place here.

Curtis Turbine Generators.

The peculiar adaptability of the Curtis turbine to railway loads, which entail frequent variations in pressure and temperature, is in a large measure due to its having no revolving parts subject to high pressure or temperature. The parts sub-

superheat employed in these tests expanding to 1.5-inch absolute back pressure would generate one kilowatt for 9.27 pounds per hour in a theoretically perfect steam engine or turbine driving a generator of unity efficiency. It will be seen that, barring the unavoidable no load losses, the efficiency of the turbine amounts to about 76.4 per cent of that theoretically obtainable. This represents a very decided step forward and indicates that we are approaching the practical limit of perfection in the production of power from steam.

The high speed of turbine generators necessarily involves a close and compact arrangement of large masses of iron and

*Presented before the American Street and Interurban Railway Engineering Association, Atlantic City, N. J., October 16, 1907.

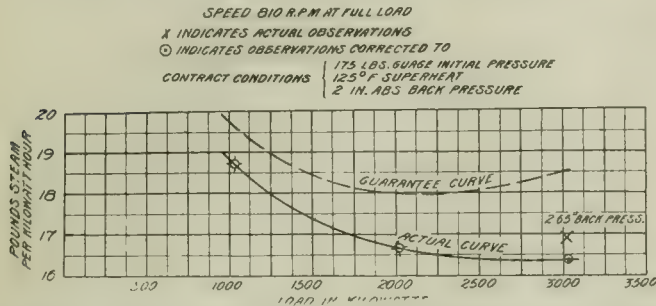
* Presented by Mr. W. L. R. Emmet before National Electric Light Association, Washington, D. C., June, 1907.

freedom from vibration. The oil is filtered continuously and an ordinary grade of mineral engine oil is satisfactory. Its specific gravity at 20 degrees C. should be about 0.89 and its viscosity between 0.6 and 0.95 measured by the pipette viscometer.

Pressure, Vacuum and Superheat.

It will be seen from the tests presented that very noteworthy advances have been made in the economy of these machines. Further advance in station economy can be made by extending the temperature range through which the machine operates by increasing the pressure and superheat of the live steam and by reducing the temperature of the exhaust steam through better vacuum. The Curtis turbine has no inherent limitations to the economical conversion of such added energy at either end of the temperature scale.

Steam working from 200 pounds gage to 28 inch vacuum

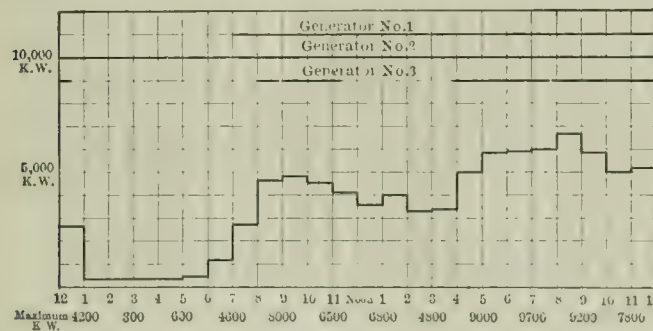


Curtis Turbines in Railway Service—Figure 2—Acceptance Test of 2,000-Kilowatt, 810-R. P. M., 27-Cycle Curtis Turbine.

makes available about 5 per cent more energy than steam at 150 pounds pressure while it requires only about 0.6 of 1 per cent more heat making a theoretical gain of about 4.4 per cent due to this increase in pressure. The actual improvement in the economy of the turbine due to this increase would be about the same. Practically all of this is realizable inasmuch as the efficiency of the boilers under these two pressures would be substantially the same.

The addition of 100 degrees of superheat adds about 4.5 per cent to the total heat of the steam and would require an extra fuel expenditure of approximately 6 per cent and makes a reduction of about 8 per cent in the steam consumption of the turbine, resulting in a net gain on this account of approximately 2 per cent.

This, however, does not represent the whole gain due to the use of superheat as compared with ordinary saturated steam



Curtis Turbines in Railway Service—Figure 3—Load Curves of Westville Power Station, West Jersey & Seashore Railroad Company.

operation, because such steam is never dry and a small amount of moisture causes an altogether disproportionate increase in steam consumption. The idea may be expressed by saying that the first 50 degrees of superheat is of appreciably greater value than the second 50 degrees. The large gain from superheat as compared with more or less wet steam was discussed at length by the late Dr R. H. Thurston ("The Steam Turbine," R. H. Thurston, Trans. A.S.M.E. Vol. XXII, Dec. 1900) as far back as 1900 in connection with steam turbine tests. While higher superheat will undoubtedly result in proportionately increased net economy its employment must in a large degree be dependent not only upon the load factor and the size of unit to be employed but also upon the nature of the service as regards severe and frequent variations in load, in view of the difficulties which have been encountered in the practical operation of superheaters, steam piping, valves, pumps and engine-driven auxiliary machinery.

It seems probable that much of the trouble which has undoubtedly attended the use of superheated steam is due not to any want of strength but to want of elasticity in the parts affected and that they are not the result of high temperature so much as the unceasing variation in temperature incidental to the ordinary railway load. It is now generally believed that water may exist under certain conditions in the presence of superheated steam and if variations in load cause occasional priming of the boilers and water in the steam piping the resulting variation in temperature due to the spraying of heated surfaces is enormously increased. The substitution of unannealed steel castings in place of cast iron fittings and valve bodies, the omission of copper gaskets and copper alloy internal parts in valves, better design of boilers and superheaters so that the boilers will deliver only steam and no water to the superheaters and so that water can readily drain out of the superheaters and piping, are all factors which will permit the satisfactory employment of higher degrees of superheat.

The low velocities in steam piping which have become customary by reason of the pulsating flow of steam engines are not suitable for superheated steam. It is essential that the piping be made flexible to the greatest practicable degree and this requires small sizes of pipe. The steam pipes for Curtis turbines will require velocities of about 8,500 feet per minute at their maximum ratings, based on saturated steam. One hundred degrees superheat will increase the volume of the steam about 15 per cent, but the velocity will be substantially the same on account of the reduction in the steam consumption of the turbine. The use of higher pressure and superheat will be facilitated by the introduction of steam turbine driven pumps and auxiliary machinery, and a satisfactory beginning has already been made in this direction in the shape of a high speed centrifugal circulating pump driven by a 75-kw. horizontal Curtis turbine for the condenser of the fourth 2,000-kw. unit in the Westville power station of the West Jersey & Seashore Railroad referred to above.

Improvement in economy arising from better vacuum is probably the most easily attained. Raising the vacuum from 28 to 28.5 inches makes 5 per cent more energy available and of this the turbine realizes an improvement of from 0.5 to 0.6 pound per kilowatt hour at rated load, that is from 2.5 to 3.5 per cent, depending on the economy of the unit. Another way of regarding this is to consider that it adds just so much to the capacity of the station. To improve the condensing equipment is often the easiest way to lighten the duty on the boilers.

THE UNION ELECTRIC COMPANY.

The Union Electric Company, Pittsburg, Pa., is a consolidation of the General Railway Supply Company and the Union Electric Company. The offices and warerooms, comprising seven large floors, are located in the Pittsburg Terminal Warehouses, South Side, Pittsburg, Pa. George W. Provost, who is well known in the railway circles, is president of the company; John P. Provost, vice-president and treasurer; L. H. Keller, secretary and manager of the lighting department; Thomas M. Cluley, assistant treasurer and manager of the railway department.

This company carries in Pittsburg stock line materials of every description, including lightning arresters, track jacks, drills, gongs, tools and lighting supplies. In fact the trade mark is "Everything Electrical," and ordinary orders for anything in this line can be filled immediately.

The Union Electric Company represents such well-known concerns as: R. D. Nuttall Company (gears, pinions, trolleys, mining machine repair parts, etc.), General Electric Company (line material and rail bonds). The International Register Company (fare registers and fittings), Wilson Trolley Catcher Company (trolley catchers and retrievers), Locke Insulator Manufacturing Company (porcelain and glass insulators and accessories), Lord Electric Company (Shaw lightning arresters), Crouse-Hinds Company (imperial arc headlights), and Brilliant Electric Company (incandescent lamps).

The location in the Pittsburg Terminal Warehouses gives this company unsurpassed shipping facilities by either rail or river. The General Railway Supply Company was organized in 1899 and the Union Electric Company in 1904, each in a small office in the Park Building. The space which they now occupy affords a good idea of their growth.

In the General Electric Company's exhibit is a frame supporting all of the parts of the Sprague-General Electric type M automatic control, of the type adopted exclusively on the elevated and subway divisions of the Philadelphia Rapid Transit Company. Like other features of this exhibit it is arranged for operation and furnishes a very interesting demonstration of multiple unit control.

MECHANICAL DEVICES AND OTHER OFFICE APPLIANCES.*

BY F. E. SMITH, AUDITOR FOR RECEIVER, CHICAGO UNION TRACTION COMPANY, CHICAGO, ILL.

The substitution of machines for manual labor, and in the case of the computing machines for mental work also, has become so general it is fitting that the matter be taken up by our association, which stands for all that improves the conditions in the accounting departments of street and inter-urban railways. It will be conceded that any device which will permit the accountant to decrease the expense of his work without impairing its efficiency or to increase the volume of statistics which he may prepare for the heads of departments without increasing the salary roll materially, is worthy of general adoption. The value of a statement showing the earnings per car-mile and the number of passengers handled on any route, is very greatly diminished if the facts it contains are not given to the operating department early enough on the day following the date for which the statement is made to permit that department to make adjustments of the schedule which may be necessary to meet the altered conditions. If there are machines that will assist to that end it is not in the interest of good railroading to adopt them?

While it has been the policy of our association to refrain from advertising the product of any particular manufacturer, it was the idea of the writer that an article of this kind would be valueless to members unless the name of the manufacturer of the machine were given in connection with the description of its work. This idea having been endorsed by your president, the names of manufacturers will be given but it is not intended that this mention shall constitute an endorsement of these particular machines as the best; it may well be that the writer has not had some of the best machines brought to his attention.

In discussing this subject it is but natural to describe first such machines as have become familiar through use in one's own office. No claim of superiority is made for these particular machines, but they have been found to be very satisfactory.

Typewriters.

Typewriters are in such general use that any description of them is entirely unnecessary and it is the purpose to describe only such special features as have come under my notice that facilitate the work, and those machines that seem particularly adapted for some special purpose.

Several makes of machines, among them the Remington, Elliot-Fisher and Fay-Sholes, now have an adding-machine attachment that will pick up the sums written upon the typewriter when in certain positions and accumulate them upon a register. I understand that the Underwood Company also has an attachment invented by Messrs. Wilson and Neal, of the Boston Elevated Railway Company, that has not, as yet, been put on the market. In these machines the figures upon the adding device are in plain view of the operator, who can write the total when desired and set the machine back to zero. The register, where but one is attached, is usually placed so it is controlled by the 10 spaces at the extreme right of the scale, but one of the machines on display at the "last Office Appliance" exhibition at Chicago, the Wahl "Adding and Subtracting Attachment" to the Remington typewriter, was so arranged that five or six or even more of the adding devices could be attached at the same time and as many sets of figures written and added simultaneously.

I have discussed with the representatives of both the Remington and the Elliot-Fisher companies the idea of having them design a register that would add in hours and minutes instead of in dollars and cents, to be used in writing the totals of our pay-rolls. By using two of the devices, one register that would add in hours and minutes and another that would add in dollars and cents, the operator could fill in the two on the typewriter and have footings of both at the bottom of each roll that could be readily proved. Of course, if there were more than one rate per hour on the page, a separate total of the hours at each rate would have to be made, and then the sub-totals made into one footing. I have not followed the matter and nothing has come of it, as yet, so far as the Remington Company is concerned, but I have been advised by the Elliot-Fisher Company within the last few days that it is prepared to deliver just such a machine as described and to guarantee its work.

Another convenient device is one which, by the use of a two-colored ribbon, permits the insertion of red figures in statements by simply pressing a lever.

By the use of the tabular assurance is given that the figures will align properly without the operator stopping to count the spaces.

Another device insures the striking of several sheets of paper at the same distance from the top.

Of the typewriters that are particularly adapted to specific work we use a book-typewriter, made by the Elliot-Fisher Company of Chicago, which sells for \$175. This machine is so constructed as to permit of writing in bound books. The table upon which the book rests is divided in halves, either of which can be lowered, so that when the book is opened, both pages are at the same height and present a flat surface to be written upon. We use this machine principally to enter the records of the stockholders' and directors' meetings and the results are eminently satisfactory. Those who have had to pore over old records written in longhand with no marginal index, looking for some resolution hidden away among a mass of other matter, know what a tedious job it is. You will be blessed by your successors who in the years to come will have to go over the records you are now writing, if you will get and use one of these or a similar machine.

The same company also makes a billing machine that we have used until quite recently in preparing pay-rolls, and so far as the machine work was concerned it was perfectly satisfactory. The advantage of using this machine on this class of work is that the entire sheet is in view all the time, and skipping from one name to another is accomplished about as quickly as the eye can catch the required name. By the use of the two-colored ribbon, overtime, or time for which other than the regular rate is to be paid, can be inserted readily in a distinctive way. This machine is also particularly well adapted for writing on cards, which, when written on an ordinary typewriter, are quite apt to retain part of the curl they get from passing through the rollers. These typewriters cost \$165 or more according to the width of carriage, and the adding devices are \$30 additional for each one. On a 24-inch carriage, 18 registers may be placed which will permit the adding of that number of columns.

Adding and Listing Machines.

Next to the typewriter, the adding and listing machines probably are the most helpful of any of the mechanical devices. There are many reliable machines on the market, each having some special feature to recommend it. We have three different makes and find them all useful. Two of the styles add but do not list. One of them is called the "Rapid Computer" and is sold by the Rapid Computer Company, Benton Harbor, Mich. The price is \$25. This machine is a very small affair that can be held in one hand or placed on the page from which the figures are to be taken and we find it very convenient, particularly for cross additions. There are many persons who are good at addition when the figures are arranged under each other but who simply cannot add cross-wise mentally. Such persons would find this little machine quite a help.

The other non-listing machine is the "Comptometer" made by the Felt & Tarrant Manufacturing Company of Chicago, which sells for \$150 or more according to the number of columns. This is, I think, the pioneer in the field of adding machines and I doubt if one can be made to equal it for speed when no printed list is required, nor do I see how its speed as a multiplier can be equalled, since one can multiply by as many figures at a time as can be reached by all the fingers. An expert can prove his work by going over it a second time more quickly than it can be done once on ordinary machines. Some of the largest concerns in Chicago use these machines to check the work done on the listing machines.

Of listing machines we have four styles, made by the Burroughs Adding Machine Company of Detroit, that add dollars and cents and are used by nearly all the clerks; then we have two that add numbers, that is, there are three figures to the right of the dividing comma which we use in checking our registers. For register records the closing numbers are taken each night from all the registers at each car-house whether used that day or not and the differences in the footings as compared with the previous night have to be accounted for. Instead of listing the opening number each day, we retain the slips of the previous day. We have two machines that add in hours and minutes and use them to check the pay-rolls by the time schedules.

The latest machine we have has a motor attached. It has 15 banks of keys, the five banks at the left being cut off so that if desired they list but do not add. We use this in listing checks and vouchers where we want the numbers as well as the amounts and find it a great time-saver. By means of an attachment operated very quickly we can make two sets of additions; one of five columns, and one of 10. Another manipulation allows us to use the 15 columns in one total. We are very much pleased with the machine. The Burroughs machines cost from \$250 to \$600 each.

* Presented before the American Street and Interurban Railway Accountants' Association, Atlantic City, N. J., October 16, 1907.

We also use in our office a calculating machine made in Switzerland, called the "Millionaire," which multiplies and divides very rapidly. We can multiply 10 figures by 10 figures in about 10 seconds. As the process for multiplying is the more simple if we have any number of amounts to divide by the same divisor, as, for instance, to obtain earnings, expenses, etc., per car-mile or car-hour, we find the reciprocal of the divisor and multiply. This is the only machine that has come under my notice which, by setting the dials, will multiply by any number from one to nine with one turn of a crank, and it is that feature which accounts for the speed with which it may be operated. The "Millionaire" is handled in the United States by W. A. Morschhauser, No. 1 Madison Avenue, New York, and sells from \$250 to \$475.

The slide rule is so well known that it needs no extended description and there are many who think it is the most convenient of the many devices used for calculating.

We use two addressing machines made by the Addressograph Company, of Chicago. One has the names and addresses of the stockholders, and we can easily address 1,000 envelopes an hour; this machine costs \$45 without the cabinet, which varies in price according to capacity. On the second machine, we have the names of the employes and print our pay-rolls from it. This machine costs \$55. The names are on plates so fastened as to make chains; the plates link together very easily and a name can be taken out or inserted in a few seconds. We can print the names of our 4,500 trainmen in about three hours. Being able to do this we can postpone getting out our rolls until the day before they are needed, and have our list correct at the start. Companies operating electric light plants in connection with street railways will find these machines of great value in getting out their monthly bills. A later style of the Addressograph has the names on plates, which are placed in a vertical magazine and are withdrawn from the bottom one by one as the machine operates.

For checking the extensions to pay-rolls we use a "Morse Rotary Wage Scale" made by the Chas. R. Morse Manufacturing Company of Chicago. These range in price from \$25 and upward for a machine that checks up to 100 hours at 50 different rates, to \$40 for a 200-hour, 120-rate machine. Our device consists of two cylinders with the rates we use printed in a line around the surfaces and four scales of hours, 50 to a scale, running across the cylinders. Suppose the rate per hour to be $23\frac{1}{2}$ cents; by revolving the cylinders until $23\frac{1}{2}$ came within the scales the amount due from one hour to 200 hours would show at a glance. The device can be operated very quickly and we have found it absolutely reliable and a great time saver in checking.

For circular letters to foremen or other employes and for statements when we want more than a dozen copies, we use an "Edison Rotary Mimeograph," made by the A. B. Dick Company of Chicago. In this device a stencil is cut by a typewriter on paper especially prepared for the purpose, which is then fastened to a drum and inked. The printing is done by simply revolving the drum and can be accomplished as rapidly as the operator is able to feed the paper into the machine. We use this also in getting out several forms for our own office which we use in quantities so small as not to warrant having them printed. A short time ago our operator made 100 copies of six sheets, each letter size, closely written in less than two hours.

These devices cover all we use in our department, except the numbering stamps for numbering vouchers, lot cards, etc. At our carshops we use three recording time clocks, each with a capacity of 200 names. They were made by the International Time Recording Company of Binghamton, N. Y., and cost, with racks for cards, \$175 each. Each employe has a number on a rack that contains this card. When he comes in the morning he takes his card and inserts it in a slot and pulls a lever. This prints the time of his arrival. He then puts the card into the proper compartment in another part of the rack, which shows he is in the shop. On going out at noon he inserts the card in the machine again and the time of his going out is printed. The same thing is repeated after lunch. The differences between the entries of time printed represent his time for the day. At a specified hour at night the clock automatically changes so that any slips printed after that hour are in red and over-time can be readily seen. The cards are balanced with the slips showing how the men were employed, that have been turned in by the department foremen.

In the treasurer's office a machine is used to prevent the raising of checks more than a small amount, by printing and perforating a line reading "not over ——— dollars" changing the amount every \$10.00.

In preparing pay envelopes the treasurer uses a cash tray so arranged that one coin of a denomination is taken from a compartment into the hand by slightly pressing on the

bottom of the compartment. A mechanical cashier more modern than the above referred to will be mentioned later.

The foregoing devices comprise the machines in use in our offices with the exception of various punches used for perforating papers for various files and for canceling coupons.

One of the most useful of devices, though it is in no sense a machine, is the "Smith Index Tag" made by Chas. C. Smith, Exeter, Neb. The tag consists of a steel clip bound with leather which is printed on or which has a paper label that may be written upon. We have the tags printed with the names of our car and power houses and use loose sheets held in binders to record the distribution of stores. At the close of each month the sheets are taken out and filed and the tags used on new set of sheets. On card indexes they are very convenient. The range in prices and styles of these tags is so great I will not attempt to name figures. The tags are handled by stationers and price lists can be had of the manufacturer on application. It may not be out of place to add that the manufacturer is in no way related to the writer.

For filing correspondence we use what is styled the "vertical" file, which takes an ordinary letter on edge without folding. We have four drawers, one for correspondence received from other officials of the company; one, for that received from outside persons; one, for letters that originate in our office to other officials, and one for letters from us to outside parties. All correspondence is numbered and card indexed and carbon copies of all our letters and answers are attached, so that all the correspondence to and from persons on one subject is found under the same number.

We believe in the use of cards and loose leaf devices and use both quite extensively. A journal is seldom used after the entries for the month are closed. Why then have to handle a heavy book month after month when twenty or twenty-five sheets are all that are needed? We have answered this question by using loose leaves held in a spring cover while being used, and transferring them to a permanent binder when the month is closed.

For a general ledger we use a loose leaf book with inserts, and run the accounts across the page instead of down. The headings read as follows:

Accounts.....	1906	Month of.....	06
		J. E.	J. E.
Balances		No. Debits	No. Credits

The figure columns are repeated across the pages. Each full page has room for three months' entries and the insert has three on each side, so that each set of leaves lasts a year. At the end of the year they are put into a permanent binder.

Our voucher record is of the loose leaf pattern with half of the sheets cut $\frac{1}{4}$ -inch short at the bottom and the alternate sheets cut $\frac{1}{4}$ -inch short at the top. This permits us to add the first page and enter the totals at the bottom of the next sheet; the second sheet is added up and the totals entered at the top of the third sheet, and so on. This saves carrying footings forward, and is one of the greatest labor saving devices we use. Any one who cares to do so will find samples of these sheets in the association's collection of blanks, they being those of the United Railways of St. Louis and the Chicago Union Traction Company. I am indebted to F. R. Henry, the auditor of the United Railways of St. Louis, for letting me know of this device.

Our treasurer uses a loose leaf cash book. This permits our department and the outside auditors to use the back records without interfering with the current work.

This, I believe, completes the list of such machines and devices as have come under my personal observation through use.

Other Machines.

One of the best duplicating machines I have seen is the "Gammeter Multigraph" made by the American Multigraph Company of Cleveland, Ohio. This consists of two parallel cylinders, one containing metal types that are readily passed to the other cylinder and set up as a letter or form. The machine has a scale across the top showing the order in which the types are to be found on the type cylinder. As the cylinder is revolved an index moves along this scale. When the letter wanted is reached the machine is stopped and by pressing a lever, one type is passed to the other cylinder. The action is quite rapid, very much more so I think than can be had by using a pair of tweezers. The work done on this machine is exactly the same in appearance as that on a typewriter, and, in addition, electrotypes can be made and fitted to set up on it so that practically any kind of work can be done on this machine that could be done on a small printing press. The price of the machine and equipment is \$250.

I have recently examined an attachment to a typewriter made by the Goldberg Calculating Machine Company of

Chicago, that would be particularly useful in billing or voucher work because amounts added in one column may be transferred to a second column and the act of transferring the figures throws them out of the first column. To illustrate: There are three amounts of which it is wished to make a sub-total, like.....

\$45.00
29.50
18.75 \$93.25

At the conclusion of writing the three items the total \$93.25 is shown on the register; the typewriter is moved to the position for the second register to act and as the figures 9, 3, 2 and 5 are written they disappear from the first register one by one and it is set back to zero and the machine is ready for other sets of figures in the inside columns, say,

\$50.00
25.00 \$75.00

Grand Total \$168.25

The act of writing the \$168.25 on the typewriter sets the outside register back to zero and the machine is ready for a new bill. This feature appears to be very valuable. At present this machine can only be attached to the Fay-Sholes typewriter, and the price of the register is \$75.

The most remarkable machine I have seen or rather that I have seen the work of, as the inventors are not ready yet to show the machine, not having obtained all the patents desired, is one that is being prepared in Chicago and is called the "Carlin Calculator." When on the market this will probably at first be adopted by banks more especially as it is estimated that it will reduce the number of bank bookkeepers one-half when in use. I have seen some of the work done upon the machine and the following is a sample:

Adams & Co.,					
La Salle St.					
					7,392.30
					306.25
272.98	6.73	75.00	.56		
67.50	26.43	4.00	73.95	527.15	
					7,171.40

The amount 7,392.30 is the balance of the account at the commencement of business and is printed in red. The item 306.25 is a deposit and is printed in black while the amounts of the checks entered are totaled and the total printed in red and the new balance carried in red to the outside column, 7,171.40. What the machine really does is to work backwards when the total of the checks is printed in red and the total stands at 6,865.15, which is 7,392.30 less 527.15. Printing the deposit 306.25 in black reverses the mechanism and it adds to the total then in the register. The machine adds perpendicularly and horizontally at the same time and automatically subtracts figures written in red from both totals. Should the sum of the reds exceed the sum of the blacks in either the line or the column, the result will be shown in red and will be the amount of the excess. I know of no other device that begins to do as much as this and when it is placed on the market I have no doubt will find a ready sale.

For those who prefer a tissue impression of their original letters to a carbon copy we think the copiers that hold the blank paper on a roll and produce a copy by running the letter and paper through rollers like a wringing machine, are more rapid than the copying-book and press. After the copies have been made the paper can be cut into uniform lengths and filed as would carbon. Yawman & Erbe of Rochester, N. Y., The Romeo Company of 88 Reade St., New York, and the Rotopress Company, of Marion, Ind., make machines that do this work. The only objection I have heard urged to this method of copying letters is that the character of the letter-book as a book or original entry is destroyed, and that in offering copies of letters as evidence in court it may be necessary to call as witnesses nearly the whole office force. The same objection would apply to any loose leaf book of original entry.

The Library Bureau of Chicago, makes what it terms "omnibuses," which are book-racks or voucher trays mounted on rollers that can easily be rolled to and from vaults or from one room to another. One of these could be filled up to hold the books required by the general bookkeeper and rolled to a position convenient to the desk and the books kept on the roller shelves when not actually in use. Another rack could hold the voucher register and the trays for current vouchers and both would be stored in the vault at night.

The same company fits up vaults and offices with either steel or wood shelving that can easily be adjusted with regard to the space between shelves so that all the space of a vault can be used to the best advantage.

The Patten ticket destroyer is an arrangement of parallel knives so set that the tickets drop from a hopper and pass

through the knives and come out cut into shreds. One of these machines was in use at Lynn, Mass., at the time the writer was connected with the Lynn & Boston Railroad, and we never found that a ticket had passed through the machine and not been so completely destroyed as to render its further use impossible. This machine is, or at least was, made by the Patten Machine Company of Salem, Mass. The Rand Avery Supply Company of Boston, Mass., has a machine that does similar work.

Ticket Counting Machines.

There was exhibited at the Columbus convention last year a ticket counting machine that attracted a great deal of attention. The machine is the invention of W. A. Gibbs, general manager of the Indiana, Columbus & Eastern Traction Company. The writer was unable to examine the work of the machine but a complete description of it may be found in the Electric Railway Review of October, 1906.

The Cleveland Electric Railway Company uses a ticket counting machine made by Robert Kimball of Cleveland, O., and is much pleased with it. These machines are not on sale, but may be obtained on a royalty. They can count 20,000 to 25,000 per hour. The device is very compact and is mounted on a standard that comes up through a can in which the tickets are dumped when counted. The Cleveland Electric Railway Company reports that it gains time by having two persons (usually girls) work together; one takes off the rubber bands from the bundles while the other operates the machine. "The underlying principle of the machine is to segregate the tickets from packs or bundles and distribute them uniformly opposite numbered spaces where the eye can readily detect any discrepancies."

Two very useful machines for the cashier's office are made by the Brandt Cashier Company, of Chicago. One is called a "Payer" and it consists of a small cabinet with rows of keys marked from one to ninety-nine. In front of these are compartments holding coins of the different denominations. Upon the pressure of any of the keys the sum represented drops out in the least number of coins that will make it. This machine is particularly useful in making up pay-rolls as the money can be dropped directly into the envelope. The other machine, called the "Changer," by the pressure of one key gives the difference between the number pressed and the other sum at which the machine may have been set. The only mental work required is the striking of the proper key. This machine is particularly useful in offices of gas and electric light companies where bills are paid over the counter. The price of each machine is \$150.

W. R. Gaither, auditor of the South Chicago City Railway Company, has invented a device for keeping time, which, I think will become popular when put on the market and used. It is operated in connection with the wide carriage Burroughs adding machine. Two paper-carrying rollers are attached to the rear of the carriage; one supplies and the other receives the paper, which has been printed and ruled, as the work progresses. When the work for a day is complete the paper is reeled back, the carriage set over a space and is then ready for the next day's posting. A space sufficient to allow two rows of figures is allotted each name, and additional spaces if more than one rate is to be used for the same man. The time for the day is printed by the machine on the top line and (having previously put into the machine the time from the start of the pay-roll period up to the current date) the total of all time including the current date is posted on the second line. In other words, each man's time is accumulated from day to day so that when the last day is entered the total time is entered immediately below it. As the total time is set down from day to day the machine clears itself. There are so many complications about the rolls for the company which I represent that I have not been able to give the machine the trial to which it is entitled, but if any accountant who is interested will take the matter up direct with Mr. Gaither at South Chicago, Ill., he will arrange for a trial of the machine that I feel quite certain would lead to its adoption. A statement regarding the device will be found in the Street Railway Journal of March 16, 1907, and in the Electric Railway Review of July 13, 1907, page 57.

Another good thing is the Wahl "Adding and Subtracting Attachment" for the Remington Typewriter. The totalizers or registers are mounted on a truck, the movement of which is governed by the typewriter. They pass over what the makers call the actual mechanism and any figure keys on the typewriter that are pressed when these two parts are in conjunction are carried into the register and accumulated. The printing of the totals clears the registers as in similar devices. I am very much pleased with the work done by these machines, and hope to have at least one in the office before long. The Wahl Adding Machine Company, Great Northern Building, Chicago, publishes an interesting circular describing the machine. A No. 7 Remington Typewriter with a tabulator

and one of the Wahl attachments with a capacity of seven figures sells for \$250. Additional totalizers of the same capacity are \$70. For each additional figure wheel \$5 additional is charged.

For keeping a record of piecework or of employees whose time is to be split up on several jobs, I think the Perry time stamp made by the Perry Time Stamp Company, of No. 19 South Jefferson street, Chicago, is a very convenient device. The price of this device has been reduced from \$25 to \$15. I have seen the work it does and can recommend it. The stamps have been adopted in a great many of the large industries of the country, which should be a good recommendation if anything further than mine is required.

For the Claim Department.

Another device which it seems to me would be a very valuable adjunct to the claim department particularly, is the "Commercial Graphophone." This consists of a dictating machine that is talked to through a speaking tube, and a transmitting machine that talks back. The price of the first is \$75 and of the second, \$65. To complete the outfit one should have a shaving machine to redress the cylinders and a supply of cylinders that cost \$25 per hundred. These will be furnished by the seller; the purchaser has to supply someone to use the arrangement who has a voice and a flow of language. It seems to me, that in preparing briefs, one lawyer could keep two or three typists busy and they need not be stenographers. These machines are manufactured by the Columbia Phonograph Company of New York, London and Chicago. Each cylinder will hold from 1,000 to 1,600 words spoken at a rate of from 90 to 100 words a minute. This is equivalent to about two full pages legal size paper single spaced.

Another machine that I believe to be a good one, is the "Ensign Electric Adder, Multiplier and Divider" made by the Ensign Manufacturing Company, 24 Milk Street, Boston, Mass. I did not see the company's advertisement until too late to investigate the machine, but the description is interesting.

For binding all kinds of loose sheets satisfactorily, and that to my mind includes provision for removing a single sheet quickly if it is wanted, I think the Tengwall devices are excellent. I have used some for over nine years, and they work just as well now as the day they were received though they were opened every work day during that time. They are made by the Tengwall Company, No. 1411 East Ravenswood park, Chicago.

Before closing this paper I wish to recommend to the members two publications that I take, in which most of the new office helps are advertised. One is "System" published at No. 151 Wabash Avenue, Chicago, and the other is "Office Appliances" published at No. 303 Dearborn street, Chicago.

I also wish to urge upon members interested in this branch of our association the desirability of attending the various "Office Appliance" expositions that are held in the large cities. It will be well worth while. I go every year at least once, and am always amply repaid for the time spent. Let me repeat what I said in the opening of this paper. I have no doubt failed to mention many machines that may be as good, if not better, than some of those I have seemed to advertise, but they are such as have not come under my observation, and if such makers feel in the least slighted, I apologize now for not having received their literature.

The Chicago Pneumatic Tool Company has in operation the latest application of its 550-volt Duntley electric drill, which consists in driving screw spikes. The rapidity with which these spikes can be put in, with the resultant saving in time and labor, is unusually interesting.

In the exhibit of the Gold Car Heating & Lighting Company, Space 403 to 417, are shown the most modern types of panel, truss plank, cross seat, cab, and other electric car heaters. This company in the last fifteen years has furnished hundreds of thousands of electric heaters to railroads all over the world.

Ball-bearing center plates and side bearings are not now the rarity they were several years ago on electric railway equipment. The T. H. Symington Company is demonstrating that there is a saving of not less than 35 per cent in steel wheel wear from the use of Baltimore bearings and these bearings are now in very extensive use. A framed list in the Symington Company's booth of a few of the traction companies using this device is interesting. Two center bearings removed from service after a mileage of nearly 100,000 are on exhibit, and show perfect condition, there being no evidence of wear on either the balls or steel wear plates.

REPORT OF COMMITTEE ON PROMOTION OF TRAFFIC.*

The committee feels that the subject matter in its first report, submitted at the last annual Convention at Columbus, Ohio, in 1906 is so full and complete that little is left to enlarge upon.

There are a few subjects of interest which the committee herewith submits:

Park and Amusement Features.

Just so long as street railway companies own, control or have an interest in parks along their lines the much mooted question as to their desirability from a purely financial point of view will continue to be debated. Last year this committee in the course of a minute investigation into the general subject of "Promotion of Traffic" went into the park proposition thoroughly. Among the questions asked the street railway managers of the country was this: "If you had it to do over again, would you equip and operate a park?" Seventy-four per cent. of the replies were in the affirmative.

While the preponderance of sentiment is thus shown to be in favor of the operation of the parks, it does not by any means necessarily mean that this 74 per cent. of street railway park managers have found that the parks themselves, of themselves, and in themselves have shown a balance on the right side of the ledger. As nearly as can be ascertained a very small percentage of the parks actually pay in their receipts from various sources the cost of operation. What profit exists must be due to the increased traffic on the company's lines in consequence of the exploitation of the park and the exact difference between the additional receipts from this source and the additional cost of the extra transportation facilities that must be provided, is still a matter for individual computation.

As to the actual, practical lay-out, construction and operation of a street railway park, must, almost all, depends upon the local conditions existing in the community in which the park is to be operated. The class of people, their average wage, their hours of labor, their predilections for certain forms of amusement, all must be reckoned with. Therefore no matter how much may be learned from the experience of others, the final test as to the success of a park must lie in the shrewdness of the park managers in adapting his offerings to the wants of his patrons.

As to the question of whether a park should be owned and operated directly by the street railway company management, or should be leased outright, there seems to be a prevalence of opinion that, conditions being favorable, it is more satisfactory in the long run to lease the park outright on a flat rental basis. Where conditions make it unwise to do this the next most satisfactory method seems to be to let as many concessions in the park on a flat rental or percentage basis as is wise.

In some sections of this country it is claimed by some park managers that a park cannot be successfully operated unless liquor is allowed to be sold on the grounds. This is not, however, the experience of the majority who find that the moment a license of this kind is granted in a park, the general class of patrons and the general tone of the place is lowered. In a short time the better class of people keep away entirely and the park, no matter how well its grounds and attractions are kept up, literally runs down.

The distance that a park should be located from the centre of a community in order to draw the greatest number from that community, has been the subject of much discussion and varying opinions. The majority of managers, however, are of the opinion, and results seems to indicate that from 2.5 to 6 miles, or a half-hour ride at a five-cent fare is about the most advisable. Of course, in some sections it is possible to draw people from a greater distance, but they are few in comparison.

Amusement.

As to just what form of amusement enterprises should be included as attractions in the parks, experience has shown quite an unanimity. First of all, it is a strong asset to a park to have it located on the banks of an attractive river, lake, or small pond where the public may enjoy boating and such features. There must be a good up-to-date carousel, a dancing pavilion and some sort of an athletic field. There must be the usual candy, cigar and other booths with a good restaurant where the inner man may be appeased at a small cost. Swings are universally popular, and it must not be forgotten that while the older folks and the male population may crowd the park in the evening, there are some good long

* Second annual Report presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

hours during the day when business might be done to advantage. For this reason as many features as possible to make it comfortable for the ladies and pleasant for the children should be installed. If you can get the children interested you can get their mothers, and sisters and aunts, and they all make riding during a portion of the day when they can be handled very nicely. There should also be some sort of accommodations for picnic parties. The ideal accommodations of this character would include a covered pavilion with tables and chairs where lunches might be comfortably eaten whatever the weather, and some means of warming up coffee, cocoa or other auxiliaries to a lunch would be well received, although regarding this, fire dangers must be considered and perhaps a watchful attendant might be necessary.

As many various sorts of concessions are advisable as the patronage and tastes of the patrons seem to justify. This is another thing that local conditions will have to govern.

Theatres have been found to be about the best of what might be called special attractions. The majority of the parks have open theatres, as far as the seating space is concerned, but it would undoubtedly be better if a theatre combining the airy coolness of the open theatre and the safety in case of rain, or a covered or closed theatre could be used. This is more expensive, but in the long run would probably justify itself.

The character of the shows presented in these theatres depends upon the community, what they like and what they are most in the habit of seeing during the winter months. It is advisable, if possible, to give them something different from their regular theatrical entertainment. In the majority of parks it has been found that the strong popular preference is for vaudeville shows of five or six good acts. The price of admission varies in these theatres, but it is generally considered that reserved seats should not be over 25 cents, and the majority considerably less.

Bands are essential to the full enjoyment of people of this country when seeking out-of-door amusement, and they should be made use of as often as the conditions will permit, Sundays and holidays, or certain days during the week, or every day if the patronage would make it possible to stand the expense. It is also wise to introduce during the season a number of unusual special features, free, and in addition to those that the regular park attractions afford. Of these the most popular seems to be balloon ascensions, but there are baby shows, animal hunts, driving horses and a wide diversity of thrillers that draw crowds at these times and keep people in the habit of looking to the park for their pleasure.

Whatever the attractions and whatever the location and general make-up of the park may be there is one thing that must not be forgotten and cannot be expressed and emphasized too strongly and that is, that the best of order should be maintained at the park, whether by the regular city or town police or by special park officers sworn in as deputies. Nothing gives a park a knock-out blow so quickly as disorder, and the management should go to any length to see that it is quelled in its incipency.

The general management of a park when operated by a street railway company itself should be vested in one of the company's operating staff, although he may have an assistant manager directly in charge. The final decision, however, should be his.

Advertising the Park.

There is another point which cannot be too strongly considered in the operation of an amusement park by street railway companies, or anyone else, and that is the advertising of the same park. A first-class, well-kept park nicely located and with an abundance of good attractions will, of itself, attract some people, but only by the most strenuous kind of publicity will it attract enough people to make the venture possible.

How to advertise is the question. How to spend the least money and get the most results. The most expensive advertising is not always the most profitable. Many a business concern has spent millions in advertising and then gone into the hands of its creditors. The advertising which counts is of the character that is seen by the people who are most likely to be attracted by it. That may sound like a self-evident fact, but it is not so self-evident but that it is often disregarded.

Of all forms of advertising in these modern days it is universally conceded that newspaper advertising stands at the head. This applies to parks as well as to everything else. It must be sharp and to the point, not too niggardly and must be supplemented with attractive reading notices in the regular news columns. Whether all this matter is paid for and how much of it is used depends, of course, on the attitude of the newspapers toward the park management and the cleverness of the advertising man. It must not be for-

gotten in this matter, as in all others, that newspaper men are a bright, intelligent, self-respecting lot of workers, very sensitive about being used fairly and squarely, as one gentleman should use another, and that they will do more in return for courteous, fair-minded treatment than money can ever procure.

Next to the newspapers, and standing almost beside them in importance in park advertising are the cars themselves of the park operating company. The first people to be reached are the people who are in the habit of riding on the trolleys and nowhere may they be better reached than in the cars upon which they ride. These cars also traverse the entire district tributary to the park. It must be found profitable advertising to hang dasher signs upon these cars, signs that have very little reading matter, but which bring out the main attractive features plainly so that all may read.

Another splendid way in which to make use of the company's own facilities is to fix up an old car with bill-boards on each side and cover them with bit stands of advertising paper advertising the park, with a proper arrangement of lights so that they may be used at night and then run them continuously over the lines. Advertising cards are also valuable when tacked in the ends of the cars or suspended in frames, where it is possible to do this without infringing on the contract of any advertising concerns. Bill-board advertising is valuable in some sections, but it is doubtful if it is as strong as any of the other methods suggested, and as a rule, should be used merely in a supplementary way.

In this matter of advertising on and in the cars, it may be well to lay special stress on the fact that if this advertising matter is printed it should be religiously used—not on one car but on all. There is a habit among operating men, who feel that their first and almost only duty is to see that the cars are run according to schedule as nearly as possible, of letting a lot of this paper lie around loose in car barns, instead of plastering the cars over with it. It is needless, perhaps to speak of this, but only the most constant and eagle-eyed attention to this matter is sure to bring the results. It must be followed up assiduously or the expenditure will be for naught.

On the whole, investigation seems to show that, given a good park in a good location, in a community capable if sufficiently interested to support a park of this size and character, with good attractions, good order and proper advertising, there should be no reason why the incentive it gives to travel should not make it a profitable venture for a street railway company to promote.

Many small railway properties are not financially able to make large expenditures for parks upon the lines practiced by the larger railway properties, and it has been the experience of not only some small, but some large railways to lease desirable, nicely wooded sites, favorably located, and to build some open air fire places, at a cost, say from \$10 to \$15 and to provide neatly constructed rustic pavilions, and by this means make an attractive spot for picnics and outing parties.

Base Ball.

The matter of professional base ball as a promoter of traffic is a subject which the committee believes to be worthy of serious consideration. The interest taken by the general public in the national game during the past few years has been growing, as is evidenced by the large number of associations formed in cities varying in population of from 200,000 to 15,000 in the Eastern, Southern and Middle-West states. The information bearing upon this report is gathered largely from the territory above named.

The large majority of electric railways either operate pleasure parks in connection with their systems, or their lines extend to or pass parks of a similar nature, operated by parties interested outside of the railroad. Where the above conditions exist, and the parks are suitably located, it is found advantageous to locate the ball park either in or adjacent to the park grounds, the ball park being either owned or controlled by the railway company. There seems to be no uniform system of leasing the base ball parks, each company apparently handling the matter in the way which would seem advantageous to the road.

Assuming the railroad company controls the base ball park, one of the methods which has worked out satisfactorily is the leasing of the grounds without consideration for a period of years to a local base ball association, the railroad company maintaining it depending entirely upon the revenue from transportation as its return.

Another method of handling this business which has proved satisfactory in some of the smaller cities, is for the railroad company to form an association of parties whose interest is friendly to the railroad. The grounds are leased to the association for a nominal sum, the association to put the grounds and buildings in condition and furnish uniforms

for the ball team. They in return guarantee to keep the grounds in repair, police them and play a stipulated number of games each week during the ball season, which is usually 12 weeks.

The association may be formed from all classes who care to be interested. One of their members is elected as business manager, who in turn appoints some college player as manager of the team, which team is largely made up of college students.

During the past few years a number of railroads operating in cities with a population as hereinbefore stated have taken up this subject. They provide suitable and attractive grounds and grandstand, and the financial results derived from the income, after deducting interest and depreciation, have been very gratifying. In several instances where the ball parks are located adjacent to the railroad's pleasure grounds, the income from this sport compares favorably with the best amusements operated.

The committee has given this subject careful study, and the conclusions reached are that street railways operating in a territory where the density of population will support a first-class base ball club, will find it will add considerably to their revenue if the matter is intelligently handled.

As an illustration of the method pursued by the Pottsville Union Traction Company, of Pottsville, Pa., herewith is appended the form of contract between the railway company and the representative of the Atlantic league; it is interesting to comment that the earnings from the base ball park exceeded the expectations.

Ice Skating.

The subject of ice skating as a promoter of traffic is one that has been given some consideration by a large number of roads in certain localities. Where rivers and lakes are within easy reach of the street railway lines, due to local conditions, ice skating has been very popular. Where facilities for skaters are located remote from highways of public travel and it is necessary to extend the lines to transport the skaters, the financial results to the road are problematical and in such cases should be given careful thought before the investment is made. Usually places are found on some parts of the existing lines where skating can be had and, if situated in the suburbs, a sufficient number of arc lamps may be erected and operated from the trolley circuit to furnish light for evening skaters.

The cost of keeping the ice in good conditions for skaters, and the result of snow, is a subject for serious consideration. In some cases where the income derived from this class of patrons has been very satisfactory, the expenses have been so great as to leave little or no profit.

The committee is of the belief that a railway company is not warranted or justified in making any large investment to care for this source of travel, as the results from this traffic largely depend on weather conditions.

Special Cars—Excursion Rates—Special Rates.

The committee is at loss to know how to contribute anything new regarding these subjects in addition to that which was included in the report of the committee last year.

It is the sense of the committee, however, for railways having heavy regular service, not to originate excursions, but to cater to special car service and excursion business planned by others.

Freight and Express.

The committee has to report that the development of the trolley freight and express business is becoming quite an important factor in the earnings in railway properties in various parts of the United States.

The value of statistics is unquestionable, and in view of the large number of railways now actually carrying on this character of business, we respectfully suggest and recommend the appointment of a committee to report upon "Freight and Express" at the next annual convention; the report to treat upon, particularly, the most desirable methods to be pursued, charges to be made, methods of collection, and, above all, to collate statistics bearing upon the revenue to be obtained from such business and the operating expenses, and finally upon the character of equipment, stations, sidings and terminals.

Conclusion.

The committee has obtained through the courtesy of the "Street Railway Journal" and the "Electric Railway Review"

most valuable indexes of articles bearing upon the various questions affecting the subject matter of your committee's work.

Respectfully submitted,

W. E. HARRINGTON, Chairman.
H. J. CROWLEY,
H. E. REYNOLDS,
H. F. GRANT,
G. W. PARKER.

Committee on Promotion of Traffic.

Appendix "A."

"ARTICLES OF AGREEMENT, made and concluded this eighteenth day of December A. D. one thousand nine hundred and six, by and between The Tumbling Run Park Association, party of the first part, and Ernest C. Landgraf, of the city of New York, State of New York, party of the second part, witnesseth that said party of the first part hereby stipulates and agrees to rent to the party of the second part a certain base ball park located near the premises of the party of the first part in the township of North Manheim, County of Schuylkill and State of Pennsylvania, which park shall be properly fenced and shall contain a grand stand with a seating capacity for five hundred persons and bleachers with seating capacity for six hundred persons. To have and to hold the said ball park for and during the base ball seasons of 1907 and 1908, together with an option on the part of the party of the second part to renew the lease for longer season upon such terms as the parties hereto may agree upon.

"In consideration of the premises, the party of the second part covenants, stipulates and agrees to pay to the party of the first part an annual rental of four hundred and fifty (\$450) dollars to be paid in manner following, that is to say, one hundred and fifty dollars on the first day of May, one hundred and fifty dollars on the fifteenth day of June, and one hundred and fifty dollars on the 15th day of July, in each of said two years. The party of the second part also covenants and agrees, as soon as the gross receipts of said park amounts to ninety-five hundred dollars, to pay to the party of the first part, as an additional rent, one-half of the excess of the gross receipts over and above ninety-five hundred dollars after deducting from said excess 10 per cent. of the gate receipts for the Atlantic League treasury, and also deducting to pay each visiting club either the sum of fifty dollars or fifty per cent. of the gate receipts, as each visiting club may elect. Such excess of rent shall be paid by the party of the second part to the party of the first part daily after any game or series of games shall have been played.

"It is mutually understood and agreed that the base ball park shall be in the form of a rectangle, whose size shall be not less than three hundred and sixty feet by three hundred and eighty feet.

"In testimony whereof, the parties hereto have set their hands and seals the day and year first above written."

TUMBLING RUN PARK ASSOCIATION,

W. E. HARRINGTON,
President. (Seal.)
ERNEST C. LANDGRAF. (Seal.)

Signed, sealed and delivered in the presence of us:

(Signed) R. H. KOCH,
(Signed) F. A. HEWETT.

Approved by Counsel,
R. H. KOCH,
12/18/06.

CAM CURTAIN FIXTURES.

Curtains for electric railway cars usually are a source of considerable trouble. Either they will not roll up or they will not stay in the position placed. The National Lock Washer Company, Newark, N. J., states that its curtain fixtures are free from these troublesome characteristics. With the locking cams in these fixtures there can be no creeping of the curtain; coil springs within the fixture force the cams against the bottoms of the grooves in the window casing, firmly holding the curtain.

Strong tension is put on the spring roller at the top and with the fixture held firmly at the bottom there can be no flapping in the wind—a disagreeable feature of many types of curtains and fixtures. As the locking cams are self-adjusting, changes from wet to dry weather do not cause the curtains to stick in the grooves.

LIGHT FREIGHT HANDLING BY ELECTRIC LINES.*

BY P. P. CRAFTS, GENERAL MANAGER, IOWA & ILLINOIS RAILWAY,
CLINTON, ILL. AND GENERAL MANAGER, JOHNSON & PITTS-
BURG RAILWAY, PITTSBURG, KAN.

This subject has been discussed pro and con for a number of years, in fact, ever since the interurban railway became a reality, that is, after it branched from the confines of the so-called urban railway. Although some of the older and slower roads began to conduct a so-called express business several years ago, the freight carrying field was not entered with spirit until the modern high speed road, built on private right-of-way, with heavy construction, was developed. It was then discovered that the interurban could not only compete with the steam roads and express companies, but that, due to its frequent and reliable service, it could also develop a freight business that could not have been developed by them.

To be sure a number of the earlier roads have charters which do not admit of their carrying freight or express but, on the other hand, the managers of many roads, although unhampered by such restrictions, have not given the subject the attention which it deserves.

As a result of the errors made by the earlier roads coupled with their faith in the final outcome of a concerted and careful campaign, some of the newer high speed roads in the Middle West made a start. To-day, it is a common thing to read

larger number of shipments at the minimum rate, which is, in fact, the most profitable part of the freight business, except in car-load lots.

Conditions of Profitableness.

Whether or not a freight business will be profitable depends somewhat on the following conditions:

1. The population served outside of the main terminal and its dependence upon that terminal as a trading center.
2. The proximity of other trading centers to the population served outside of the main terminal, and the railway facilities tending to attract business away from the main terminal.
3. Steam trunk line connections leading to the main arteries of commerce and the ability of interurban roads to establish joint rates with them.

A full exposition of the third condition cannot be given without consuming too much time. In general, however, an interurban road with proper freight handling and terminal facilities, which offers quick and efficient service, together with joint rates with some trunk line, in competition with other trunk lines operating between competitive points, may reasonably expect a fair division, or a greater portion, of the freight traffic. As stated earlier in this paper, shippers desire the best service with lowest rates, but, assuming rates to be even, shippers are generally favorable to the roads which provide



Modern Electric Express Car.

of interurban financed and constructed with a view of handling freight as well as passenger traffic, as it is now becoming an important factor in the earnings.

Care in Handling.

Where parallel steam competition exists, interurban managers should not be discouraged for shippers will favor the road which gives them good passenger service, provided, of course, rates are equalized and proper attention given to that branch of the business.

Generally speaking, it is a mistake to assume the position that freight will be carried only as an accommodation to your patrons, and then charge an exorbitant rate or neglect to ship promptly, or to take proper care of the shipment after arrival at its destination. On the other hand, many managers, in their anxiety to build up a profitable business, have overloaded their roads with expensive handling facilities, such as costly freight depots, intricate accounting systems, free team deliveries, etc., which have eaten the profits that might otherwise have been realized.

For that reason, it is sometimes a mistake to charge a higher tariff on passenger cars than is charged on freight trains; rather say to the shipper that you will handle his small rush shipments, on passenger cars when possible, at the regular rate, as an accommodation, so long as he confines himself to the freight trains as far as possible. It is very gratifying to the average shipper to know that the road upon which he depends will accommodate him when he gets caught short of some commodity, or that his profits will be increased by being able to obtain quick shipments of perishable goods. This also induces him to carry a smaller stock of staple articles, the result being that the road gets the benefit of a

good passenger accommodations; consequently the interurban roads reap the reward of frequent passenger service.

Owing to the antagonistic attitude of the steam roads, however, it is generally difficult to establish joint rates except where competition does not exist between them, unless connection may be made with some competing road which disregards the pooling or territorial agreements.

Let us trust that the day is rapidly approaching when the national and state commissions will take such action as will induce our larger and more powerful brothers to recognize the despised interurban. The progressive and aggressive attitude of the interurban managers, if continued, will exert more influence in that direction than anything else that can be done.

Classification.

Interurban freight traffic may be properly divided into the following classes:

1. Strictly light packages, transported only in baggage rooms of passenger coaches, at express rates or at a fixed charge per package or per hundred pounds, regardless of class, and generally termed express business.
2. Less than car-load freight transported on fast baggage cars at regular freight or special tariffs under regular or special classifications, generally the former.
3. A combination of class two and the haulage of a few local carload shipments daily at regular tariffs and classification.
4. Regular car-load tariff hauled by steam or heavy electric freight locomotives at regular tariffs and classifications. Or any combination of the above mentioned classes.

Depending upon local conditions the freight traffic of a road may be confined to any one of these classes or it may be started in the first class and grow to the fourth class. As the

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

fourth class will be discussed in another paper, I will treat only the first three classes, particularly the second class.

A freight business of class 1 may be conducted at small expense and is of material assistance in the earnings of a road. The freight carried consists generally of packages easily transported in baggage compartments of passenger cars, which are usually empty except for a very few trisps per day. Usually no extra office force is required, the only expense being for stationery, books and possibly a small storage space at the main terminal. In some cases, when the charges are a certain rate per package, regardless of weight within reasonable limitations, a proper system of tickets dispenses with way-bills, expense bills, etc.

Inasmuch as the majority of freight-handling interurban roads comes under the head of class 2, that part of the paper will probably be of interest to the greater number of managers, so I shall enter into greater detail in handling the subject.

Interurban roads which conduct their freight business under the head of class two more nearly approach operating conditions parallel to the time freight business of steam railways. The ability of the interurban roads to make fast time and to deliver at highways, farm crossings and warehouse or store doors is an inducement to either the shipper or the receiver, which assists in obtaining the business. Being usually restricted, however, to a narrower car similar in appearance to a passenger car, due to operating over city streets, an interurban road has limitations of its freight earning capacity.

The profits of such a business depend largely upon the opportunity of the management to secure combined freight and passenger depots at the terminals and in the larger local towns, so that extra labor in billing and handling at stations may be avoided, upon the charges of terminal city railways for the right to haul freight over their tracks, and upon the hour of day when freight may be delivered to receivers.

Generally speaking, the margin of profit in this class is close and only careful management will produce a profit, particularly during the first few months after the business is started. Expenses must be carefully watched and attractive freight houses and convenient hauling facilities at terminals sacrificed for something which costs less to maintain.

Damage claims must be very carefully handled, and to that end it is advisable to adopt some system of billing and accounting which permits a shipment to be easily traced from its starting point to the final destination. Some interurban roads have adopted simple billing systems, requiring only one writing to make the receipt, way-bill, expense bill and office copy. Such a system, however, does not permit of proper checking, particularly if merchandise is transported over more than one road.

After an interurban road enters class 2, a good local commercial agent is a necessity. The business, consisting of a great number of small shipments, requires constant development and care, particularly if competition exists. A live commercial agent, who is a good street man, and not a desk man, earns his salary many times over, particularly if he understands how to deal with shippers. The business obtained depends considerably on the personality of the commercial agent.

I fear that many managers, in charging expenses to the freight business, do not give proper consideration to such items as additional clerks, printing and stationery, insurance on goods in freight houses, a proper percentage of the receipts to cover loss and damage, power for freight cars, proportion of track and line maintenance, telephone service, interest on the freight handling investment, etc. Neglect of these items deceives the manager as well as his stockholders, and unless receipts grow beyond the safe point the awakening will be painful and embarrassing.

Methods of Iowa and Illinois.

Perhaps a brief description of the freight business conducted by the Iowa & Illinois Railway Company may be of interest as illustrating the point brought out in the foregoing paragraph. We went into the freight business in a very tentative manner. In fact, it took considerable time for us to decide whether or not there was sufficient business in less than car-load lots to warrant the purchase of a freight car and the expense of operating a freight business.

The next grave question was that of rates, and, after considering for some time a reduction of the rate below that permitted by the Iowa state laws for class "A" roads, we finally concluded to adopt the maximum tariff and to consider the business as freight and not express.

At first our old passenger depot in Davenport served also as a freight depot, but within very few months, we outgrew the capacity of the space allowed to freight and were forced to take our passenger business to a new location. In Clin-

ton, we still have sufficient space to handle the business, but within a very few months we will be compelled to seek additional storage room.

Immediately upon starting the business, we engaged a commercial agent, and the quick growth of the receipts to the point where we are paying expenses showed our wisdom in so doing. Within one year, with one freight car engaged in the business and the use of passenger coaches to carry some freight, the business grew to a gross exceeding \$10,000 a year. During the summer and fall of 1906, we were compelled to operate our freight car two round trips per day for nearly 75 per cent of the time, and after the contract with the American Express Company was put into effect, we purchased and placed in service a trailer freight car, having the same capacity as the motor. The improved facilities which we have been able to offer shippers since purchasing the second car have increased the business at a very rapid rate.

We make a specialty, on less than car-load business, of beating the time of the steam railroads 24 hours between Davenport and points on the Chicago & Northwestern Railway in the western part of the state. For this reason, we obtain considerable business which is transferred to that road.

Besides this rush shipments in small quantities of perishable goods, such as milk, cream, butter, eggs, fruit, etc., from certain stations are handled in the baggage rooms of the passenger coaches.

We find that a trailer freight car is much cheaper to operate than a motor, but of course, it can handle only through business. It does not seriously delay the passenger coach to which it is coupled.

When the freight business was started, we adopted what we considered to be a very simple set of forms for billing and accounting, but we soon ascertained that the tracing of damaged and stray shipments was very difficult, and after carefully looking over the field we finally adopted the forms used by the Chicago and Northwestern Railway. These appeared at first to be very complicated, but a short acquaintance indicated their simplicity and the ease of tracing damaged and stray shipments.

We make a specialty of rush orders by telephone via our private line. Often a merchant in Clinton, who finds himself short of some particular article, telephones to us, and through our Davenport office, via the private line, we transmit the order to the shipper in Davenport. Shipments so ordered are frequently in Clinton within two hours from the time we were called up at the Clinton office.

Wherever possible, we deliver from the cars to the store doors, which saves drayage and naturally brings business to us. A number of small platforms at which we stop the local express cars have been built by the shippers between towns.

We constantly endeavor to please our shippers and to show a spirit of co-operation, which has a great influence on the growth of the business.

We endeavor to be conservative in charging off expenses against the freight business and work into it anything which rightfully belongs there. We go so far as to charge off monthly three per cent of the gross receipts. This is piling up a tidy fund, but we propose to allow the account to grow, for at any time we may have to meet heavy freight damages due to fire, water or wreckage.

At the present time, the earnings from this business amount to 15 per cent of the total gross and we hope to see it reach 20 per cent on the same basis, i. e., while our freight business comes under the head of class (2).

Our transfer business has been developed under heavy steam road competition at lower rates, for in obeying the state laws we have been compelled to charge two local rates which are higher than the rate for the same mileage in a continuous haul on one road. The saving of time mentioned above has accomplished that result.

A recent ruling by the Iowa Railway Commission reduces the tariff on two locals 20 per cent., and although our receipts per shipment will be naturally reduced, the increase in volume of business will be gratifying.

This exposition of the freight business as conducted by the Iowa & Illinois Railway is not made so much to indicate what is being done by that road, but is rather intended to illustrate the methods generally pursued by interurbans of like character.

An investigation made of a number of roads has brought out the fact that the average interurban conducting a freight business pursues practically the same methods described in this paper. There are, of course, a number of roads which pursue other methods and successfully too, but, in such cases, local conditions govern to a great extent.

The percentage which earnings from freight traffic bear to the total gross earnings of course depends largely on local conditions, but of those roads which have favored me with statistics, I have ascertained that these earnings vary from 5

to approximately 40 per cent of the total gross. Interurbans which handle car-load business, in addition to the traffic of which this paper treats, in some cases enjoy gross earnings from freight exceeding those derived from passenger traffic.

I believe the experience of interurban railways to this date is that such satisfactory results are now being obtained, I am safe in predicting that any average interurban railway, the existence of which is warranted by prospective passenger traffic, can be assured of a profitable freight business, which within a few years, if not immediately, will become an important factor in its earnings.

A DEPARTMENT OF PUBLICITY.*

BY J. HARVEY WHITE, PUBLICITY MANAGER, BOSTON ELEVATED RAILWAY COMPANY.

The organization of public departments by public service corporations is a comparatively recent innovation. For many years certain corporations have maintained carefully organized and systematically conducted advertising departments, but it has been only within the past few years that a few of the larger companies have established departments for supplying the public with general information relative to their affairs, plans, policies and acts.

Publicity has been heralded as a positive and permanent cure for all corporate ills. A loud and increasingly clamorous cry for corporation publicity is being raised by the public, press and political leaders who commonly represent that corporations are monsters of inequity, plundering the poor defenseless public. So persistently have they been portrayed as institutions of dishonor, greed and oppression, that the public is disposed to believe any accusation against a corporation unless overwhelming evidence to the contrary is produced.

The problems involved in the public relations of large corporations to-day are quite as important as, and in many cases much more complicated than, those involved in operation. It is in the general field of public relations that a department of publicity finds its principal usefulness and performs its most valuable service. Its function is to enable the public to know the corporation as it really is.

Annual reports disclose the vital statistics relating to operation and finance. These complications are not only seldom read, but are almost meaningless to the general public. They do not and cannot meet the popular demand for publicity. The public wishes to know and is being educated to the belief that it has an absolute right to know practically everything that relates to public service corporations. A refusal to answer in full every question that may be proposed to a corporation is commonly regarded as *prima facie* evidence that it is afraid to have the truth known and conclusive evidence that it is arrogant, insolent and despotic.

Public opinion is a practically irresistible power. The company that stands discredited in public opinion is hampered and harassed at every turn. It does not receive fair treatment. Its merits are not recognized and every shortcoming will be magnified. On the other hand, if the public believes that a company is trying to give an efficient service and a "square deal," its excellencies will receive some recognition and its unavoidable defects will be tolerated with reasonable good nature by a large portion of the community.

No one who participates in the larger responsibilities of street railway management needs evidence outside of his experience as to the power of public opinion or as to the importance of securing and holding the public good will. It is undoubtedly a fact that the service rendered by most street railways merits a larger measure of public confidence and esteem than is accorded. The reason that the public so often fails to give full credit where credit is due is not because the public is constitutionally unfair, but because it is uninformed or misinformed. To overcome this defect, to eliminate unfairness and hostility based on ignorance or misinformation is the function of a department of publicity, and the extent to which this is accomplished is a fair measure of the department's efficiency. Responsibility for criticism and opposition based upon real facts must be borne by the general management, but responsibility for hostility and unfairness based upon public ignorance must be borne by the department of publicity if it is authorized to make the real facts known.

The Local Press.

The most efficient, available and practical agency for developing a fair and even friendly public sentiment is the local press. If the local newspapers constantly condemn the service and policy of a corporation, even though the criticism be unfair and unfounded, the public is certain to become antagonistic.

If, on the other hand, the facts presented by the newspapers to their readers show that the company is alive to its obligations and is giving a reasonably good service and that its shortcomings are not due to indifference, inefficiency or willful disregard of public rights, public unfriendliness will be reduced to a minimum.

The first step toward securing fair treatment of a company by newspapers is fair treatment of newspapers by the company. This means the reversal of the old and rapidly disappearing policy of giving no information that can be withheld, and establishing a policy of entire frankness and withholding nothing that can properly be supplied for publication.

If those whose duty it is to gather news learn from experience that all reasonable information is truthfully and promptly supplied to them and that it is only in rare cases that their requests are denied, they will learn to depend upon the company, as they ought to be able, for their news, and the stories that get into print will be more accurate and more satisfactory to both the publisher and the corporation.

The first essential for a department of publicity is ability to secure information quickly and accurately. The person in charge should have facilities for reaching every department and branch of the organization. The range of inquiries touch every phase of railway activity and interest. The head of the department will be called upon to give information concerning operation, construction, equipment, discipline, law, legislation, accounting, finance, plans, policies, accidents, undertakings and occurrences of every description. It is not necessary for the head of a department of publicity to have a very profound knowledge of any particular branch of the business, but he should know a little something about nearly everything that pertains to, or affects, the company.

Next in importance to ability to get information quickly and accurately is to make the department accessible to the newspapers at all hours of the day and night. From midnight until about ten in the morning, there is seldom need of being prepared to furnish information about anything except accidents or other unusual occurrences, but from ten o'clock in the morning up to midnight all sorts of inquiries are received and the department should be prepared to answer them.

Equipment of Publicity Department.

The equipment of a department for publicity work need not be elaborate. One man with a telephone connected with all of the departments and stations, a desk and a few chairs for the use of reporters can accomplish considerable valuable work. A large company will require a somewhat more extensive outfit. The writer of this paper is provided with two offices; a private office for himself, and a general office for a stenographer and clerk. Each office has a telephone. There is a small library, a collection of maps and plans, files for clippings, documents, memoranda and correspondence. These offices are open from nine to five on business days. During the other hours of the day and night and on holidays and Sundays a clerk, to whom all accident reports are made as soon as possible after their occurrence, is on duty and gives information to the newspapers.

The company's effort to cooperate with the newspapers in securing accuracy in stories relating to the company is generally appreciated in the newspaper offices. Inaccurate news accounts are still printed and the company is misrepresented in reports, but there are decidedly less of these objectionable and unwarranted statements than formerly appeared. Uniform accuracy in newspaper reporting is as impossible of accomplishment as the entire elimination of accidents in railway operation. All that can be accomplished in either case is to reduce the unfortunate occurrences to a minimum.

The Boston Elevated Railway Company does comparatively little advertising. The exhibit which has been prepared for this convention is, therefore, not very extensive. It consists of a bird's-eye view of the system on a large poster, a map of the central portion of the system, showing connections and pictures of places of interest reached by it and a few display newspaper advertisements of trolley trips.

What has been said in this paper relates to publicity from the company's standpoint. An appropriate conclusion to the discussion is a presentation of the same subject from a newspaper standpoint, and this is to be found in the remarks of Thomas F. Anderson, one of the best known representatives of the press of Boston, made at a meeting of the Massachusetts Street Railway Association last winter.

Viewed by an Outsider.

Mr. Anderson said: "This is an age of publicity, and it is a great mistake for any transportation company or other public service corporation to try to ignore this fact and keep the newspapers and the public in the dark concerning its doings."

"In the nearly twenty-five years that I have been actively engaged in journalistic work a vast change has taken place,

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

not only in the physical make-up and the management of street railways, but in their general relations to the press.

"In the old days, it was sometimes next to impossible for a newspaper man to obtain from the head officials of these companies any authentic information about the company's affairs, no matter of how legitimate public interest it might be, and one of the most dreaded of my 'assignments' in the earlier days of my newspaper work was that of interviewing the taciturn and unapproachable president of one of the larger of these roads.

"How different are the conditions to-day! Twenty or twenty-five years ago the reporters often had extreme difficulty in getting a satisfactory report of the annual meeting of one of these companies, but see what happened here in Boston within a week, in connection with the annual meeting of the Boston Elevated Railway Company.

"Not only was a carefully prepared summary of the company's report and financial statement sent around in advance to all the Boston newspapers, but the company, through its publicity department, even made itself responsible for officially reporting the election of directors and all the other essential details of the meeting. The newspaper reporters and editors didn't even have to do any thinking and the best thing about it all was that the published reports were in exact accordance with the facts. Under such conditions there was, of course, no excuse for inaccuracy.

"Twenty years ago the reporter sent by his city editor to interview a street railway president—frowningly 'grouchy' or smilingly uncommunicative, as the case might be—always went forth on his errand with fear in his heart, and usually was obliged to cool his heels in an outer office awaiting the great man's pleasure.

"To-day he sets forth with lightness of spirit, for he is morally certain that the twentieth century railway magnate will give him the 'glad hand' and perhaps a good cigar; and if he cannot give him the information he seeks he will at least send the newspaper man away feeling almost as pleased as if he had secured the desired news.

"Not only have the managements of our street railways adopted a radically different policy with respect to their personal dealings with representatives of the press, but they have gone even a step farther, in some instances, and established official 'publicity bureaus,' after the manner of the modern steam railroad company.

"Through the medium of these departments, the press is kept in constant and almost instantaneous touch with the affairs of the company, and the president, vice-presidents and general manager of the corporation are each and all relieved of the burden of attending to the wants of a battalion of news-gatherers.

"When I speak of publicity bureaus in this connection I do not mean the departments established by some roads for the special purpose of advertising the facilities and attractions of the road, but those that have been created primarily for the purpose of serving as an official medium of news and news-suggestion between the public and the newspapers.

Boston Elevated Publicity Department.

"The first American street railway company to establish a publicity bureau of this sort was the Boston Elevated company and to William A. Gaston, who was president of the company at that time, is due credit for this exceedingly happy concession to a legitimate public demand for authentic information.

"The elevated company's publicity department was established in 1897, and it grew out of President Gaston's conviction that the public, which furnished the patronage and the dividends of the company, really had some rights in addition to that of riding a certain distance for five cents.

"Another important consideration was that the time of the president was too valuable to be infringed upon very extensively even by newspaper men; and this was probably the determining reason for establishing the bureau.

"J. Harvey White was selected as the head of the department. At first he devoted only a part of his time to this work, but with the growth of the system, and the increasing popularity of the bureau itself with the newspapers, he was soon obliged to give all his time to the duties. Just now that comes pretty nearly meaning 24 hours a day, for he is practically 'on call' at all hours.

"Mr. White has an office of his own in the elevated company's building, and has a stenographer and an assistant. His mission in life is not to advertise the company, except as that may come in incidentally to his regular work, but to save the time of President Bancroft—one of the busiest men in New England—and to aid the newspapers in getting authentic news reports about the company, be it changes in policy, accidents,

appointments of officials, additions of new rolling stock, or what not.

"His time is given up largely to receiving and talking with reporters who come with every conceivable sort of inquiry, all of which Mr. White is supposed to be in a position to answer off-hand; and when he is not doing this he is preparing special matter to be sent out by himself in the shape of news items of 'special articles.'

"When I called on him the other day he was preparing for the Boston papers an article about the life history of the latest employe to be added to the elevated company's pension list; and not only had he obtained and prepared the necessary data, but had sent the company's official photographer to make some photographs of the subject—all of which will later make a readable article that will be appreciated by both the newspapers and the public.

"It is the policy of the elevated company—in contrast to the secretive methods of many of the old-time street railways—to give out everything of a news nature that can possibly be construed as legitimate public property; and in the case of accidents everything except the names of those who are injured or claim to be injured.

"The later reservation is made for the protection of the company, and to circumvent the enterprising 'ambulance attorneys' who are always around in times of such trouble, and some of whom do not scruple to engineer legal conspiracies against the company. The elevated company, like most others, also has a rule forbidding its employes to give to reporters or others any information as to accidents."

ADVERTISING FROM THE STANDPOINT OF THE STREET RAILWAY COMPANY.*

BY A. W. WARNOCK, GENERAL PASSENGER AGENT, TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

This is the age of advertising! No one who wishes his business to grow and develop neglects the important feature of publicity.

One of the last industries to adopt this modern business force was the street railway, but these carriers are appreciating that printer's ink, judiciously used, is the power to encourage trolley travel and assist in the delightful work of paying dividends. It is such an axiomatic and proverbial saying "Advertising Pays" I will not take any time to discuss that question. I shall try to suggest some practical means for advertising street railways that may prove interesting.

When I say that advertising pays, of course I mean—it depends. Depends on what you have to offer and how you offer it. But granted you apply the same reasonable business rules to the problem that you would to any other feature of operation, there is no question but that returns will be satisfactory.

I take it that what one company thinks and what one company has done will be a far more interesting story to hear than a long line of glittering generalities. So with that end in view, I want to tell you what the Twin City Rapid Transit Company, or the "Twin City Lines," as we are now calling our system, have recently done in the line of publicity.

Two years ago the "Twin City Lines" completed and opened for travel the famous "Great White Way" electric line of 18 miles from Minneapolis to Lake Minnetonka. This line is now one of the really celebrated electric lines in the United States and has been the means of revolutionizing cottage and picnic life at Lake Minnetonka, "The Lake Beautiful" of the Northwest. With the opening of this line, the company found a great many opportunities for expansion. The fleet of four large steamboats already operated on Lake Minnetonka was purchased and rebuilt. The company also built in its own shops six fast express boats, each 70 feet long and capable of a speed of 15 miles an hour. The idea of this fleet was to encircle the shores of the lake and build up a summer cottage business for the electric line, as well as to offer transient tourists and excursion parties an opportunity to cruise the lake.

To supply the demand of picnic parties, 65 acres on beautiful Big Island were purchased and converted into a most attractive picnic and amusement resort. This island is two miles distant from the terminus of the electric line, and three large ferry boats which the company built, with a carrying capacity each of 1,000 passengers, were put on to perform a shuttle service between the electric line and the park. One of the steam roads which had furnished service between Minneapolis and the lake was leased and electrified, giving the "Twin City Lines" two first-class routes between Minneapolis and the lake. In view of such broad development there was urgent need for

* Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

the widest publicity in order to secure business, and the general passenger department was formally launched. This department had for its function the development of business for the two lines to Lake Minnetonka, for the fleet of a dozen steamboats, and for Big Island Park, as well as for many other parks and resorts, such as Minnehaha Falls and Lake Harriet in Minneapolis; Phalen and Como Parks and Indian Mounds in St. Paul; Wildwood, on White Bear Lake.

Having outlined our necessity and appreciating that our lines offered unique and magnificent opportunities for exploitation such as are possessed by few electric transportation companies, we undertook a vigorous campaign with the central idea of letting the public know what we had for sale. Our advertising has been along four general lines: Newspapers, folders and pamphlets, car window cards, special advertising, and I will briefly relate our experience with each of these methods of advertising.

Local Newspapers.

There has always been a good sentiment existing between the "Twin City Lines" and the local newspapers. The time will probably never come when street railways or any other public service corporation will be immune from criticism on the part of the press, and this is a good healthy sign, both for the press and for the roads. I am making a temperate remark when I say that, through and through, our newspapers, as well as our public, entertain a fine feeling of regard for our company. I think this is due in large part to the high personnel of our management, which is broad, progressive and always disposed to do the fair thing. Our company has anticipated what people want instead of being urged by them to fulfill their wants, and I think as you travel the country over, you will find no street car patrons more loyal or more to express superlative praise for their home system than the people of the cities of Minneapolis, St. Paul and Stillwater. I emphasize strongly the feeling between the press and the road because I think it a strong asset that every road should have. The good will of the newspapers is of incalculable value and a road should utilize every fair means to secure the support of its newspapers. I mean by this that the relation of the company to the public should be of such a character that in all fairness the newspapers will have a friendly feeling for the company. Criticisms, of course, will be made on the best of service, but the general trend of sentiment should be favorable. There is nothing that appeals to newspapers so strongly as the practice on the part of a public service corporation of taking the public into its confidence, and we have always taken our public into our confidence.

Our newspapers do not accept tickets or transportation of any kind from us, and all the advertising we receive from them is paid for by us in cash at full standard rates. We make contracts with all the papers at the beginning of each year for a good round sum, sufficient to tell the public all about our attractions, as well as sufficient to impress the newspapers that we are eager to give practical expression of our friendship for them by buying liberally of their product. It depends largely on what we have to say as to the amount of space we use. We have used as much as a page in each of the papers to tell of some new feature of our service, and we have taken as small a space as four inches. Our advertising campaign is on practically from May to October, and during those five months we plan to use our entire yearly contract with each paper. Before we systematically undertook advertising, our company would spasmodically give a page advertisement possibly in the middle of winter to the various papers for their special edition, which, of course, had no advertising value as far as our company was concerned. Since we have adopted a business basis for advertising, we absolutely eschew the special edition and the newspapers are eminently satisfied with the basis we have established.

It is a difficult thing to measure the returns for a transportation company from newspaper advertising. The department store which offers a list of articles in its advertisements one day, can the next day, by actual sales, tell very closely the net results of the advertisement, but in advertising any transportation feature, it is difficult to check up except by the general volume of business that is developing. I am quite convinced, however, that our newspaper advertisements have not only educated people as to what we have to offer, but by exploiting what we are doing and are trying to do, a warm confidence in us and our intention to serve them has developed.

The good-will of reporters, paragraphers, editorial writers and jokesters on a paper, it seems to me, is of inestimable value to a street railway, and if they poke good natured fun at your company is good advertising. I would sooner have our announcements printed in the columns of good clean newspapers and carried into the homes of our patrons, than

any other means of educating the people direct. Such advertising can scarcely be properly estimated or appreciated. Beyond question, the more intelligent newspaper advertising you do, the better will be your business. I am making these statements on the assumption that the service you are advertising is as good and possibly better than what you say it is. Personally I feel that our company offers such good service under all conditions that superlative language is warranted and still be absolutely within the realm of actual truth. If you do not have a good proposition to offer, then make it a good proposition or do not advertise it. The same rules apply to advertising a street railway as to advertising a theatre, a department store or any other enterprise. A good article can stand unlimited advertising, a poor one cannot win out in the long run, no matter how much or how good the advertising may be.

Folders and Pamphlets.

Our company had never issued a folder of its own until we decided to issue the Twin City Trolley Trips folder. We planned to produce the best electric folder that had then been issued. We adopted the regular standard railroad folder as to shape, nine by four inches, and it was to comprise 48 pages. The best paper was selected and the best printing company was given the work. We went to a great deal of pains to have an attractive bird's-eye view map of our system engraved for four colors. We devoted the entire folder to outlining suggestive trips on our lines, and we neglected no opportunity of indicating to the reader where he might go and what he might see by traveling on our cars. Small charts indicating exactly where to get on cars and where to get off, and a wealth of pictures with reading matter boiled down as much as possible, was the material we put into this publication and enclosed in a most attractive cover. We launched our first edition of 50,000 copies on a breathlessly waiting public. This year we issued the second edition of 50,000 copies. Our folder has been the model for at least 10 other electric folders. Speaking purely from a mechanical standpoint, it was said to be the finest trolley folder ever issued, and we have something like a bushel of letters from prominent officials of steam and electric companies in the United States endorsing this judgment. Wonder was expressed that we issued such a good folder, but there is no wonder about the matter. We have a wonderful proposition of splendid car and boat lines and glorious places to tell about, and the story should be told in the best possible way. Had we not used as good paper or employed as good mechanical means to turn out a folder that would be appreciated and kept by the recipient, I think we would have fallen short of doing something first-class as it should be done.

We instituted a practical campaign of distribution. By advertising to send the folder to any address on receipt of four cents in stamps, we started an avalanche of mail and inquiries that has been coming upon us ever since. I think we have received requests for our folders from prospective visitors living in nearly every state in the Union, as well as a number of foreign countries. We have the folders on distribution at our ticket offices where copies may be had for the asking. Prospective visitors to the Twin Cities are always eager to secure copies and our large department stores are more than pleased to distribute them from their information bureaus to visitors who have just come to the cities. We have enjoyed the cooperation of not less than 14 of the largest and best department and stationery stores in the Twin Cities in this matter, and the support and good will of these stores is a good advertisement for us as they really constitute themselves agencies in our favor.

The returns from folders can be checked pretty closely. That is to say, you can tell more or less accurately whether the folder is a good advertisement or not. On the cars day after day I see patrons perusing the pages of these folders and following up special trips which are outlined. Day after day people come into our offices to ask advice as to certain desirable trips marked out which they wish to make, and as some of these trips run as high as 60 cents per passenger, it can readily be seen that it is profitable to have instilled in the home body or stranger's mind the desire to make these journeys.

A trolley folder should be absolutely devoid of advertising matter, except for the company itself. It should be a story of the cities in which it operates told in such a broad way as really to be a text-book for the cities. It should accurately picture and portray the many beauty spots around the cities, whether reached by the cars of the company or not, and altogether, it should breathe a spirit of boosting for the cities it represents in such a way as to command the admiration of the various public and civic clubs which appreciate publicity of this character. The first cost of maps and plates may seem to the uninitiated as severe, but I do not think any

money could be better spent in the publication of a folder than for the best paper, ink and engravings. It should be a tourist handbook that reflects, in a strong, clever way, the company it advertises and the cities it describes.

We have also issued an "Airship View of Big Island Park," a 20-page folder exclusively for Big Island Park. This contains, on one side, a bird's eye view of Lake Minnetonka and Big Island Park, and is used to create a distinct travel to Lake Minnetonka. The method of distribution is practically the same as for our trolley folder, and we also use it as a means of circularizing all prospective parties to Big Island Park.

A third folder of six pages we issue describes our "Sight-seer" car service which we have successfully operated for the past two seasons. This "Sight-seer" offers a belt trip of 40 miles around the Twin Cities in three and one-half hours for 50 cents, and has been the means of educating strangers and showing them the beauties of two cities, which they could not possibly see on their own account in so short a time and in so comfortable a manner. To each passenger on the "Sight-seer" we give a small 24-page pamphlet containing the lecture as given by the conductor on the car. This pamphlet serves in a manner to bring to pleasant memory the trip and lecture the passenger has enjoyed.

We issue a complete 16-page time table for all our inter-urban lines, with steamboat schedules and information which strangers need to guide them over our interurban lines. While we issue these time tables in an attractive way typographically, they are printed on inexpensive paper so as to permit of the widest distribution.

In addition to having prominent stores in the Twin Cities hand out our printed matter, we have our publication for distribution in the folder racks of all the railroad ticket offices and hotels. These racks are controlled by an association of ticket agents of both cities. The ticket agents of all the roads entering the Twin Cities have a most friendly feeling towards our company and are always glad to suggest trips and plan little journeys over our lines for strangers who come to their offices with the inevitable inquiry: "How can I spend a few hours before my train leaves?" I have had so many direct evidences of this attention on the part of our railroad ticket friends as to feel that that feature of trolley travel development is worthy of special endeavor.

In the Twin Cities, the telephone companies and union stations maintain information bureaus, and these also distribute our literature and take an active interest in telling strangers what we have to offer. With such a kindly sentiment toward us on the part of so many different agencies with which the traveling public comes in contact, it can readily be seen that we possess a good-will in a line of publicity that is of immeasurable value.

Cards in Car Windows.

An attractive feature of our publicity is the use of large cards for the windows of our cars. We use eight windows of each of our standard cars, four on each side. These cards are 13 by 24 inches in size and are fastened on the inside of the upper sash. They are printed in large type on both sides so that they can be read from the inside of the car as well as from the outside, and on these cards we sing the praises of all the lakes, parks and resorts on our lines. One of these cards is devoted to the telling of the adventures of "Hi Jinks, the Picnic Person."

Mr. Jinks has had a really remarkable career. We tell each week with a funny cartoon and a verse, the adventures of Mr. Jinks at Big Island Park, and the series of 12 Hi Jinks cards for the season of 1907 has made such a hit as to really be worth passing mention. The first week we had Mr. Jinks making his bow. The second he was hugging himself with delight at the idea that Big Island Park was soon to open. The third week he was packing his picnic basket to go to Big Island Park, etc. Each week he does something new.

We held a competitive contest in which artists prepared this character from the suggestion we outlined of a genial, old bachelor who was out for a good time, and who could appreciate the good things we had to offer at Lake Minnetonka. After the character was finally selected we employed the best lithographers to develop the pictures. The verses were really funny and of such easy rhyme as to be remembered. To illustrate how the Hi Jinks cards have taken with the public I may say that we have had a wealth of poems submitted by patrons from everywhere. Presidents of banks, lumber companies and other large enterprises, as well as clerks, bookkeepers, school teachers and a vast army of other trolley riders suggested verses about Mr. Jinks. Mr. Jinks has become as good an advertisement for the "Twin City Lines" as any vaudeville joke that has made a soap, or breakfast food famous. The compliment has been paid us that Mr. Jinks has Mr. Sunny Jim and Miss Phoebe Snow completely wiped off

the map. This, perhaps, is fulsome praise. People have actually been on the lookout for these cards as they appeared every Saturday morning in our cars. We have kept Mr. Jinks entirely in our own cars and he has come to be recognized as one of the distinct officials of our company. Only rarely has he made his appearance in newspaper columns, although the jokesters and the rhymsters on all the daily papers have used him as a mark at which to fire many good natured shots. The career of Mr. Jinks has quite convinced me that people like good-natured advertising with a touch of humor in it. When you get your advertising so serious and so matter of fact that it reads like a complaint in a lawsuit, I should say you were on the wrong track, but when advertising develops a good-natured and kindly feeling on the part of patrons towards you, I believe it is a sure sign that people are paying attention to what you are saying. Next year we have in mind using a sequel for Mr. Jinks, and we expect to make this character lead even a more successful life than he did this year.

While speaking about our car window cards, I should say that most companies have it in their power to use their equipment for advertising in the cheapest and most effective way possible. Street car advertising admits of much display and the use of colors, and appeals to the trolley rider. It always strikes his eye when he is in a receptive mood and this advantage is very great. Street car advertising admits of all the inventive genius one can summon to one's aid and offers an opportunity for the exploitation of new parks, lakes, resorts, opening of new lines and other trolley information which should be given to the public attractively and persistently.

Last year our company adopted an effective trade-mark. It is designed after a Spanish Mission window and is original, attractive and unique. We are using this symbol very generally on all our advertising matter, letter heads, etc. Every road ought to have a distinctive trade-mark.

Right in line with our publicity we have named our famous fleet of boats after cities, towns and resorts on our lines—Como, Excelsior, Harriet, Hopkins, Minneapolis, Minnehaha, Minnetonka, Plymouth, Puritan, St. Paul, Stillwater and White Bear. Each boat is thus a good advertisement for the place the name of which it bears.

Special Advertising.

In special advertising, our company has followed two or three lines that have been effective. We had the best landscape photographers photograph our lines from one end to the other, and the most attractive scenes of cars, boats, parks, double-track, wooded grove, shining lake, beautiful meadows and woods have been reproduced by their cameras. These photographs are 9 by 12 inches in size and form a collection distinctly in a class by itself. In each of these photographs can be seen a bit of track or one of our cars or boats somewhere in its make-up, and this gives us an advertisement that it is impossible to miss. These photographs are so good that persons publishing books about the Twin Cities invariably come to us for the loan of them, and as all the photographs are copyrighted, we grant the loans on condition that a line of advertising for our company be printed with the picture, and this is readily done. The photographs are so good that one company issued 30 souvenir post cards in colors, absolutely without expense to us, and the company reports it as the best selling series in its large stock. Furthermore, each card bears a line of advertising for us which was written and put there by us. So much for the great benefit of a fine collection of photographs to any electric transportation company. These photographs have also been used for souvenir stamp books, and the publishers have reported that the sales in that line have been large.

The two maps published by us, one being the bird's-eye view of our entire system, and the other the bird's-eye view of Lake Minnetonka and Big Island Park, are so attractive and they tell such a good story, that the hotels in the Twin Cities, as well as some of the larger business houses, have had them framed and given the best places possible in their rotundas and offices where strangers may see them.

I do not know of any business to-day that offers such strong possibilities for intelligent exploitation as street railways or "electric railroads," if you prefer the term. The people generally feel a sense of proprietorship in the street railway when they see its cars running along the street, and take a pride in them that they would not think of entertaining for the commercial railroad with which they come in contact only when they go to the station to meet friends or take a trip. With this sense of proprietorship on the part of the public, it is easy to appeal effectively to your patrons. For ourselves, the "Twin City Lines," offer so many attractions in the way of parks, lakes, falls and other points of interest, that it is really a pleasure to educate the public as to where we can take them and how well we can take them there.

With good feeling existing between the company and the press, with the manifold advantages we possess, and with the desire to do the fair thing on all occasions, our company offers a magnificent field for the most intelligent exploitation. We aim to make our lines the best advertised in all America.

In conclusion let me say from a close personal observation, that these statements apply with equal force to almost every electric transportation company in the country. The ground for this line of endeavor still lies fallow in many communities.

That business can be developed and a fine public spirit engendered by printer's ink properly, intelligently and enthusiastically applied is my profound conviction.

FREIGHT SERVICE ON ELECTRIC RAILROADS.*

BY H. H. POLK, PRESIDENT AND GENERAL MANAGER, INTER-URBAN RAILWAY COMPANY, DES MOINES, IA.

The first electric railroads built were nothing more or less than street railways extended into the country, the track being laid upon the public highways, constructed of light rails and ties, and in most instances operated by street railway men who had had no experience in steam railroading. They therefore did not realize the great possibilities of freight as a source of earnings. Had they, however, given serious thought to the freight question it would have been immediately dismissed owing to the character of constructions and the equipment then in vogue.

These conditions have changed, and the modern electric railroad is following very closely standard steam railroad construction, which means low grades, minimum curvature, heavy rails and bridges, and also the private right-of-way, which permits of high speed and the handling of any kind of traffic. In every territory occupied by an electric railroad there will be found freight to be shipped in and out. The electric railroads will have steam railway competition or they will not. If they have no competition they should get all of the freight to be moved, both car-loads and less than car-loads. If they have competition and make the proper effort, they should get practically all of the local or less than car-load shipment, owing to the frequent and rapid service which can be given.

If an electric railroad is fortunate enough to have traffic arrangements with connecting steam railroads it should secure a large portion of the through car-load foreign shipments to competitive points. It seems to me that steam railroads that refuse to recognize electric railroads because they are such, are very short-sighted. They cannot, by this policy stop the building of electric railroads and the electric railroads can be made good feeders for steam railroads, if afforded proper treatment by them, such as publishing joint tariffs and granting a division of the rate, thus securing for the steam railroads much freight which originates on the line of the electric railroad. There are also many instances where the electric railroad taps a new territory, one to which the steam railroad has heretofore never had direct access. In order to do a successful car-load freight business it is absolutely necessary to have a traffic agreement with at least one connecting line of steam railroad, for if this cannot be accomplished, then the rate from a point on the electric railroad to a point on the steam railroad would be the sum of the two locals, and therefore prohibitive in most cases.

The question of Interstate through routes and joint rates and facilities for the interchange of traffic is fully covered in the Hepburn act and the interstate commerce act. It is provided in section 15 of the Hepburn act, that "The commission may, after a hearing on complaint, establish through routes and joint rates as the maximum to be charged, and prescribe the division of such rates as hereinbefore provided, and the terms and conditions under which such through routes shall be operated, when that may be necessary to give effect to any provision of this act, and the carriers complained or have refused or neglected to voluntarily establish such through routes and joint rates, provided no reasonable or satisfactory through route exists, and this provision shall apply when one of the connecting carriers is a water line." We are awaiting with deep interest the decision of the interstate commerce commission on the complaint made by the Cedar Rapids & Iowa City Railway Company, against the Chicago & Northwestern Railway Company, charging it with refusing to establish such through routes and joint rates.

A. B. Stickney, president of the Chicago Great Western

Railway Company, and one of the ablest railroad men of today, says that he does not care how freight is brought to his road; whether in a wheelbarrow, stage-coach, horse car, or by an electric car, he will take it and be willing to pay something to get it. This is the broad view to be taken of this question. I think it is generally conceded that the electric railroad is more popular with the farmer than the steam railroad. Accorded the proper treatment, the majority of farmers living along an electric line will take great pride in it, and soon come to think that it is his railroad. It is more profitable for him to ship over the electric line than over the steam line, as the former gives him more rapid, frequent, and fully as reliable service, enabling him to receive and ship freight, mail, and express at almost any hour of the day. The farmers, merchants and manufacturers will generally ship their products over the electric railroad if they are given the opportunity, for in a great many ways it is much more convenient than shipping via the steam railroads and hauling long distances in a wagon.

With the electric railroad doing a general railroad business, such as the hauling of passengers, freight, mail and express, running through the farms or near them, it is, of course, a simple matter to market the produce of the farm, including fruits, poultry and dairy products. This farm produce can be marketed regardless of the condition of the roads, at any time of the year. It should be the policy of electric railroads to put in side tracks, stock-yards, loading chutes, etc., whenever it is shown that they will be used. Stock can then be loaded on the farm without driving them seven, eight or ten miles to some railroad station. The estimated shrinkage for driving cattle 12 miles is 47 pounds per head, while the shrinkage in transit is but 27 pounds per head, when shipped 300 to 400 miles. By using the electric railroad, the shipper will save the resulting shrinkage from driving, and has his choice of the steam railroads of larger cities, enabling him to obtain the lowest rate and the shortest route.

The electric railroad having joint rates with connecting steam railroads gives to the farmer the advantage of such through line. He has merely to notify the electric railroad of his intention to ship over a certain road and he will be supplied with a car from that road. He can also ship in tile, coal, machinery, cattle, hogs, etc., having cars set upon sidings on or near the farm, eliminating the long haul to the railroad station.

Much the same thing is true of the smaller cities and towns through which the electric railroad runs. A merchant can easily order by telephone from the wholesale houses, and within an hour or two the goods so ordered are in his store. Is it not true, then, that these advantages will give to the electric railroad all of the business it can handle?

Steam railroads are the main arteries of commerce of the world; electric railroads are the capillaries that bring life and activity to the various communities. This being true, the prosperity of the community depends largely upon these smaller avenues of trade, and the electric railroad built through unoccupied territory (I mean a territory lacking in steam railway facilities) with the proper facilities offered in the way of freight depots, loading platforms, stock-yards, elevators, and reasonably good service, can obtain a great deal of freight, both carloads and less than car-loads.

The bulk of the business of steam railroads is made up of car-load freight. Lyman E. Cooley, the noted engineer of Chicago, is authority for the statement that over two-thirds of the freight moved in the United States consists of fuel, ore and building materials. All of these are handled by rail in car-load lots. Now add to this the total of other commodities and livestock known to move regularly in car-loads and it seems to be a reasonable assumption that the amount of car-load freight in the United States is not less than 85 per cent. of the total freight handled. Without access to the records of the steam railroads it is, of course, impossible to say just what proportion the car-load traffic bears to the whole freight traffic handled.

In a recent hearing in Minnesota this subject of car-load freight was dealt with very exhaustively, and the railroads asserted and attempted to prove that the less than car-load freight was very expensive, and did not yield its fair share of the net, total revenue, on account of the cost of handling. This seems to be the prevailing opinion among steam railroad traffic men. They solicit the car-load freight more strenuously than they do the less than car-load, and will gladly take it at much lower rates per hundred pounds, than the less than car-load or package freight.

Some of the reasons given in support of this opinion are:

(1) That car-load freight is loaded by the shipper and unloaded by the consignee, thereby relieving the railroad company of the responsibility of loading and unloading, and the cost of handling.

* Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

(2) That a very large percentage of it is handled on private terminals.

(3) That for the two reasons given, the risk from loss and damage is very much less.

(4) That less bookkeeping and accounting is necessary on car-loads.

(5) That it costs much less per ton to move ordinary commodities, such as move in car-loads, than to move a car of merchandise or package freight.

Accurate data on the cost of handling freight on electric lines is very difficult to obtain. I addressed letters to the general managers of 30 electric railroads, asking for certain information relative to the cost of handling freight. I received replies from the majority stating that they did not keep their records of handling freight and passengers separate, and therefore could not give the desired information. I am therefore compelled to resort to our own experience.

Some comparison of statistics of freight traffic on steam and electric railroads may be interesting here.

During the year 1904 steam railroads of the United States handled 1,306,628,858 tons of freight, at an average revenue of 0.8 cent per ton-mile.

The Baltimore & Ohio earned 5.82 mills per ton-mile. The Inter-Urban Railway earned 5.928 cents per ton-mile. The great difference in the cost of handling and the amount earned is caused by the difference in the average distances hauled. The Baltimore & Ohio's average haul being 192.84 miles, while the Inter-Urban Railway's average haul was only 10.5 miles.

In the following table I have taken the earnings of steam railroads from all sources, with the per cent. that each item

1901.	Steam.		Electric.	
Passenger	\$ 351,356,265	22.12	\$233,821,549	94.4
Mail	38,453,602	2.42	432,080	0.2
Express	31,121,613	1.96	401,672	0.2
Other Car Pass ..	8,202,982	.52	303,608	0.1
Freight	1,122,608,471	70.67	1,033,097	0.4
Other earnings ..	36,729,104	2.31	7,703,574	3.1
Miscellaneous ...	54,000	.01	3,853,420	1.6
	Less			

is of the total as published in the annual statistical report of the interstate commerce commission for the year ending June 30, 1901, and the earnings of strictly electric railroads from all sources with the per cent. that each item is of the total, as published in the latest reports of street and electric railways, compiled by the department of commerce and labor, bureau of the census, for the year ending June 30, 1902.

Energy Consumption. Freight Trains.

GROSS WEIGHT IN TONS	Schedule speed between trains	Watt-hours per ton-mile at locomotive
100.....	15 m. p. h.	28
200.....	15 m. p. h.	23
300.....	15 m. p. h.	20
400.....	15 m. p. h.	19
500.....	15 m. p. h.	19

Interurban Cars.

GROSS WEIGHT IN TONS	Maximum speed	Stops per mile	Watt-hrs. per ton-mile
20.....	45 m. p. h.	1/2	80
		1.0	92
40.....	45 m. p. h.	1/2	70
		1.0	81
50.....	45 m. p. h.	1/2	67
		1.0	78

On steam railroads it will be noted the receipts from freight traffic is about 70 per cent. of the gross earnings, while on the electric railroads the average receipts from freight is only 0.4 per cent. However, there are a few electric railroads that receive for freight between 20 and 35

per cent. From the foregoing it is evident that freight traffic on electric railroads has not yet received the attention which we believe its future development will justify.

E. E. Kimball, of the railway engineering department of the General Electric Company, has very kindly given me some data on power consumption and cost of maintenance of electric locomotives and passenger cars.

The cost of repairs and maintenance of a 40-ton locomotive equipped with 100-horsepower direct current motors, when hauling a 200-ton train about 100 miles per day will average about 1.5 cents per locomotive mile. This includes repairs to motors and control, and care of locomotive.

The cost of repairs and maintenance of interurban cars will average about 1.5 cents per car-mile. This figure includes cost of repairs to motors and control, and cost of cleaning the car bodies.

Of course, these figures will vary considerably on different roads in different sections of the country, owing to the service conditions of the road. It will be noted from these data, that as the weight of the train increases, the power consumption decreases per ton-mile, this, of course, is due to wind pressure per ton. This is also true of power consumption on passenger cars, but the passenger cars will use more power per ton-mile on account of making more frequent stops.

The report of the Inter-Urban Railway Company for the year ending June 30, 1907, gives the following statistics on freight:

	Number of tons carried	Per cent. of tons carried	Average rate received per ton	Freight revenue	Carloads handled exclusive of switching	Carloads switched	Number of tons carried one mile	Number of tons carried one mile per mile of road	Average receipts per ton mile, cents	Operating expense per ton mile, cents	Operating expense per cent. of freight earnings	Freight earnings per cent. of gross earnings
Local freight car-loads	65,052	78.94	\$0.406	\$26,421.11			694,828	9,677	3.802			
Local freight less car-loads	8,116	9.85	\$2.27	\$18,423.32			85,920	1,197	21.443			
Foreign freight car-loads	9,195	11.16	\$0.84	\$7,723.80			107,335	1,494	7.724			
Foreign freight less car-loads	40	0.05	\$2.67	\$106.80			443	7	24.131			
Total.....	82,403	100.00		\$52,675.03	3,627	1,484	888,526	12,375			0.37	0.23
Average.....			\$0.6392						5.928	2.194		

An electric railroad, in order to do a general railroad business must be equipped to properly and promptly handle any business given to it.

(1) The freight department should be in charge of a general freight agent, who should be held responsible for all matters pertaining to his department. He should also pay strict attention to freight claims, giving them a thorough investigation and adjusting them promptly. There is no excuse for delay in settling claims promptly, as the mileage of the majority of electric railroads is short, and the stations few, as compared with steam railroads; it is, therefore, much easier to locate damages, shortages and delays.

(2) In the large cities a good solicitor should constantly be at work, keeping in touch with the freight situation, making regular calls upon the merchants, manufacturers, dairy concerns, wholesale houses, etc., as well as soliciting business from the farms through which the road runs and from as far away as it is possible to draw it. The amount of business obtained by a solicitor five or six miles away, on either side of the road is astonishing.

Besides the soliciting, he should find a market for the products of the farm, such as dairy products, poultry, fruit, vegetables, etc. Encourage all of these lines and the freight business will rapidly grow.

(3) The accounting is a matter of so much detail that it will be impossible for me to cover it in the limited space allotted to me. I will say, however, that transportation of freight on electric railroads is so nearly identical with that of steam railroads that it is very essential that the general form of steam railroad accounting be adopted.

(4) There should be a commodious freight house, centrally located, and convenient to wholesale houses. This is of primary importance in the larger terminal cities. The freight house should be built on the most approved design

in order to economically handle freight. There should be doors on one side convenient for the use of teams. Opposite these doors should be located the doors for loading and unloading of cars, so that the truckers may truck from the wagons directly to the cars or vice versa.

This house should be in charge of the agent, and under him should be a foreman, and as many men as are needed to properly handle the business. There should also be in the larger terminal cities and smaller cities freight-yards, with sufficient switch tracks and team tracks.

(5) Each of the stations along the line should have a freight-room, in charge, of course, of the station agent. The duties of the agent are, of course, many outside of the freight service. He receives and issues train orders, sells tickets, and solicits passenger as well as freight business.

(6) At all stations or side tracks, shippers should be encouraged by the company. In addition to the stock-yards, and loading chutes for the convenience of stock shippers, it is also of great importance to have depot grounds of sufficient size to permit the leasing of a part of them for a nominal rental to persons desiring to put in grain elevators and other industries that will ship their products.

In my opinion, grain is one of the best paying commodities to handle, and effort should be made to obtain shipment of this commodity.

(7) The rolling stock should be modern, the electric locomotives equipped with motors of sufficient capacity to handle trains of at least one to fifteen cars at a speed of at least twenty miles an hour or better, in order not to interfere with passenger service. The company should own enough box and flat cars to properly handle the business.

The service must be of the best; its frequency depending upon demand and incidentally upon competition.

(8) The small or less than car-load shipments should be handled in express cars, equipped with motors of at least the same capacity as the passenger cars.

The less than car-load shipments on the Colfax division of the Inter-Urban Railway are handled in express cars, at freight rates. Car-load shipments on this division are handled by an electric locomotive, when necessary. While on the Deaver valley division we have a way freight leaving Des Moines at 4.00 o'clock in the morning. This train is composed of an electric locomotive, merchandise cars, car-loads, and a caboose. It picks up all car-loads and does all the switching at the various stations, out and back, setting loads and empties at the various elevators, stock-yards, coal mines, etc.

Rates.

Until 1887 nearly every large railroad had a classification of its own, but now most business is handled by one of three classifications. These are the official, which is used in the east, the southern and the western. In several states, Illinois, Iowa, Georgia, and some others, there are classifications prescribed by the state board of railroad commissioners applying to freight carried entirely within the state. The electric railroads should use the classifications and rates which are used by the steam roads in their territory.

It may be interesting to know how the freight rates of the United States compare with those of some of the European countries. In England the average amount paid by the shippers for moving a ton of freight one hundred miles is \$2.35, in France \$2.10, in Austria \$1.90, in Germany, where most of the railroads are owned and operated by the government, \$1.84; in Russia \$1.70; while in the United States the average cost to the shipper is only 73 cents, or less than 40 per cent of average cost in Europe.

A report of the department of commerce and labor for the year 1902, in a general discussion of the characteristics and significance of electric railroad service, says: "It is difficult to avoid entrance into the domain of prophecy. Some of the electric railroads have already made such progress in methods that certain prophets look forward to the complete superseding of steam traction by electric traction. However this may be, it is evident that, even if the electric railroads confine themselves to the methods already widely prevalent, they are bound to become a social and economic factor of enormous importance. Remarkable benefits have already been realized from the existing electric lines, and the extension of such railroads to a large proportion of our more prosperous communities seems but a matter of a short time."

A trolley head for high speed work is being shown in Space 456 by E. B. Holmes, of Wellington, New Zealand. This patented head has been adopted universally throughout New Zealand and Australia, and Mr. Holmes has come to this country to meet manufacturers who are interested in manufacturing and supplying apparatus of this character.

GENERAL ELECTRIC DISPLAY.

The General Electric Company's exhibit occupied one of the largest spaces on the pier and its location gave ample opportunity for an arrangement of machinery so that it was easily inspected by visitors.

The Curtis steam turbine was illustrated by a 1,000 kilowatt 12,000-volt 60-cycle machine dismantled so that every part was displayed, and it furnished a most valuable demonstration of the simplicity and rugged construction of this design.

The General Electric Company has devoted special attention to presenting a complete installation of the emergency straight air brake outfit including motor car and trailer car equipment and air compressor.

For the first time at any convention a commutating pole motor was shown in operation and undergoing test to demonstrate the remarkable commutation features of this design. This is done by means of a booster set which furnishes voltage up to 950 volts. Full load on the commutating pole motor is provided by a GE-90 railway motor direct coupled to it and operated as the generator with water-box load. By means of the variable voltage supplied the commutating pole motor ample demonstration is given of its sparkless operation under such unusual conditions.

A collection of contactors, and similar devices used in railway equipment is here exhibited and the new K-35A controller which is designed for four 50 horse-power motors at 500 volts or four 60 horse-power motors at 600 volts, and includes in its design some radically new features making possible the handling of such large motors by a comparatively small controller.

Various other devices of interest to electrical railway engineers are installed such as multiple-gap lightning arrester for 10,000 volt alternating current circuit and a direct current lightning arrester type-M form D-2 for 600 volts.

Power-circuit arc lamps for railway use are shown and a feature of the exhibit is two direct current arc lamps of the company's recent design mounted at the front entrance to the exhibit. The company's reception headquarters on the pier are arranged inside with illumination by new Tungsten lamps with Holophane reflectors.

A very complete exhibit of bonds and line material is displayed as well as the company's latest design of catenary line material. As actually demonstrating the use of catenary construction a straight line is run across the exhibit space and a curved line starts from the same point and runs to the diagonally opposite corner.

The company's headquarters outside of the exhibit were at the Marlborough-Blenheim.

The company as usual had a large representation at the convention, including J. G. Barry, manager of the railway department; W. J. Clark, manager of the traction department; W. B. Potter, engineer of the railway and traction department; E. D. Priest, F. E. Case, A. H. Armstrong, engineering department. C. C. Peirce, Boston; J. J. Mahony, S. W. Trawick, New York; R. E. Moore, Philadelphia; H. L. Monroe, Chicago; G. D. Rosenthal, St. Louis; E. H. Ginn, Atlanta; H. C. Houck, Cincinnati; H. N. Ransom, W. G. Carey, Schenectady; F. H. Gale, in charge advertising.

For the information of its representatives the Westinghouse Companies' publication department has issued a 6-page folder that outlines the extent of this company's exhibit, includes announcements regarding the daily meetings of the Westinghouse representatives, and other general information, including a list of representatives present and the particular Westinghouse company with which they are connected.

J. W. Duntley, president, and W. O. Duntley, vice-president, of the Chicago Pneumatic Tool Company, were on the Steel Pier yesterday. President Duntley was enthusiastic in his praise of the impressive exhibit which he found installed there.

Among the Exhibits

The Washburn coupler of M. C. B. design for use on equipment for electric roads is attracting considerable attention and many favorable criticisms are being passed upon it. Stanley Washburn and J. L. Hopper are in charge of the company's exhibit and will be glad to see all those interested in coupler matters.

The Galena-Signal Oil Company maintains a corps of skilled electrical mechanics to assist managers of electric railways in reducing the cost of lubrication. The service which has been maintained for the steam roads has been recognized by railway officials as a material aid.

The International Register Company has on exhibition in the Music Hall a very complete line of detachable fittings for round and square register rods which will prove of interest to every one having trouble with this part of their register fitting.

A very instructive pamphlet is being distributed by the Western Tube Company, of Kewanee, at Booth 918, which gives an account of the researches and experiments leading to the discovery of "High-Duty-Metal" used in the manufacture of its valves, cocks, etc. This metal, as its name implies, is especially valuable in high steam pressures. It is a distinct advance in the development of bronze mixtures, and withstands the deteriorating effects of extreme temperatures better than any other known composition. The history of its development makes "good reading," and we recommend those interested in the use of such material to call on Western Tube Company's Booth 918 and get a copy.

The American Car Company of St. Louis has recently received from the American Mason Safety Tread Company, 220 car safety treads $7\frac{3}{8}$ inches wide with curved fronts for cars for the Portland, (Ore.) Railway Light & Power Company.

The Park boards of Chicago take the greatest pride in their roadways, and the best is the only thing sought when improvements are to be made. Last year Sheridan road, one of the beautiful drives in that city, was surfaced with Bitulithic and the success and satisfaction was so pronounced that a second contract has been signed for surfacing with Bitulithic, Michigan avenue one of the most famous boulevards in this country. The selection was made after a most careful investigation.

Col. W. E. Ludlow, patentee and original manufacturer of the Ludlow track drill, who has never missed attending a street railway convention, arrived here Tuesday evening. Mr. Ludlow is representing the Cleveland Armature Works, Cleveland, O., who are now manufacturing and selling the Ludlow drill. Mr. Ludlow has recently perfected a reamer which cuts from the end instead of from the side. This reamer has Novo steel blades and is now in actual service in Buffalo under very trying conditions. Each reamer reaming an average of 100 holes 1 15-64 inches in diameter. These holes are reamed at an average of one hole per minute, including the movement of the drill machine. At Buffalo they have in use three No. 4 double drilling machines operated by electric power. Mr. Ludlow reports several sales of his drill this year in foreign countries.

The Cooper Heater Company of Dayton, O., is meeting with gratifying success in the demonstration of its heater at the company's booth on the sunny side of the Steel pier. The heater consists of a water lined fire-pot connected with a water-wall from which closed-end tubes project horizontally. A dome is connected to the top of the water-wall at

right angles. When installed in a car the heater occupies a very small floor space and the manufacturers are willing to give any railway company a practical demonstration of the economy with which a car can be heated by its adoption. The Cooper heater is made in four sizes varying according to the type of car in which it is installed. The representatives are J. D. Hunter, W. L. Blackwell and J. B. Cooper.

At Exhibit Spaces 0-28 and 0-30 the Under-Feed Stoker Company of America, manufacturers of the Jones stoker, is distributing considerable printed matter. Among these is its monthly journal, the Publicity Magazine, in its October number containing many interesting references to electric railway and interurban systems they have equipped.

In the space allotted to the Chicago Pneumatic Tool Company is being shown a portable pneumatic cleaning machine for cleaning and scrubbing railway cars. The machine is driven by an electric motor and does its work in an efficient and satisfactory manner. These tools are shown at Space 129, 131 and 133, steel pier.

G. C. Reiter, of Canton, O., is showing, at the booth of the Wallace Supply Company, a complete line of overhead, foot-gongs and conductors' signal bells. These can be made in any size ranging from 5 to 14 inches in diameter from steel, brass or bell metal. Mr. Reiter is one of the pioneers in the manufacture of bells and gongs. E. Rutter is in charge of the exhibit.

Interurban cars usually are limited in width by track conditions in cities through which they run, but that the tendency is toward larger and wider cars rapidly approaching steam railway dimensions is evidenced by the following widths submitted by the Niles Car & Manufacturing Company, Niles, O., covering recent orders for cars:

Washington Baltimore & Annapolis....	9 ft. $\frac{3}{4}$ in.
Northern Electric Company.....	9 ft. $2\frac{1}{2}$ in.
San Francisco Vallejo & Napa Vly. Rwy.	9 ft. $2\frac{1}{2}$ in.
Fort Dodge Des Moines & Southern Rwy.	9 ft. 10 in.

while the Chicago Lake Shore & South Bend cars are the full steam railroad width of 10 feet, yet all of these cars operate through cities.

The track men of the street railways are particularly interested in the new Justice spike puller, which by pulling all the spikes straight saves considerable both in material and time.

The Hudson Companies have recently received 10 cars from the Pressed Steel Car Company which were floored with American Mason Karbolith.

The Atha Steel Casting Company, of Newark, N. J., the manufacturer of the Titan gear, has increased its capacity to properly handle the increase in orders resulting from the continued use of Titan gears on 70 different roads and has perfected gears for heavy service, such as are required on interurban and elevated cars.

American Steel & Wire Company is entertaining its full quota of visitors. The company is showing a very complete line of rail bonds, bonding tools, railway fencing and concrete reinforcement. Special interest is being shown by the visiting delegates in the company's new hydraulic screw compressor now being put on the market. In addition to the regular departmental managers in charge of the exhibit the company had a number of its officials at the booth yesterday to meet the visiting street car men, among them being George A. Cragin, assistant general sales agent, Worcester district; Thomas H. Taylor, assistant general sales agent, New York; Geo. F. Rummell, assistant general sales agent, Chicago; and

Clinton Marshall, district manager, of Worcester, Mass. The company is giving very handsome paper knives and key chains to the visitors as souvenirs.

The Pressed Steel Car Company of McKees Rocks, Pa., has recently finished 95 cars for the New York Central & Hudson River Railroad Company and have used American Mason Karbolith flooring.

Small items of economy are receiving more attention as managers come to analyze their maintenance charges and find that first cost of material is often small compared with expense of replacement. The Samson Cordage Works at its exhibit can tell you things about trolley cord, bell cord and register cord. They have had a long experience and make all grades, so they know. Don't forget to acquire at S. C. W. exhibit a souvenir pencil to remind you about the economies in using the best trolley cord, bell cord and register cord.

The Green Engineering Company, Commercial National Bank Building, Chicago, manufactures an entirely automatic chain grate type of stoker, which has found especial favor wherever low-grade bituminous coal is used. Among the half-million horsepower of these stokers now in use we note a large number of street railway plants. A few of these are:

Railway Company.	Horsepower.
Birmingham Railway, Light & Power Company.....	21,600
Columbus Railway & Light Company.....	2,800
Nashville Railway & Light Company.....	7,000
Omaha & Council Bluffs Street Railway Company....	3,000
Chicago Union Traction Company.....	10,000
St. Louis Transit Company.....	16,000
East St. Louis & Suburban Railway Company.....	7,000
Metropolitan Street Railway Company, Kansas City, Mo.	18,200
Illinois Traction System.....	20,000
Toledo Railways & Light Company.....	5,000
Omaha Electric Light & Power Company.....	3,500
Union Electric & Power Company, St. Louis, Mo.	20,000
Springfield (Ill.) Light, Heat & Power Company.....	2,900

The Pennsylvania Steel Company manufactures steel rails of all standard patterns, including girder Trilby, half groove, full groove and girder guard pattern rails; high tee or Shanghai, flat or tram rails for bridges; slot rails and conductor rails for underground trolley construction.

The American Mason Safety Tread Company is now filling orders for safety treads for 48 car steps for the J. M. Jones' Sons at Watervliet, N. Y.

"Within the past seven years the long-looked for pavement has come, and, I believe, has come to stay. A pavement that is less slippery and less liable to crack or shale, not liable to disintegration by water, mud, oil or gas leakage, affording a better foothold for horses, easy of traction, more cheaply repaired before and after expiration of the guarantee period, more permanent than asphalt and less noisy than brick. This pavement is Bitulithic, and the work in our city is to-day sufficient proof that it will need less repairs within the guarantee period than would asphalt."—Hon. Franklin Hamilton, former mayor of Traverse City, Mich., in the Evening Record of that city, May 2, 1907.

F. J. Ryan, sales manager, J. N. Brownrigg, and C. T. Biddison, superintendent of the McGuire-Cummings Manufacturing Company, Chicago, are attending the convention, but owing to the large amount of business in hand it was impossible to make an exhibit. However, a full line of blue prints, catalogues and photographs showing

the latest designs of cars, trucks, sprinklers, snow sweepers and fenders may be seen at the Marlborough-Blenheim, where these gentlemen are stopping.

The Electric Railway Improvement Company is giving a continuous performance, at its booth, of the application of bonds by means of the electric brazing and welding process. The demonstrations clearly show the entire application of bonds by this popular method of joining the rails. The exhibit is attracting a great deal of attention among railway officials.

This convention is rather prolific in the matter of souvenirs, and among those offered to members and guests of the various associations is a box of matches resembling a copper coated carbon brush. This is being distributed by National Carbon Company of Cleveland, O., to call attention to its well-known Columbia brush and is useful as well as unique. This company has recently added another carbon brush to its line, the new one being called "Laclede," and it is intended especially for severe service, which it is claimed to meet in a satisfactory manner. The company recommends this brush for its minimum commutator wear, high conductivity and long life.

The troubles of paralleling alternators when driven by different powers is well known, but to put a gas engine driven alternator in parallel with water and steam driven alternators is a noteworthy achievement, especially if it had been impossible to previously parallel the water and steam driven alternators. The Crocher-Wheeler Company, Ampere, N. J., states that its 4,000 kilowatt alternator is the largest ever driven by a gas engine. It also states that a 4,000 kilowatt alternator driven by a gas engine was paralleled with a water and steam driven alternators supplying power to the transmission lines of the California Gas and Electric Company. The steam and water driven alternators had resisted previous efforts to parallel them.

The T. H. Symington Company is showing samples of the newly adopted standard journal box discussed in the Tuesday's meeting of the standardization committee. A practical illustration of why standards should be adopted is made evident from an examination of the large number of special designs to accommodate the varied conditions. The Symington Company shows a large number of photographs illustrating the best and latest designs of electric trucks to which its journal boxes are applied.

If you are interested in harps, other than angels' harps, call at the exhibit of The Star Brass Works, Kalamazoo, Mich., and see its well known Kalamazoo trolley wheels and harps.

In its solicitude in guarding against the ravages of the fatal disease known as "short arm" the Ohmer Fare Register Company is now putting forth an electrically operated fare register to prevent callousing the hands of the conductor.

The auxiliary registration plant and the noise of the compressed air engine operating the exhibit of H. B. Underwood & Co., calls attention to their method of boring engine cylinders and valve seats.

No friction is in evidence at the booth of the Galena-Signal Oil Company, though one would hardly look for it when the merits of the products of the company are taken into consideration. This company's booth is one of the best furnished that has ever been seen at a convention. The floors are luxuriously covered with Kermanshaw, Tabrese, Sarape and Beleuchan rugs and the walls are covered with expensive paintings. The furniture throughout the booth is of Japanese teke and East India woods. Believing that by interesting the ladies attending the convention the favorable attention of the dele-

gates will be received, the booth has been turned into a tea house where tea is served to visitors. The following representatives are looking after the company's interests: A. Green, Geo. J. Smith, J. E. Southwell, W. P. Westcott, W. A. Trubee, W. Walsh, C. E. Schaffler, J. V. Smith, W. O. Stieff, J. R. Williams, L. J. Drake, Jr., C. H. Thomas, Geo. A. Barnes, E. H. Baker.

The booth occupied by D. Harrington of Colorado Springs, Colo., who is demonstrating the safety switch device, contains two models of the switch. The safety switch has been in practical use in the Colorado Springs & Interurban Railway for the past nine months and has been carefully tested on the main line switches of the Colorado & Midland Railroad.

The Union Electric Company, of Pittsburg, Pa., which handles a general line of railway supplies, is well pleased with the results obtained from the first three days of the convention. The company's booth is very artistically decorated. The exhibits, which include a complete line of supplies for the construction and maintenance of electric railways, are arranged so as to show to the best advantage in cabinets and on tables which are stationed about the booth. The exhibit is in charge of George W. Provost, Thomas M. Cluley, and R. M. Kerschener.

The Spear & Miller Company, Chicago, dealer in brake-shoes and heads, is not exhibiting this year, but Henry A. Dorner, manager electric railway department, is in attendance.

A combination file and paper weight is being distributed as a souvenir by the Egry Register Company, The General Systems Department, Dayton, O. This is a very useful article.

The Hale & Kilburn Manufacturing Company exhibits a line of electric and interurban car seats which with their variegated colorings in upholstery present an attractive appearance. Among these samples are shown the new electric and interurban seats of the New York Central, Chicago City Railway, Boston Elevated Railroad, United Railways of St. Louis, Public Service Corporation of New Jersey, Detroit United Railway, etc. A number of these samples represent the new all-steel car seats constructed with special reference to lightness and indestructibility. An entirely new departure for this company is represented by a sample of a door which is claimed to be the first all-steel car door ever manufactured. A door is shown fitted with glass, brass locks, trimmings, etc., and finished in dark green and Tuscan red. It is attracting attention from all, being one of a lot of 500 now being furnished for the Hudson tunnels of New York City. The Hale & Kilburn Company is now engaged in constructing the steel doors required for the equipment of the new steel coaches building for the Pennsylvania railroad. Numerous other parts of car construction, including the most complete railroad metal sash, are also manufactured.

The Chase-Shawmut Company, of Newburyport, Mass., manufacturer of electrical specialties, is not exhibiting this year, but is represented at the convention by Frank D. Masterson.

The Novi incandescent lamps and Holaphane reflectors have been placed in the large interurban car which is exhibited by the Niles Car and Manufacturing Company at the track space.

At the booth of T. H. Symington Company, the Gilchrist malleable iron rail chairs are being exhibited. Where a concrete roadbed has been constructed or where it is used in the construction of floors for the car house and shops, these chairs are almost indispensable for safe track construction. As is well known the Gilchrist chairs are made in designs to

suit most any condition. To obtain the best effect they should be imbedded in the concrete at the time the concrete is laid.

W. R. Garton and Ray P. Lee, of The W. R. Garton Company, Chicago, are attending the convention. While this company is not exhibiting this year, products of several manufacturers whose line the Garton Company handles in the West are on exhibition, and Messrs. Garton and Lee therefore can be found at the booths of one of the following: A. and J. M. Anderson, Lord Electric Company, Heiney Fireproof Wire Company, Massachusetts Chemical Company.

For economy and safety in guying, the Atlas Anchor Company has a new anchor that at once appeals to the practical overhead man. The company's thrust ball-bearing setter is particularly interesting, as with it one man can in two or three minutes set the anchor to its full bearing position, without hitching to the pole and pulling it out of line. "Cheaper and stronger anchorage" is its slogan.

The steel measuring rule given out by the Russell Car and Snow Plow Company at the booth of Wendell & MacDuffie, is a very useful article. The ladies also get a useful souvenir here. It is a book of powder paper.

P. W. Turner, president of the Turnerised Metal & Canvas Roofing Company, of Ada, O., is attending the convention in the interests of his firm. The Turnerised roofing is not a new composition, but has been on the market for the past ten years and has withstood the tests of severe climatic conditions on corrugated and all other forms of roofing that require repairing. This company was formerly located at Niles, O., but recently removed to its present home. The roofing system was developed not only to repair defective roofs but to stop the corrosion of any metal roof from the inside. In the manufacture of the metal roofing, it is claimed by the firm, that the best combination of materials known to science is employed, thus guaranteeing that when this system is used a perfectly satisfactory and long lived job will be obtained. It has been adopted by many of the largest companies of the United States and is giving remarkable results.

The loadstone of the convention exhibit at the Lord Electric Company's booth has attracted the attention of the railway men. It comprises a display of lightning protective devices and Thomas soldered rail bonds. The one novel article to be seen there is the aerial park display illuminated sign, which is maintained at any desired elevation and can be illuminated by means of current from any accessible circuit. It is a great drawing card for railway amusement parks.

The Stone & Webster Engineering Corporation has about completed the new extensions of the Boston Elevated Railway Company's powerhouses at Lincoln Wharf, Charlestown and Harvard station, Cambridge. Four 2,700-kilowatt direct-connected direct current generators have been installed. A 5,000-ton coal pocket, with conveying apparatus, is another important addition to the Boston railway company's equipment which has been built under the direction of the Stone & Webster Engineering Corporation. The total cost of the extensions and improvements handled for the Boston Elevated Railway Company amounts to approximately \$2,000,000. The Stone & Webster Engineering Corporation is well ahead of the time specified in the contract for the completion of the various parts of the work.

The Schoen Steel Wheel Company, of Pittsburg, Pa., is showing at its booth a set of wheels that have been in service on the Brooklyn elevated and surface lines since June 1906. Though the wheels have seen very severe service they show no undue wear. The company is also showing several new

Schoen wheels. The representatives in charge of the exhibit are C. T. Schoen, president, M. R. Jackson, vice-president and general manager, W. M. Johnson, general manager of sales and N. B. Trist, assistant to general manager.

The W. R. Garton Company, of Chicago, manufacturer and dealer in electrical railway supplies does not have an exhibit on the Steel Pier but the company is ably represented in the persons of W. R. Garton, president and Ray P. Lee, secretary.

The U. S. Electric Signal Company, of West Newton, Mass., represented at the convention by Ronald F. Gammons II, and John J. Ruddick has cause to be somewhat elated by the receipt of orders for automatic signals since convention opened, from the Rio de Janeiro Tramway Light and Power Company and from Portland, Me.

At the booth of the Wheel Truing Brakeshoe Company, Dr. Griffin is handing out a little pamphlet giving "twenty reasons" for using wheel truing brakeshoes. So well pleased are many of the users of these wheels that additional reasons have been given to Dr. Griffin which he will be glad to tell all who call.

The Cooper Heater Company of Dayton, O., whose exhibit is on the sunny side of the Steel Pier, has not been called upon as yet to demonstrate the heating propensities of the Cooper heaters owing to the very pleasant weather. However, W. L. Blackwell and J. B. Cooper, who are in charge of the exhibit, will be glad to tell how and why the Cooper heater will effect economy in car heating—10 cents a day is the by-word.

The Goldschmidt Thermit Company is making daily demonstrations of the application of this weld at 4 o'clock in the vacant lot near the Hotel Jackson.

Dossert and Company is exhibiting at its booth a special design mounted with Dossert solderless lugs manufactured for the McAdoo tunnel system. Dossert solderless lugs are specified on switch and panel boards for the new Singer building, City Investment building, Little building and, in fact, for nearly all the large buildings in construction in New York.

The representatives of the Standard Paint Company, whose exhibit is on the right of the entrance, say that their P. & B. compound is so well known that many people take it for granted that P. & B. refers to the old stock that has been on the market for the past 23 years. The fact is this concern is showing a complete line of drying and insulating varnishes sold under the name P. & B. It is claimed that these products, although distinctly different from the P. & B. compound, possess the superior qualities which entitle them to be classed under the high P. & B. standard. They are offering samples to all interested.

The O. M. Edwards Company, of Syracuse, is showing a new street car window. This sash lifts into the headway at such an angle and height that the bottom rail of the lifted sash is raised to the level of the bottom rail of the upper sash. It is perfectly tight in the guideways at any height or position. It is counterbalanced by a spring roller with connections on each side of the sash. It is in use on various roads, among them being the Milwaukee Electric Railway & Light Company. This sash is fitted with the new No. 13 design of sash lock which is said to be the most effective lock offered at the price.

Heywood Bros. & Wakefield Company has at this convention the Wheeler seat mechanism with steel seat rails, pedestal base, automatic foot rest and high 3-part back with

arm rest. This seat is so constructed that there is no necessity for lubricating any of its parts.

The Garlock Packing Company, of Palmyra, New York, is addressing special efforts to advise the electric traction interests as to the merit of the Pitt metal packing for powerhouse work. This cast-iron packing may be placed inside or outside the stuffing box, as desired. This material is used extensively in the United States, and this company has made packing of this character for some of the largest engines in the world. The company is also exhibiting on the pier "Tauril" sheet packing, which has found many users, who think it to be the best jointing on the market. "Tauril" is made in Europe and the Garlock Packing Company is the sole agent for it in this country. One of its most valuable properties is indestructibility. It may be used over and over again. They are also showing a blue print of a new type of packing called the Pitt combination hydraulic, which is a semi-metallic packing made to take care of the highest hydraulic pressures. It is particularly adapted for use on step-bearing pumps on turbine engines and has given splendid results. The exhibit includes a wide range of fibrous and metal packing material.

The Blake Signal & Manufacturing Company's space, 228-230, has a very complete and interesting operating exhibit of its standard dispatchers, signaling apparatus. This exhibit includes line signals for roads operating with either 500 volt direct current or single phase alternating current, as well as a type suited for steam railroads. In addition to these there is a complete dispatcher's office equipment for the signals, dispatcher's telephone board and table, train order sheets and blanks, various types of railway line telephones and automatic triplicator. A model section of the dispatcher's desk set up in the middle of the exhibit space demonstrates very clearly the simple and ingenious mechanism of that portion of the apparatus, while one or more signals with the covers removed permit of detailed examination of the standard line signal. The exhibit is in charge of Messrs. E. J. Burke and C. C. Blake, and Mr. McFee, who is a practical train dispatcher and well acquainted with all the details of the best practice in both telephone and telegraph dispatching.

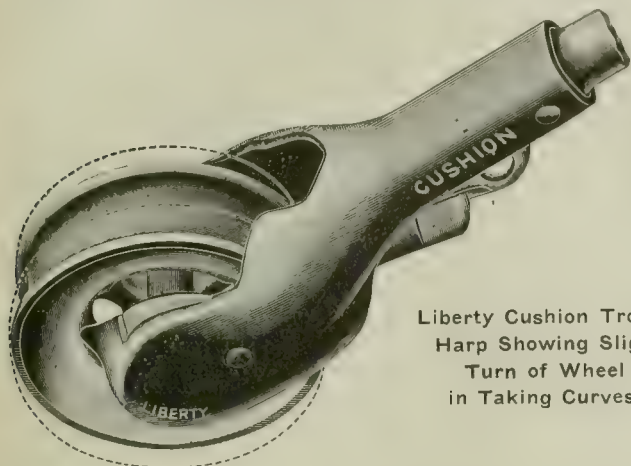
The Pantasote Company is showing samples of a new headlining for passenger cars which is about to be placed on the market. The headlining is made after an English process which has been largely used for years on English and continental roads. It is made of a pulp board impregnated with pantasote gum, which makes a material entirely homogeneous, waterproof and free from the possibility of depreciation through warping, bagging or splitting.

John Taylor, president of the Taylor Electric Truck Company, Troy, N. Y., expressed himself as more than pleased with the practical results of this convention as evidenced by inquiries and orders. The company is showing one eight-foot wheelbase single truck, one Taylor improved S. B. double truck, one H. L. B. type, one M. C. B. triple spring truck, also a full line of coil and elliptic springs for electric railway service and T. N. C. steel tired wheels. Represented by Jno. Taylor, C. H. Dodge, Thomas Thorne, W. B. Taylor.

The Eclipse Railway Supply Company of Cleveland, O., has had a very satisfactory week in demonstrating the operation of the Eclipse life guard. At the company's booth on the pier the device is shown by the representatives, Messrs. Farmer and Lev. A full sized equipment has been working overtime since the opening of the exhibits. The Eclipse guard has been adopted by many of the leading railways of the country and has, because of its life saving propensities and its great wearing strength, given thorough satisfaction. The guard is entirely automatic. It is claimed the life guard is maintained at a surprisingly low cost.

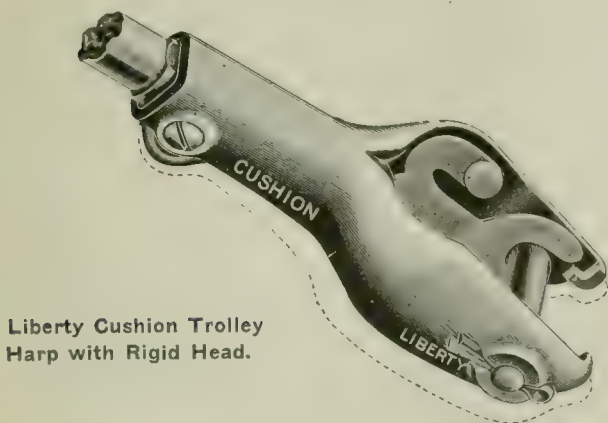
NEW DEPARTURE BELLS AND LIBERTY TROLLEY HARPS.

The exhibit of the New Departure Manufacturing Company in spaces 418, 420 and 422, is one of the most interesting on the pier. Numerous progressive trolley specialties are demonstrated, including the Liberty cushion harp, an inven-



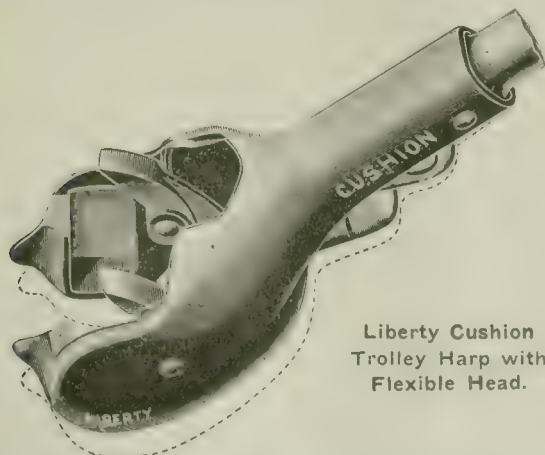
Liberty Cushion Trolley Harp Showing Slight Turn of Wheel in Taking Curves.

tion that should interest all street railway men concerned with overhead work. Undoubtedly much of this interest comes from the fact that a simple device has been provided for meeting serious street railway problems. The Liberty harp was



Liberty Cushion Trolley Harp with Rigid Head.

developed through co-operation of the inventor and expert street railway master mechanics and is thoroughly practical. The mechanism is very simple; all parts are strong and in its construction and operation every requirement was considered.



Liberty Cushion Trolley Harp with Flexible Head.

Another feature of the exhibit is the show of car bells. The display includes car bells, with push lever for foot operation, the overhead bell with pull lever for hand operation and the small single tap car bell for foot operation. The New Departure Company has long been recognized as one of the leading manufacturers of high grade bells and their product

is to-day used extensively in many countries. A distinctive feature of the New Departure bells is the simple, yet effective mechanism, by which a continuous alarm is secured. The parts are heavy and as durable as the gong itself.

In connection with the trolley harp, the New Departure people manufacture a superior trolley harp wheel. The company's high standard of manufacture prevails in this article and all wheels are made of new metal, free from lead. The wheels are made to standard measurements and may be used with Liberty harps or any other harp. An undoubted element of their superiority is their durability, outwearing any other wheel on the market.

The sleet cutter is one of those simple little devices that mean much. It can be set in the harp without use of tools in a few seconds' time and as easily removed. Experience has shown it to be very effective in clearing wire of sleet. The reverse side has a rounded shoulder for sliding on the wire in event of loss of wheel.

THE WESTINGHOUSE TRACTION BRAKE COMPANY'S AMM BRAKE EQUIPMENT.

The Westinghouse AMM brake is in use all over the country, and is designed to meet the requirements of a high class, interurban service where trains of from one to five cars are operated at slow speeds and with frequent stops in towns, but are subject to high speeds and more or less long distance runs outside these centers.

For such a service embracing a great variety of operative conditions an automatic brake system is essential in order to insure the proper operation of the brakes in service, and to secure the necessary protection in cases of emergency, damage to the piping system, break-in-twins and the like. These conditions require a triple valve on each car of the "plain" type; that is, one which will operate in response to variations in brake pipe pressure, and shall have no quick-action feature, as the latter is not only unnecessary on account of the short length of train, but would do more harm than good when attempting to handle single or two-car trains.

In addition to these two essential requirements, provision should be made for a quick recharging of the auxiliary reservoirs when a release is made, in order to insure prompt and certain response of the brakes to reduction in brake pipe pressure whenever circumstances may require rapid successive brake applications; for a quick serial action of the brakes from car to car in service, to produce rapid and definite application of all the brakes in the train; for a graduated release as well as graduated application of the brakes, in order that the motorman may control his train smoothly and accurately and in the most efficient way; and for a high emergency brake cylinder pressure, available when the shortest possible stop becomes imperative.

The AMM equipment, combining these features, possesses peculiar advantages for the safe and economical operation of modern high-speed, interurban electric traction systems. Any desired braking pressure may be carried, the change from low to high pressure operation requiring no additional operation of any kind.

The M triple valve is of the "pipeless" type, simple in construction and performs all the functions of a "plain" triple valve, including the additional features mentioned above. The brake valve used is of the rotary type, simple and compact in construction, and mounted on a pipe bracket to facilitate removal without breaking any pipe joints.

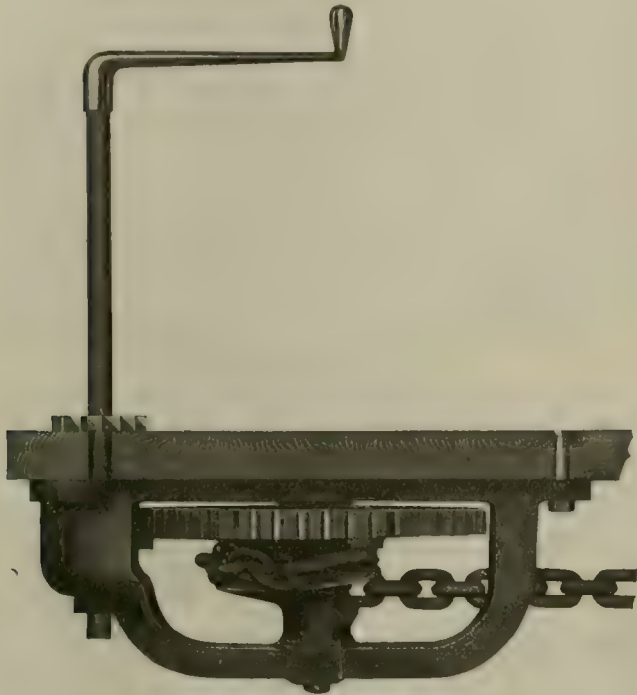
Two pipe lines are used, extending through the train. One, the brake pipe, corresponds to the single pipe of the old Standard automatic brake system, as used in steam road service. By means of this brake pipe the motorman is able to apply and release the brakes and recharge the auxiliary reservoirs. The other, the control pipe, serves to connect the sources of air supply on each car to each other and to the brake valve, and also supplies air to the triple valves on each car to assist in obtaining a graduated release of the brakes, a quick recharging of the auxiliary reservoirs, and a high brake cylinder pressure in emergency applications.

From the above it is evident that the AMM equipment is designed to meet successfully the very wide range of conditions existing in modern electric traction service where short train operation is the determining factor.

Russell Car & Snow Plow Company, of Ridgway, Pa., has on exhibition on the side track on Virginia avenue in front of the Steel pier one of its size six combination car and snow plows. An inspection of it is easily worth the time. The company is represented here by M. S. Kline, J. E. Logan, R. L. McDuffie, Jacob Wendell, Jr., H. E. Osterreich, O. C. Feraus, Geo. C. Morse. Information may also be had at Wendell & McDuffie's Space 40.

LATEST MODEL PEACOCK BRAKE.

At the booth of the National Brake Company in the ball room the latest model Peacock brake which is shown in the accompanying illustration is on exhibit. In this model the projection below the car floor has been shortened to seven

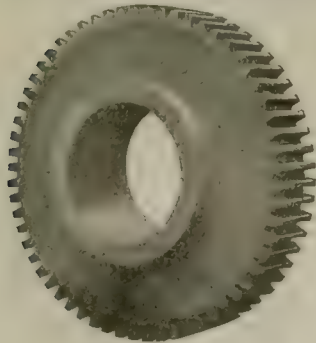


Latest Model Peacock Brake.

and one-half inches, which will permit the use of the brake on cars where the draw bars swing so closely to the floor as to prevent the use of the brake as manufactured heretofore. This new design is considerably lighter than the regular type-C brake of the same gear ratio of which it is a modification. The brake has been on the market less than a month.

TITAN GEARS.

The material composing the Titan gears manufactured by the Atha Steel Casting Company, of Newark, N. J., is so hard



Titan Gear.

that it cannot be cut by any tool steel yet known. All finished surfaces, such as teeth and hub-fit, are accurately ground to templates. Although the material is hard, it is not brittle; on the contrary it is so tough that test pieces have been bent cold through an angle of 180 degrees without showing fracture. The gear is made solid with the teeth cast in, then a special machine grinds the periphery of the teeth to the accurate diameter. Another machine grinds each tooth to the

master, while still another machine grinds out the hub-fit and faces both sides. A gray iron or soft steel hub is then pressed in at a pressure of 35 to 45 tons per square inch, and is bored out to the proper size for forcing on the axle. When arrangements were being made for the Louisiana purchase exposition, held in St. Louis, Mo., in 1904, a special committee was appointed to consider the question of street paving. After an exhaustive investigation Bitulithic was selected for Lindell boulevard, the main thoroughfare which led to the principal entrance to the exposition. The wisdom of this special committee later was indicated by the superior jury of awards, which granted to Bitulithic the gold medal as the nearest approach to the ideal pavement. The Jamestown boulevard commission also selected Bitulithic above all others for the boulevard to the Jamestown, (Va.), exposition grounds.

PLASTIC RAIL BONDS.

A rail bond with a conductivity of two-thirds that of the rail is obtained only under exceptional circumstances, but a rail bond of such conductivity that the drop of potential across two feet of bonded rail is less than the drop of potential across two feet of solid rail would certainly seem to be the ideal bond. Harold P. Brown, 120 Liberty street, New York, is showing a plastic rail bond of greater conductivity than the solid rail itself in his working exhibit.

The plug type of semi-plastic bond is composed of two plugs placed in amalgamated holes drilled through the tram of rail into the inner angle plate, the current passing from the rail through one plug to the angle plate, and then through the other plug to the next rail. This type of bond was designed principally for rebonding grooved or girder rails in paved streets without tearing up the pavement, removing the angle plates or interrupting traffic. To attach this bond the Brown magnetic clamp and electric drill is particularly well suited. The magnetic clamp is equipped with interchangeable shoes to fit any type of rail. The clamp itself is provided with wheels to facilitate moving from bond to bond. The drill used for this work is a half horse power drill taking current at 550 volts, the drill points being of tungsten steel, and will bore 1,000 holes without lubrication and without regrinding.

Where the angle plate is accessible for rebonding, the plastic plug bond is desirable. This plug bond is applied by drilling holes in the angle plate between the first and second bolt hole, downward through the flange of the angle plate into, but not through the base of the rail. The hole is nearly at right angle to the rail flange, and is as near the vertical web as possible. The drilled hole is amalgamated with solid alloy, the plastic plug then inserted and the hole closed by an amalgamated disc, locked in place by a hammer blow making a burr in the angle plate above the top edge of the disc. To further insure the seal, a piece of flexible waterproof insulating material is fastened to the angle plate over the hole, with waterproof cement.

For new work or where the angle plates can be removed the plastic rail bond is particularly desirable. It is this plastic bond that has given a conductivity of the rail joint greater than that of the continuous rail. This bond is composed of two portions, a plastic alloy of putty-like metal compound, which makes contact between the rail and the angle plate, and a flexible elastic cork case to hold the bond in position near the end of the rail. A cork case is made of a compound of cork and oxidized linseed oil, and is practically indestructible. The current passes from the rail through one plug to the angle plate and through a second plug to the other rail.

In attaching bonds, contact spots about two inches in diameter on rails and angle plates are cleaned of scale and rust, and treated with solid alloy, which silvers the surfaces and prevents them from rusting. This fills the surface irregularities and penetrates the metals for a perceptible distance, leaving a surface to which the plastic alloy readily adheres. The time necessary to attach this type of bond is very short, no heat being required.

Another application of plastic alloy is in connection with the contacts on circuit breakers. By using an amalgam alloy at the contacts the carrying capacity of the contact is increased and stitching of the contacts made improbable. The contacts are slightly modified by making the lower one in the form of a cup containing the plastic alloy and the upper one in the form of a finger dipping into the cup.

AN EFFICIENT LOCK WASHER.

Plain nut locks are nut holders only to the extent of the spring. It is claimed, however, that when set up the National lock washer, made by the National Lock Washer Company, Newark, N. J., holds the nut tight by the operation of the rib, independently of the spring and, besides, has all the elasticity required, thus taking up elongation of the bolt or looseness caused by settling or wear. When in service this lock washer is so embedded in the nut that there is no friction between it and the nut as the parts jar; it will, therefore, wear much longer than a lock washer that does not lock the nut in this manner. Tests have demonstrated, also, that its use will prolong the life of the rail joint. It can be used on any make of bolt or nut and the same bolt, nut and lock washer can be used as often as required. It is stated that over 415,000,000 lock washers have been used on railroad track alone.

An air motor system for operating doors on electric cars is being exhibited at the conventions by the Consolidated Car-Heating Company, which company is also exhibiting its standard electric heaters, switches and complete switchboards.

PROTECTION.

"Show me," says M. C. Stern, general manager The Egry Register Company, General Systems Department, Dayton, Ohio, "railway officials that have made a study of security in train despatching and I will prove to you that their respective roads have very few mishaps."

Cause a man to recognize the responsibility that rests upon him, and you make him careful and trustworthy. That same principle must be followed in train despatching, for with the immense value of property, as well as the lives of passengers which are practically in the hands of every conductor, motorman and despatcher, too much stress cannot be laid upon this subject.

This may be done by installing a thoroughly practical system of train despatching, a system whereby the motorman and conductor are required to sign each order after obtaining the despatcher's "complete." By the use of the Egry despatching registers three full copies of an order are issued at one writing, a copy for the motorman, one for the conductor and a third retained in a locked receptacle, accessible only to the authorized official, who gathers these records at certain intervals. These records, according to the plan of the company, are taken to the general office, are duly audited and preserved for future reference. This full information is always at hand concerning each and every order given and received. No disputes, no misunderstandings, no verbal orders, no counter claims, in fact, none of the excuses which have so frequently been offered, will be presented, for the manager can, without doubt, place his hands upon the responsible party.

THE CONTINENTAL BOILER WITH MORISON CORRUGATED FURNACE.

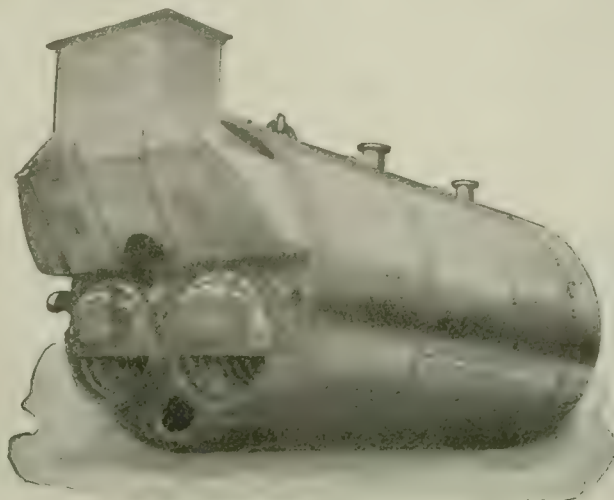
The Continental boiler, with Morison corrugated furnace, is becoming more and more popular for electric railway power plants, and, in fact, any power plant where economy, efficiency, high pressure and safety must be combined. There are a great many installations of this type of boiler throughout the country, one of the most notable being that in the plant of the Fonda Johnson and Gloversville Railway, Amsterdam, N. Y., of the type shown in accompanying illustration.

The efficiency of this type of boiler is primarily due to the fact that the boiler is entirely self contained. The horizontal tubular boiler and the various styles of water-tube

will give as high a factor of evaporation at the end of the tenth year as at the beginning of the first.

Its safety is a matter of record. A boiler of this type has never been known to explode, though more than 25,000 are in use.

The Continental boiler, with Morison corrugated fur-



Continental Boiler—Exterior View.

nace, is not patented, and may be built by any shop having the necessary equipment.

To those contemplating the installation of a power plant or in any way interested in the designing and constructing of boilers it will be of interest to confer with Joseph T. Ryerson & Son, 18 Milwaukee avenue, Chicago, Ill.

ELECTRO-PNEUMATIC BRAKE SYSTEM.

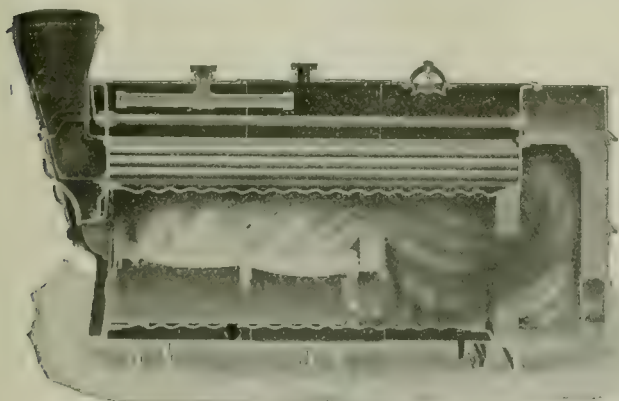
The electro-pneumatic brake system of the Westinghouse Traction Brake Company is an example of the highest refinement in apparatus for the safe and economical control of modern electric trains. It is designed primarily to handle trains such as are used in ordinary subway or elevated service, but the results are just as satisfactory whatever the length of train or conditions under which they operate. It consists of two distinct systems of control, electric and pneumatic, so arranged that either may be used without in any way interfering with the other, the same brake valve being used with each system.

The advantages of an electric control of the brakes have long been recognized. The effect of the length of train handled is practically eliminated and the judgment and skill in operation required of the motorman largely reduced, due to the fact that the brakes apply instantaneously, simultaneously and uniformly throughout the train, and that the system remains fully charged while operating electrically. At the same time the ability to graduate the application or release of the brakes to whatever degree of refinement may be desirable is a feature of great importance in the smooth and accurate handling of the trains. As regards safety, the electro-pneumatic system far exceeds all others. Not only is the system kept fully charged while the brakes are being operated electrically, thus allowing for as many or as rapidly repeated applications as may be necessary, but in the case of failure of current, or derangement of the electrical control of the brakes in any way, the pneumatic system is always available, and can be operated at once without any manipulation being required other than the moving of the brake valve handle from the electric to the pneumatic position. Furthermore, when the brakes are applied the cylinder pressure can be maintained at will. A greatly increased economy in air consumption is also secured by electric operation as the air used is only that actually required in the brake cylinder.

The electro-pneumatic system consists of a complete pneumatic system, which may be of any type desired, with the slight additional apparatus necessary to provide for electric operation.

These are (1) the addition of suitable admission and exhaust magnet valves to control the flow of air to and from the brake cylinder, (2) the location of contact fingers in the brake valve so as to enable the necessary electric connections to be made by proper movement of the brake valve handle, and (3) the wiring necessary to complete the circuits from the magnet valves to the brake valve contacts.

One of the chief advantages, from an operating standpoint,



Continental Boiler—Sectional View.

boilers are in relation to heat application modifications of the camp kettle, and while a judicious use of masonry avoids the loss of a great deal of heat, yet it can readily be seen that the foundations and brick walls on all sides absorb and radiate much of the heat that the water surfaces should receive in order to secure a perfect condition.

In the Continental boiler all fire surfaces are water surfaces, and every unit of heat has to pass into the water surrounding the furnace. This makes the evaporation per pound of fuel much greater than in the tubular and water-tube types.

It is stated that its economy rests in its simplicity of construction. There is nothing to get out of order, no brick work to crack from the alternate heating and cooling; no cast-iron connections which may be honey-combed with blowholes, and a continual source of anxiety. It is economical in space, will burn the poorest grades of fuel and save a large proportion of the coal bill. It is easily cleaned, and

secured by the use of this equipment is that new men can be broken in to handle trains satisfactorily in a very short time, due to the extreme flexibility and uniformity of the electric control system. And where service conditions demand the handling of a large amount of traffic in the most safe, expeditious and economical manner possible, the electro-pneumatic system possesses superior advantages which make it as near an ideal system for the control of trains as has yet been evolved.

HAWTHORNE WORKS OF WESTERN ELECTRIC COMPANY.

The enormous growth of the electric power industry is so generally recognized that comment is hardly necessary.



Hawthorne Works of Western Electric Company.

There is probably no better example of this, than the preparations recently made by the Western Electric Company for the manufacture of power apparatus.

This company, as the tendency to use large units developed, found its city plant inadequate for the demands put upon it, and accordingly selected a tract of 110 acres at the extreme west of the city of Chicago, upon which the Hawthorne works, for the manufacture of power apparatus, was built. Since then more land has been obtained and new

BRILL CARS FOR MEXICO.

The chief feature of the car illustrated, which is one of a number that The J. G. Brill Company has just shipped to a road in Mexico, the F. C. Electrico de Lerdo a Torreon, is the "Narragansett" step. This additional step is formed by an extension to the lower outward extending flange of the Z-bar sill, making an upper step $8\frac{1}{2}$ inches wide. As will be noted, the cars are divided at the center by a bulkhead thus providing for first and second class passengers; this bulkhead is fitted with drop sash and stationary seats on each side. The cars are 33 feet $4\frac{3}{4}$ inches long over the crown pieces; width over sills, 7 feet 5 inches; side sills are composed of 8-3- $\frac{1}{2}$ -inch Z-iron. The trucks used are of the Brill No. 27G1 type, with 4-ft. 6-in. wheel base.

The road which connects Lerdo and Torreon, situated on the borders of the states of Durango and Coahuila, was one of the first in Mexico to be electrified. Brill interests have furnished the entire equipment. The two towns named are about five miles apart.

G. L. L. Davis, formerly with the General Castings Company, has resigned to become associated with the United States Metal & Manufacturing Company of New York. B. A. Hegeman, Jr., the president of the company, is in attendance at the convention and is accompanied by Mr. Davis.

Both of these men are prominent figures in the railway supply world and are pursuing an aggressive campaign into the field of electric railway supplies.

"The Modern Car for Passenger Transportation," is the title of a 56-page pamphlet published by the Pressed Steel Car Company which describes and illustrates a number of very interesting all-steel cars which have been built for various electric railway companies, including the Metropolitan



Narragansett Type Car for a Mexican Road.

buildings added as demanded by the enormous increase in business. All buildings and departments are interconnected by a system of industrial railways, which, together with the heavy crane equipment in all buildings, affords a rapid and easy method for handling heavy apparatus.

Likewise throughout in the equipment and design of the plant every known method for facilitating the manufacture of large power apparatus has been made use of, and this company is prepared to offer the best possible service to the trade.

Street Railway of New York and its successor, the New York City Railway Company, the United Railroads of San Francisco, the Philadelphia Rapid Transit Company, the Boston Elevated Railway, the Hoboken Rapid Transit Company, and also a number of cars built for the Southern Railway and the Pennsylvania Railroad. Those in attendance at the convention who are interested in improving the design and construction of rolling stock cannot fail to be very much impressed with this attractive publication of the company which has achieved such a high position in the manufacturing world.

FENDER TRIPPING AIR VALVE.

With the idea of making more certain the dropping of the fender in all cases of an impending accident or collision, The Consolidated Car Fender Company, Providence, R. I., manufacturer of the "Providence" fender and the Campbell snow broom, is just placing on the market an "emergency" air valve which promises to be a valuable addition to the car equipment. It is readily apparent that any cause for



Emergency and Air Valve.

dropping the fender would also be a cause for stopping the car. Naturally the motorman's first thought and act in an impending accident or collision is to stop his car; in either case the fender should be down. The emergency valve applies the brakes and simultaneously drops the fender without interfering with and entirely independent of the regular valve. Another good feature of the valve is, that its purpose being specific, viz., for quick stops in emergency cases, the motorman is not likely to use so often the regular valve to the emergency point, thus saving wear and tear on the brakes and the flattening of wheels.

The American Carbon & Battery Company, of East St. Louis, Ill., has no exhibit at the convention, but is represented by Harold J. Wrape and P. V. D. Brokaw, who are stopping at the Dennis. The company is just entering the street railway field with a line of brushes, though it has manufactured carbon brushes for the last seven years. The company's regular price brush is known as "Diamond A" and has proven a very satisfactory brush in ordinary city service. For interurban service, or where brushes are subject to severe strains, the company recommends its American special brush.

The Diamond A brush is a hard carbon brush, made to withstand constant jarring and strains of continuous railway service. The brush is self-lubricating and has shown a long life.

The American special brush was designed especially for severe railway work and is the result of several years' experiments in the factory and in extended tests on cars in service under varying conditions. The American special brush is hard and dense and contains no grit to scratch the commutator. Where rough usage is the rule, as in a large pro-

portion of street railway service, the company especially recommends its American special brush.

For use on small motors and generators the company makes a soft self-lubricating graphite brush which will not cut or scratch the commutator. It is made to meet conditions where a soft, dense brush is required.

The company is particularly anxious to have officials of street railways who have had brush troubles give the American Diamond or the American Special brushes a thorough trial, as it believes that in one of these brushes a brush that will fully meet the requirements of service will be found. If one of these grades does not give full satisfaction, brushes of special texture will be made to meet any service conditions.

TOMLINSON AUTOMATIC RADIAL CAR COUPLER.

One of the interesting devices displayed by The Ohio Brass Company, Mansfield, O., is the Tomlinson automatic radial car coupler which is meeting with favor among electric railway men. The coupler is among the devices shown by the car equipment division in charge of Mr. Nathan Shute. The Tomlinson coupler, one type of which is shown herewith, aside from its automatic feature is especially to be recommended on account of the safety to trainmen which is



Tomlinson Coupler for Channel-Bar Draft Gear.

gained by its use. There is absolutely no need for anyone to step between cars during coupling or uncoupling as there are no loose parts which require adjustment. Uncoupling is accomplished by simply pulling a chain which may be reached without danger to the operator. This feature of safety is one which should appeal to all. In the exhibit the coupler is shown mounted upon movable trucks by means of which the automatic feature is readily demonstrated. The M. C. B. knuckle is also on exhibition, which is easily and quickly applied to the Tomlinson coupler, making the latter adaptable to intercoupling with standard steam road couplers. Tomlinson couplers are built in sizes applicable to any class of electric railway service and in forms adaptable to all standard forms of draft gears.

Street railway track men are showing much interest in William Wharton Jr., & Company's heel-less type of tongue switch. This has been on the market for about three years and yet it is stated that over 2000 are already in use. Several styles of this switch in girder and in tee rail construction are exhibited and a full size wooden model is used to explain its details and advantages.

"If Atlantic City, N. J., is not 'stuck on itself,' it is 'stuck' on its Bitulithic pavement, and it is willing to forgive itself all its sins and shortcomings when it contemplates the smooth stretch of Atlantic avenue that reaches from the Pennsylvania Railroad station to the Inlet. Every city official, from the mayor down, will declare that automobilists, drivers of fast and slow horses and manipulators of pushcarts are feverish with anxiety to leave other highways and get on Atlantic avenue."—Philadelphia (Pa.) Public Ledger, July 30, 1907.

The International Register Company has on exhibition at its Music Hall booth a very complete line of International waterproof trolley cord. The International waterproof cord is made of the finest quality of fibre cotton, one of its superior qualities being that the cord is waterproofed in the fibre before braiding, which makes the cord waterproof throughout. This quality of waterproofing cannot be obtained in cord which is not waterproofed before braiding. Another one of the special points of merit is that the cord repels water from penetrating the interior of the cord. This can be clearly shown at any time by cutting off the end of the cord and placing it in a glass of water for several days. The cord is made in all sizes and is very flexible.

THE WESTINGHOUSE AUTOMATIC CAR AND AIR COUPLER.

When two or more cars are operated together regularly, the means of connecting them becomes of prime importance because of certain essential requirements which fall naturally into two groups under the following headings:

Safety.

Safety, being the first consideration in all questions of transportation, must be secured to a maximum in the coupler itself. With the Westinghouse automatic car and air coupler this feature is made paramount. Not only is protection against accidental uncoupling assured, but the substitution of an unfailing mechanical device for more or less hazardous and uncertain hand processes affords a vastly increased protection to the railroad employe against unnecessary danger to life.

While the ordinary automatic car coupler accomplished much in this direction, there still remained the necessity of going between cars to couple or uncouple the air hose and, in consequence, almost as much risk as had previously attended the making up of a train. With the automatic car and air coupler this is completely avoided, the coupling and uncoupling of the drawbars and air connections being accomplished simultaneously and automatically.

Economy.

Economy of operation embraces two factors of equal importance to the successful handling of all modern transportation service: time and maintenance.

Past experience extending over a number of years, on many roads, has demonstrated that by the use of automatic couplers congestion at large terminals and delays in the making up of trains can practically be eliminated. Next to the increased protection to the trainmen, this feature commands particular consideration.

A further material saving, perhaps more tangible to the maintenance department, of a railroad than either of the foregoing, is in the item of coupling hose itself. It is a fact familiar to every practical railroad man that a very large proportion of all defective hose removed from cars has been cut, torn or strained due to carelessness in uncoupling, and permitting hose to pull apart, or dangle along the track. One large railroad has estimated the maintenance expense in the item of hose to be about two and one-third times greater with hand coupling than with the automatic coupler.

(2) When locked it is quite impossible to separate the couplings by accident while in operation, due to unevenness of track or other cause. (3) Should the lock on one coupler become deranged or defective the other is not affected in any way as the locks are so designed that if one becomes defective the other prevents the uncoupling of the device except in the usual manner. (4) It couples and uncouples both car and air connections simultaneously. (5) It largely reduces the time required to make up trains at terminals or to couple to or uncouple cars en route. (6) Reduces cost of operation by saving wear and tear on flexible hose. (7) Will automatically couple and uncouple cars of varying height, whether on straight or curved track. (8) When coupled all slack is eliminated, preventing severe shocks and damage to apparatus between cars. (9) Air connections are accessible, tightness is assured, wear and tear, and breakage of gaskets practically eliminated. (10) Simple and strong design; thoroughly practicable and durable. (11) Coupling gaskets can be replaced with ease quickly. (12) It may be coupled with any other type of coupler by use of an adapter head.

An adapter head is furnished when desired for use during the transition period when the equipment of a road is being changed over, or in cases where cars having a different form of coupler are to be operated at times with those equipped with the automatic car and air coupler. The face of this adapter head corresponds to that of the Westinghouse coupler head into which it couples. The opposite end is provided with suitable socket and locking device to take the other types of couplers which it is intended to provide for.

OPEN CARS FOR DALLAS.

The typical open car, although not so widely used since convertible types have entered the field, is still in large demand, and in a town such as Dallas, Tex., for instance, has been found indispensable in fine weather. The illustration shows one of the five cars just shipped by The J. G. Brill Company to the Dallas Consolidated Railway Company which operates with both 9 and 10-bench open cars of this make.

The Dallas Consolidated Railway Company's cars were ordered through Stone & Webster of Boston, and through the same source orders for cars have been received by The J. G. Brill Company for shipment to Tampa and Pensacola, Fla.; Columbus, Ga., and El Paso, Tex.; the railway companies in the last two mentioned towns ordering open cars



New Cars for Dallas, Tex.

Another important saving accomplished by the automatic coupling of hose is less leakage of air from the brake system and, in consequence, a reduced burden imposed upon the air compressor.

The important advantages which the Westinghouse automatic car and air coupler possesses over the ordinary type of automatic car coupler with air connections which require to be coupled by hand are, therefore, as follows:

(1) It eliminates the element of personal danger in coup-

pling cars. (2) When locked it is quite impossible to separate the couplings by accident while in operation, due to unevenness of track or other cause. (3) Should the lock on one coupler become deranged or defective the other is not affected in any way as the locks are so designed that if one becomes defective the other prevents the uncoupling of the device except in the usual manner. (4) It couples and uncouples both car and air connections simultaneously. (5) It largely reduces the time required to make up trains at terminals or to couple to or uncouple cars en route. (6) Reduces cost of operation by saving wear and tear on flexible hose. (7) Will automatically couple and uncouple cars of varying height, whether on straight or curved track. (8) When coupled all slack is eliminated, preventing severe shocks and damage to apparatus between cars. (9) Air connections are accessible, tightness is assured, wear and tear, and breakage of gaskets practically eliminated. (10) Simple and strong design; thoroughly practicable and durable. (11) Coupling gaskets can be replaced with ease quickly. (12) It may be coupled with any other type of coupler by use of an adapter head.

"Don't let the play be too high or too late" in playing with the handsome cards given out at the U. S. Graphite Company's exhibit.

Electric Railway Review

DAILY EDITION

PUBLISHED BY THE WILSON COMPANY

IN HONOR OF THE ANNUAL CONVENTIONS OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION AND OF ITS ALLIED ASSOCIATIONS OF ACCOUNTANTS, ENGINEERS, CLAIM AGENTS AND MANUFACTURERS, AT ATLANTIC CITY, N. J.

Subscription in advance, including regular weekly issues and daily editions published from time to time in places other than Chicago, postage free; one year, \$2.00; foreign, \$5.00; Canada, \$3.50; single numbers, 10 cents.

PUBLICATION OFFICES: 147-151 North 10th Street, PHILADELPHIA

EDITORIAL OFFICES: The Steel Pier, ATLANTIC CITY, N. J.

BUSINESS OFFICES: 100 Harrison Street, CHICAGO; 150 Nassau Street, NEW YORK; 129 Williamson Building, CLEVELAND.

Application made at the Philadelphia (Pa.) Postoffice for entry as second-class mail matter.

VOL. XVIII

PHILADELPHIA, PA., OCTOBER 19, 1907

No. 15f

Those familiar with the operating and traffic departments of steam railways should they peruse papers presented before the American Street and Interurban Railway Association on the subject of freight traffic would miss a number of familiar friends, to wit: "car service," "demurrage," "per diem" and "interchange rules." Because of the scant freight equipment possessed by most electric railways there has been but little opportunity for managers to become acquainted with the operation of the interchange rules and the per diem rules agreement; but there are a number of electric railway companies which are already members of car service associations and we think it is rather a matter of regret that this matter was not touched upon in the papers presented before the association. If it is intended to extend the interchange of traffic between steam and electric lines, electric railways will probably find it necessary to follow the same methods as their elder brethren in the transportation field in regard to car service and demurrage and we do not believe that there will be any serious obstacles interposed when the electric companies wish to become members of the various organizations which have for their object the increase in the efficiency of railway equipment. The attitude of the car service managers in this regard is that the electric railways will handle some steam railway cars, perhaps as switching companies if not parties to a through rate, and such being the case it is important to have these cars handled on the same terms as is the case with steam lines.

Some of the pioneers in the electric interurban railway field made the mistake of assuming that in order to get business it was necessary to reduce the rates for transportation considerably below those which obtained on competing steam railways. The company which built the Anderson-Indianapolis line of what is now the Indiana Union Traction Company furnished a striking example. When this section of the road was opened the rate of one cent per mile for passengers was established and was maintained for several years. It was found that this rate was too low, and accordingly, some two years ago, it was increased 50 per cent, making the basing rate $1\frac{1}{2}$ cents per mile. The theory of those who made such low rate did not take into account the other elements which have been so important in establishing the supremacy of electrically operated lines in the field of local passenger transportation; that is, the attractions of a frequent service and convenience in the matter of terminals where passengers could be taken up and put down at the business centers of the road's termini instead of at stations more or less remote from those business centers, as is the case with most steam railroads. In the discussion on the papers submitted by P. P. Crafts and H. H. Polk before the American association on Thursday, dealing with freight traffic on electric railways, it was developed that a number of managers had made the same mistake

as had the passenger lines when going into the express or freight transportation business. Several of those who discussed these two papers said that when commencing business they had cut the rate for freight or express below that of their steam-operated competitors, but had since seen the error of their ways and increased the rates so that they were now equal, or, in some cases, higher than those charged by the steam lines. The important point was made that frequency of service and convenience in the matter of terminals was quite as efficacious in drawing freight traffic as it had proved to be in developing and maintaining passenger traffic. The fact that the rates charged by electric railways made for express or freight service may be higher than corresponding charges on the steam railway does not mean that the electric railways are asking anything unreasonable of their patrons. Because of the two points mentioned, and especially because of the frequency with which trains are operated, the service offered is worth more, and patrons are willing to pay for this improved service.

===

A visit to the ball-room at the outer end of the Steel pier suggests some ideas which may be worth elaborating.

Segregation of Exhibits.

Although the exhibits shown in this room are of various kinds, one could not but be impressed with the displays of office appliances located there and with the belief that had all of the office appliances shown at Atlantic City been concentrated in one place the display would have been even more effective than it is, and have attracted more attention from the accountants and other delegates who are interested in this particular line of apparatus. Probably all of us have remarked that in the business districts of cities certain lines of business are segregated. The dry goods stores are in one quarter, the wholesale and hardware houses in another, and so on, and it occurs to us that it might be of a considerable advantage to exhibitors, and to convention delegates also, were competitors to be assigned adjacent exhibit spaces. It would certainly be a great convenience for delegates were they to be able to find all the rail exhibits in one portion of the hall, all fare registers in another, etc., and the manufacturers would benefit thereby.

===

Now that both the Engineering and American associations have signified their approval of one set of standards for axles, journal boxes, wheel tread contours and brakeshoes, there yet remains for consideration the second part of the problem of standardizing electric railway equipment.

That such a body as the American Street and Interurban Railway Association would unanimously accept the recommendation already sanctioned by the Engineering association affords the most positive assurance to be desired that those members of the former body, upon whom rests the responsibility of putting into practical use

the newly recommended standards, will so conduct the choosing of their equipment that the future will see the electric railways enjoying the benefits of standard practice now so highly appreciated by our steam railroads. The report as it stands approved by both bodies does not differ essentially in detail from one recently approved by the Central Electric Railway Association. The standard practices enumerated in the report of the Engineering association's committee were evolved only after calling into consultation the highest available authorities in the operating and manufacturing fields, and for this reason the owners and managers of properties can feel perfectly safe in following the recommendations laid down. As was so aptly stated in the discussion of this report before the American association, it is of the utmost value to have available a set of standards upon which further work may be based and the necessary refinements made. In order that such detailed improvements as suggest themselves may be considered in the future, it is, if for no other reason, very desirable that representative roads when considering new purchases utilize the standards as far as existing conditions will permit. It is understood, of course, that it would not be possible for any one road to adopt all the recommended practices at one time unless it was an entirely new road. But if consideration of the standards is duly given, and those recommended practices adopted which may satisfactorily be used under existing conditions, there will result in a surprisingly short time all the benefits to be desired from unified practice for electric railway work.

===

On this, the day following the close of the most successful convention ever held by the various interests represented by the American Street and Interurban Railway Association, using the name as a general term, it seems proper to call attention to one or two of the features that have contributed in a large measure to this success. Even a word about the weather seems not inadmissible. From the beginning the climatic conditions have been almost ideal—a fact which has possibly been appreciated to a greater extent by those in charge of the elaborate exhibits upon the steel pier than by those who had only personal comfort in charge. The exhibits themselves, individually and as a whole, have undoubtedly surpassed in extent and harmony of arrangement any similar display ever presented outside of an exposition the duration of which was to be of as many months as the life of the present exhibition has numbered days. It has been repeatedly a matter of comment during the past week that the exhibits seem to have been arranged with all the care and taste, including attention to minor details, that might well be considered possible only in connection with a permanency. For this, the painstaking care of the Manufacturers' association, exercised through its most efficient representative, is responsible and the association and its representatives are entitled to equal credit for the formulation of plans and for their execution in detail. In handling the intricate details of registration, also, there has been nothing left to be desired. This is the first time these associations have followed the segregational plan—separating by physical fixtures the various classes of attendants into the groups in which they are classified in the printed record—and the practical working out of the scheme has been eminently satisfactory. It has appeared, on account of the absence of crowds around the registration headquarters, as if the attendance had been less than upon the occasion of former meetings. As a matter of fact it has been considerably greater. On the whole, the managerial functions necessary to the handling of so large a body of people and such a multiplicity of exhibits have been excellently performed. The executives of the associations and of the local organizations have many things upon which to be congratulated, and, so far as now appears, nothing upon which to base regrets.

HANDLING CONVENTION BUSINESS.

When an association is organized, or at least after it has been organized for several years, it is reasonable to suppose that a comprehensive plan of action has been formulated, and that in time this plan shall achieve the dignity of a standard. That is to say, the association is either a deliberative body, having as its object the formal discussion of reports prepared by duly authorized committees, which, prior to the convention, have carefully considered the subjects assigned to them so that when the matter is presented before the association it appears as a number of conclusions based on facts that have been carefully digested; or, on the other hand, the conventions are in the nature of mass meetings where the subjects to be considered are to be discussed extemporaneously, in which latter case the report of the meeting is apt to satisfy F. Marion Crawford's definition of history—"a play, which is so badly played because the actors do not know their parts." All this is suggested by the fact that a considerable number of the most important reports presented before the several association meetings in Atlantic City this week were not printed and ready for distribution until the session at which they were to be presented had been called to order.

It is possible that we feel this more keenly than do members of the association, who really should be more vitally affected, but a daily paper either goes to press or it does not, and when at the eleventh hour a report requiring some days, possibly, for the preparation of drawings and engravings is received, we cannot wait, and our inference is that somebody has unreasonably procrastinated. We know the trouble cannot be with the secretaries because they have been camping on the trails of the authors for weeks, perhaps months; so the difficulty must lie in the lack of loyalty to the association which permits a man to accept an assignment or an appointment on a committee and then crassly to neglect his duty.

It is not fair to indulge solely in destructive criticism, though that is much easier than is constructive criticism. Therefore, we believe it proper to make some suggestions as to a plan which might prevent occurrences such as those just described. Let there be an understanding that the work of the association shall move like the clock. Let the "Subjects" committee for 1908, as was very happily suggested by Mr. McCulloch in his report before the American association on Wednesday morning, be appointed at this convention so that assignments can be made early. The assignments once made, let it be understood that the reports and papers must be in the hands of the secretary at a stated time, say sixty days before the date of the convention. And further, let the secretaries be instructed that they shall have printed copies of the papers in the mails thirty days before the convention. And most important of all, let it be understood that 60 days means 60 days and not 45 days; and that 30 days means 30 days and not 20 minutes.

When the programmes for the meetings are prepared let the time for the consideration of each subject be assigned and the schedule followed so that at the end of the session there is not a mass of reports to be thrust in, read by title and buried in the files. Such plans as those suggested have been carried out and are being carried out every year by associations which have memberships as large or larger than these associations, and which represent interests quite as important, if not more important, so that the magnitude of the task involved in securing the orderly despatch of business does not impose an insurmountable obstacle. The thing to do is to get busy; get busy early and continue in that state until the convention adjourns.

The Stone & Webster Public Service Journal for November made its appearance at the convention today. It is an admirably gotten up issue, containing a great many interesting articles on electric railway matters. A "News from the Companies" department contains news regarding many of the Stone & Webster properties.

PROCEEDINGS OF THE AMERICAN ASSOCIATION—
FRIDAY SESSION.

President Beggs called the meeting to order at 10 a. m.

The report of the committee on "Insurance" was presented by H. J. Davies of the Cleveland Electric Railway.

President Beggs said he desired to emphasize what Mr. Davies had said; that this was a matter of great importance to most of the companies, and that it received at their hands very little attention. The insurance matter was usually left with some subordinate, or the head of some department, usually the accounting department, and went along from year to year as a matter of form without much attention being given to it. In his companies, this was one of the matters which has always received his personal attention. He made the statement that under no circumstances could over 50 per cent of the amount paid by the insuring public in any line of business—except in the case of some great catastrophe—be returned to the insured. The first draft on every insurance premium which is paid was probably 25 per cent, which went to the state agent as a commission. That must go, and could never come back. The tax on fire insurance premiums in the state of Wisconsin was about 7 per cent of the entire amount of premiums paid. The records showed some years ago that there had not gone back to the insured in this country, between 40 and 50 per cent of the premiums. The rest was that which the insured, if they were in position to do it, could save; and that was the object of the proposed company, to save that 50 per cent.

Mr. Beggs added that with his Milwaukee company the records showed that in eleven years the amount the company has received back from the insurance companies less than 4 per cent of the premiums paid, and yet the premiums, during a good part of the time, were at a much lower rate than the average. If his company had not carried any insurance in the last eleven years it would have \$750,000 in its insurance fund today—instead of \$450,000—and they would be saving the 50 per cent which goes to bear the legitimate expenses.

H. N. Staats said, that about three years ago he had received an invitation from Mr. Davies to attend the convention of the American Street Railway Association, for the purpose of bringing to the attention of the executive committee of their association the advisability of appointing an insurance committee. He had received very great encouragement from Mr. Ely, who was then president of the association. After that meeting steps had been taken to organize what are known as the American Railway Insurance Company, the Electric Mutual Insurance Company, and the Traction Mutual Insurance Company, with the end in view of interesting the members of this association in carrying their own insurance at actual cost. He said he was not running down the old line companies. They had a very necessary place in the community; but through co-operation on the part of this association with other associations, electric railways could carry their insurance at actual cost, and that cost would be less than the old line or stock insurance companies could carry it.

The report of the committee on "Rules for the Construction of Modern Car Houses," was then presented.

On motion the report of the committee was adopted and its recommendations earnestly recommended to any company intending to build car houses, or overhaul those already constructed.

The report of the committee on "Municipal Ownership" was then presented by C. D. Wyman, chairman, and on motion was accepted and spread upon the records.

The privilege of the floor was then extended to A. T. Bell, president of the Atlantic City Hotel Men's Association,

to make some remarks upon the subject matter set forth in his letter making the suggestion that Atlantic City should be selected as the permanent place of meeting for a period of five years. (Electric Railway Review, October 17, page 555).

Mr. Bell described existing conditions and the substance of the proposition, and continued as follows:

In order that we might have the ocean side of our board-walk free and clear, all the property owners sign covenants granting to the city the right to restrict against the putting of buildings outside of the pier and against the sale of commodities outside of the pier, and against a number of things, among which is this, that they are not permitted to restrict the public from coming in. On the Ocean pier, however, which was built before the signing of these deeds and the forming of these covenants, these restrictions do not lie, which fact has been determined by carrying the matter through the highest courts. It would therefore be possible, if it were so desired, to exclude the public entirely from this exhibit structure during the time of your convention, which

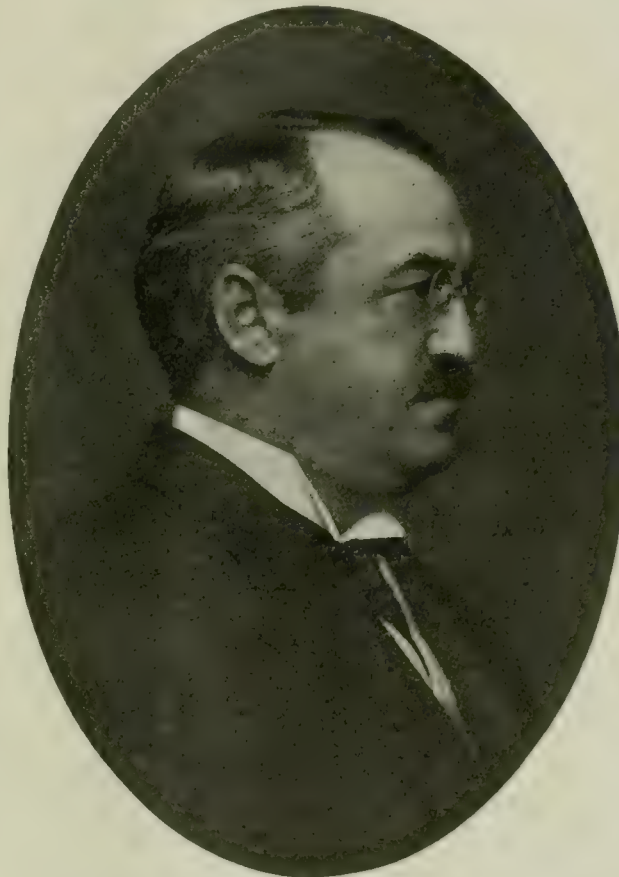
is a matter that some of your exhibitors think very important. The idea, further, is to manage this exhibit hall on something like what is called the American plan of a hotel, which furnishes all accommodations at a flat rate.

Now, this corporation has in mind the expenditure for the purpose of this hall a sum approximating \$1,500,000, and should it be found on going into the matter later on that the sum necessary would be \$2,000,000, that sum will be forthcoming provided the financial plan, which would have to be considered more in detail by the individual exhibitors, is agreeable to them. The question that as I understand it, is the question comes up to your association, whether in a broad general way it would be advisable for your association to determine is the term of years that the pier people feel they should be assured as a starter for the ending place for five years, which upon Atlantic City as a meet-terprise. There are, of course, some large questions in reference to that which you have to determine, and they are questions upon which I am not in a position to speak to you, or to advise you, or try to influence you upon. They are questions that you must answer for yourselves. I will, however, say this—that I feel that the consideration of this proposition must be taken up from three points of view. First, there is

your own point of view as to whether the erection of such a building is of sufficient advantage to you that you should determine to come here for five years; second, your Manufacturers' association must determine in a general way that these facilities proposed are ideal and satisfactory; and then, after those two things have been determined favorably, we must go to the individual exhibitor and ask him whether he sees in it a good business proposition.

We should be particularly pleased and gratified, if you will take some action at this time. The financial interests connected with this pier are determined to make an improvement. They must make it in the immediate future. If action is taken now, favorable to this enterprise, they will go ahead along these lines, and if the action taken is unfavorable, or if action is postponed, then they feel that they must go ahead along other lines. Some action either on the part of your association favoring it, or placing the authority in the hands of a committee, giving them full power to take definite action later, would be entirely acceptable.

President Beggs: It seems to me that it would be better to refer this entire matter to the incoming officers and executive committee, giving them full power to go ahead in the premises, so that if it was found to be desirable they could act upon the suggestions made by Mr. Bell, without postponing it for another twelve months. On motion the



Calvin G. Goodrich, President-Elect.
American Street and Interurban Railway Association.

matter was referred to the executive committee with full power to act, after consultation with the executive committee of the Manufacturers' Association. The vote was unanimous, every gentleman voting.

The report of the committee on "Heavy Electric Traction" was presented by the chairman, Calvert Townley.

The report of the committee on "Compensation for Carrying Mail," was presented by Gen. G. H. Harries, of Washington, D. C., who said an effort had been made by Mr. Rogers, the chairman of the committee and Secretary Swenson to interest the post office department and the house committee on "Post Offices and Post Roads" in the matter of increased compensation for carrying the mails on electric cars. The committee had already, as most of you are aware, succeeded in procuring legislation to increase the maximum compensation for carrying pouch mail from 3 cents to 4 cents. At the same time, congress has placed a very serious restriction in the law, by providing that on electric railroads, outside of cities, exceeding a distance of twenty miles in length, that the compensation received by such roads should not exceed the rates paid to the steam roads. That he believed to be an unfair discrimination that would cause many railway managements more or less distress because the price paid must necessarily be less than the actual cost of rendering the service. The difference between steam service and electric service was manifest to all. It had been agreed some time ago by the then second assistant postmaster general, Mr. Shallenberger, that the service on the electric cars was very good and the compensation very small, much less than it ought to be. Since that time he had talked with the new second assistant postmaster general, James T. McCleary, and had a little chat with the postmaster general himself, incidentally bringing this out, and while no organized campaign was yet in progress still the new committee should be instructed to make an effort at this next session of congress to secure the maximum of 6 cents for the pouch service, and not less than 25 cents a car-mile on the postal car service. The 20 mile limitation should be extended to 50 miles. There was now such an unquestioned discrimination that there should not be any trouble in making it perfectly clear to the department. The department was friendly, and in spite of the fact that there has been a desire on the part of congress to decrease the compensation for carrying the mail, that desire would not extend to the electric suburban and interurban service.

The paper on "The Use of the T-Rail in Cities," by C. Gordon Reel, vice-president, Kingston Consolidated Railway Co., Kingston, N. Y., was presented. Before reading the paper Mr. Reel said that while the matter of rails was an engineering question, at the same time it had to be determined more by the officers of the companies than by the engineering department; because the engineers all knew the advantages of T-rail construction, whereas the trouble usually came from the fact that the municipalities would not allow the use of the T-rail, and these prejudices must be overcome by the general officers of the companies. He was under the impression that corrugation is less with T-rails than it is with girder rails. Recent tests conclusively proved that corrugation was not the result of inequalities alone. It was the equipment on the rails which creates the corrugation trouble; he thought that corrugation with steam roads amounted to nothing, and personally he believed it might be that the corrugation was due largely to improper design of rail sections.

P. P. Crafts asked as to the particular object in using 90-pound rails over, say, 70-pound rails. Mr. Reel replied it was very much more substantial. Also an objection to the 70-pound standard T-section was, its insufficient height to accommodate paving bricks alongside the rail—between the base and head.

F. W. Coen (Lake Shore Electric) said his company had used 70-pound T-rail in paved streets and found it unsatisfactory. The brick will not stay. They had abandoned that construction entirely, except on some streets where there is little service or very light cars. With heavy cars the rail was absolutely unsatisfactory. With nosed bricks, with the nose under the rail, the other end of the brick will turn up.

The paper on "Public Policies of the Past and Future," by C. Loomis Allen, president Utica & Mohawk Valley Railway, was read by title and ordered printed in the proceedings.

The paper on "Interurban Railway Fares," by Theodore Stebbins, New York, N. Y., was next presented.

The paper on "Municipal Ownership in Great Britain and in the United States," by William J. Clark, of New York, N. Y., then followed. In presenting the paper Mr. Clark said that in the work of the investigating commission, of which he had been a member for the last two years, he had found no class of men worked more thoroughly and earnestly on the investi-

gation than the labor leaders, and he believed that the most valuable contribution to the literature on this great subject was that which will soon appear by Prof. John R. Common and J. W. Sullivan, both eminent labor leaders. There was actually more solid meat, more truth, told in their report, more facts that go to the point, than are concentrated in any other source. He also said that at this committee meeting the only man he knew to change his mind thoroughly, as the result of the investigation, was one of the labor leaders.

W. Caryl Ely on behalf of the committee on "Public Relations," presented its report which was accepted and ordered to be printed.

The committee on "Nominations" then presented its report nominating the following:

For president, Calvin G. Goodrich, of Minneapolis.

For first vice-president, James F. Shaw, of Boston.

For second vice-president, Arthur W. Brady, of Anderson, Ind.

For third vice-president, Thomas N. McCarter, president Public Service Corporation, Newark, N. J.

For Members of the Executive Committee: The president, the vice-presidents, and Frank R. Henry, St. Louis, president of the Accountants' association; Frederick G. Simmons, Milwaukee, president of the Engineering association; H. R. Goshorn, Philadelphia, president of the Claim Agents' association.

On motion the report was adopted and the secretary cast the ballot for the officers named, who were declared elected.

H. J. Davies presented the report of the committee on "Resolutions." The resolutions proposed expressed the thanks of the association to those who had extended courtesies, and were adopted unanimously.

W. Caryl Ely:—I have a resolution which is the outcome of the discussion at the executive session held yesterday afternoon, at the end of which this resolution was directed to be prepared as receiving the unanimous sanction of the executive meeting.

"Whereas, Experience has demonstrated the desirability and usefulness of our existing affiliated organizations; and

"Whereas, It has appeared from discussion that another organization of similar character should be organized, to which should be committed lines of work pertaining to transportation, traffic and general operation, now therefore, be it

"Resolved, That the executive committee be and hereby is requested to take such steps as it may deem desirable to encourage the formation of such an organization."

Vice-President Shaw:—We will take a recess for a quarter of an hour until Mr. Beggs returns, about 1 o'clock.

(The meeting then took the recess, but in five minutes was reassembled.)

Mr. Beggs appeared within two minutes after the adjournment of the convention and said:

You have already taken a vote to adjourn sine die. You have heard from me a good deal during the last two or three years, and there may be some gentlemen who feel it a relief to know that he who has been president of your association for the past twelve months and one of the co-laborers in the interests of the association with Brother Ely and other gentlemen who have given careful thought and earnest, continuous work to bring this association to its present condition, to feel that you will not hereafter be burdened with so many talks from the president.

I desire to sincerely, heartily thank the entire membership, not only of the American Street and Interurban Railway Association, but likewise the Accountants' association, the Engineering association, the Claim Agents' association, and last, but by no means least, The American Street & Interurban Railway Manufacturers' Association, for their uniform courtesy and consideration during my term as president, and I could not bespeak for the new officers and executive committee greater consideration, or give them greater assurance of the continued successful administration of the affairs of the association than to be able to assure them, which I feel warranted in doing, of that continued and united support from these various affiliated associations, which are from year to year becoming, in my judgment, more important. I, therefore, again say I thank you. I shall always look back—the chances are it is not for many years—as one of the greatest honors I have received in the street railway business, to my year's administration as president of this association. I desire to pledge without reservation or qualification to the incoming officers and executive committee of this and the affiliated associations, just as earnest work as I have given in the past, notwithstanding I will not have the same degree of responsibility.

The vote for adjournment having been passed, we will assume that my remarks were made before that motion was passed, and the meeting will now stand adjourned.

MUNICIPAL OWNERSHIP IN GREAT BRITAIN AND IN THE UNITED STATES.*

BY WILLIAM J. CLARK.

Since we first met, some twenty years ago, you have accomplished more in producing local transportation facilities than has been done in all other countries of the world combined, thus promoting the public welfare, general progress and development of the country to an unprecedented degree. This brief statement in itself practically answers the question as to whether or not Municipal Ownership or private enterprise best serves public needs in that field where you have accomplished so much.

All virtues are not possessed by any particular class of mankind or are attendant upon any specific form of public policy; neither are all vices and shortcomings. Fewer serious evils exist however, in connection with the development of public utilities by private enterprise in this country than are found connected with municipal ownership and operation either here, or in its greatest stronghold, the British kingdom.

Comparison of municipal with private ownership of public utilities should naturally be made on economic grounds alone, based upon the actual results secured therefrom; for the worth of partially demonstrated theories is, of course, but speculative at best.

How impossible it is to thoroughly treat all that is covered by my text within the time allotted me here, is best illustrated by stating that there will shortly appear a printed report of nearly 3,000 pages upon "Municipal and Private Ownership," made by a committee of which I have the honor to be a member. Yet this report, voluminous as it is, does not by any means exhaust the subject.

To deal briefly with municipal ownership in this country:

Contained in the report is much valuable information concerning certain municipally owned American gas, electric light and water supply plants that were investigated, which clearly demonstrates that with the exception of city water works, municipal ownership is not a success financially or otherwise, and even as regards water supply the showing made by the municipal plants was not so favorable from either a sanitary or financial standpoint as that of the company water works which were investigated.

The baneful effects of political control and management appear in connection with the municipal plants investigated, and are quite fully set forth in the report mentioned.

Turning to United States Census Bulletins of 1902 and 1903, giving statistics upon towns and cities of 8,000 population or over, it is seen that the cost of their municipal water works was \$508,469,415, and their estimated selling value is \$499,925,742.

The cost of municipal gas works is stated as \$43,018,673; their selling value is estimated at \$30,186,567. But on municipal electric lighting plants the cost is stated as \$10,670,954 and their estimated selling value is \$13,614,064.

No further comments on the last feature are necessary other than to say that the disinterested experts of the committee found great shrinkages in values from original costs on every municipal electric lighting plant which they investigated.

The same bulletins show that the estimated value of all municipal industrial enterprises in American towns and cities of 8,000 population or over is \$707,511,949.

The annual revenue therefrom is stated as \$60,725,802; the operating expenses as \$28,352,317; earnings from operations, \$31,955,581.

According to the same United States Census Reports the average rate of interest paid on municipal loans is 4.1 per cent, so from the earnings should be deducted \$29,007,090 for interest, leaving an apparent net income of \$2,948,491.

If a depreciation of 5 per cent on the estimated value of the plants were allowed for, such depreciation would be \$35,375,597, so that the actual deficit from operating such municipally owned plants would show as \$32,427,106.

There are no municipally owned street railways in the United States, at least only one with a trifle of trackage. So, on that industry in which you are most interested, we must turn to the United Kingdom for information, and naturally you wish this feature treated more thoroughly than the other municipally owned public utilities.

Before proceeding to do this, however, a glance should be given to the comparative development of the more important other public utilities in the United Kingdom and in this country.

In the United Kingdom there are about 1,400 water supply undertakings, approximately 1,100 of which are municipally owned, and represent an investment of about \$400,-

000,000. The investment in the 300 company plants is about \$250,000,000.

In the United States, there is a total of over 4,000 water supply plants, about equally divided in ownership between municipalities and companies.

The present investment of American municipalities in their water works is about \$650,000,000, or the equivalent of the entire investment in water works of the United Kingdom.

There are a total of about 730 gas plants in the United Kingdom, of which 265 are municipally owned and having an investment of approximately \$200,000,000.

The 465 company plants have invested about \$410,000,000. The total investment for gas plants in the United Kingdom is, say \$610,000,000.

There are about 1,000 gas plants in the United States, with an investment of nearly \$1,000,000,000.

In the United Kingdom there are 268 municipally owned electric lighting plants with an approximate investment of \$177,400,000.

There are 206 company plants with an approximate investment of \$110,000,000. Total investment of the United Kingdom in electric lighting, \$277,400,300.

In the United States are about 4,000 electric lighting stations representing an investment of over \$1,000,000,000.

The total kilowatt-hour output of the American stations is some eight or nine times greater than that of the British stations, so it is seen at a glance that far greater practical results are secured from the American investment in the electric lighting plants than is the case in the United Kingdom.

It is obvious that the greatest advantages and benefits which the public derive from the existence of local transportation facilities are directly proportionate to the extent that these are available to it; this to make local travel itself possible at low rates of fare, and incident thereto, aiding on such important matters as public enlightenment through readier intercommunication; redistribution and scattering of congested population; improved sanitation; making the ownership of homes possible to the humblest; extending the area available for employment to the laborer, and increasing taxation revenues through the improvement and increased values of real estate.

These are the most important economic features involved in the local transportation problem.

American progress in this respect has been accomplished by private enterprise without imposing financial burdens upon public treasuries, or increasing local taxation.

British development of local transportation has been hampered by the municipalities where undertaken by private enterprise, or favored by every unfair means at their command when undertaken by the municipalities themselves, at serious risk to and great expenditures from their treasuries, accompanied by increased taxation.

Compare the results arising in the two countries from the widely varying policies that have been respectively followed:

In 1902, the last year when official figures thereon are available, the urban population of the United Kingdom was 29,144,726; that of the continental United States was 33,850,000 and this latter included smaller communities than in the former.

The total length of tramway track in the United Kingdom was 2,336 miles or one mile of track for 12,476 of its urban population. At the same time there was only one car for each 3,760 of the urban population.

The United States then had 22,328 miles of electric railway track or one mile for 1,516 of its urban population and a car for each 574 thereof.

In short, the urban resident of the United States had comparatively $8\frac{1}{2}$ times greater trackage facilities available to him for travel than had the urban resident of the United Kingdom, and $6\frac{1}{2}$ times the number of cars.

From 1890 to 1902 the increase of trackage in the United Kingdom was but approximately 56 per cent.

During the same period the corresponding increase in the United States was about 200 per cent.

From 1902 to 1906 the length of trackage in the United Kingdom had increased 1,256 miles.

In the United States during the same period the increase was approximately 12,500 miles or ten times greater than in the United Kingdom.

In 1902 there were two cities of over 100,000 population in the United Kingdom without street railways. In the United States there was none.

In the United Kingdom there were seven cities of from 50,000 to 100,000 population without street railways. In the United States there was none.

In the United Kingdom there were 39 cities of from 25,000 to 50,000 population without street railways. In the United States there was none.

*Presented before the American Street and Interurban Railway Association at Atlantic City, N. J., October 19, 1907.

In the United Kingdom there were 295 communities of from 8,000 to 25,000 population without street railways. In the United States there were 21.

Next in importance to the creation of transportation lines is of course the service rendered thereon.

In the United Kingdom where the greatest of handicaps and hardships have been placed upon the local transportation companies, and where the municipalities have acquired the cream of the properties with the densest traffic, the average headway between cars is at present about one-third more frequent upon the company owned lines than upon those operated by municipalities.

Contrasting British conditions of service with those in America:—

In 1902, the last year when full comparative figures are available the total car miles run upon the tramways of the entire kingdom was 145,127,423.

Upon the local transportation lines of America, 1,144,430,466 car-miles, or nearly eight times a greater number were run to accommodate an urban population but a trifle larger than that of the Kingdom.

A total of 1,394,452,983 passengers were carried on the tramways of the United Kingdom.

On the street railways of the United States 5,521,509,521 passengers were carried. Of this last, however, 1,062,403,392 were on free transfers; a number practically equivalent to 90 per cent of the entire number carried in the United Kingdom.

On the basis of passengers carried per year, the American street railway car averaged but slightly more than one half the number carried by the tram car of the United Kingdom. That is, the American car averaged 93,585 passengers per year as against 182,463 passengers per car in the United Kingdom.

Now as to comparative costs of service rendered:

Making due allowance for the more favored conditions surrounding the existence and operation of British municipal properties the rates of fare upon British company systems are comparable with those of the municipalities.

On this most important feature it is therefore demonstrated that despite all of the disadvantages under which they labor, British tramway companies are doing comparatively as much for the public on low fares as are the municipalities.

The average receipts per passenger on all tramways in the United Kingdom were 2.25 cents as against 3.76 cents in the United States. However, 9.65 passengers rode per car-mile in the United Kingdom as against 5.2 passengers per car-mile in the United States.

Gross receipts averaged 21.81 cents per car-mile in the United Kingdom as against 19.55 cents per car-mile in the United States.

The British passenger paid about 60 per cent of the rate of fare paid by the American passenger; but as stated, the facilities for travel available to him were only from 12 per cent to 15 per cent of those enjoyed by the American urban resident.

From 1890 to 1902 the increase in length of local transportation line in the United Kingdom was but 536 miles. Similar increase in the United States was 10,755, or nearly twenty times as great. During the same period the average fare per passenger in the United Kingdom had decreased about 33 per cent. In the United States, despite rapidly increasing cost of essentials to operation and greatly increased facilities, it had yet decreased about 26 per cent.

It should be appreciated that it costs far more to operate local transportation service in America than in the United Kingdom. Rates of wages in this particular industry are at least double in this country to those paid for similar purposes abroad.

As the result of fairer treatment before the courts the rate of damages per car-mile for personal injuries in the British Kingdom averages about one third of what is paid by American companies.

So near as can be estimated the operation of an American street railway costs about 65 per cent more than should a similarly situated property in the United Kingdom.

So it is seen that considering the cost to them of service rendered by American street railway systems the rates of fare charged are comparatively as low as those prevailing in the United Kingdom, while far greater facilities are afforded the public.

From what has been stated it is apparent that the legitimate objects for creating and operating local transportation lines have been more thoroughly met by American private practice than has been accomplished through British municipal methods. But there are other phases of the situation which should be considered.

Prominent among the arguments which are always advanced in favor of municipal Ownership and operation are the alleged financial advantages which accrue to municipal treasuries therefrom.

Unquestionably there are a few instances where municipally owned public utilities have brought an actual return from their operation to municipal treasuries.

It would be strange indeed if this were not so, but these cases are rare and I have never known an instance where, if, in the statements of their capital and operating expenditures, due allowance were made for assistance rendered them toward a favorable showing, from other municipal accounts and branches of the city government, the showings would not be far less favorable.

Investigation of specific municipally owned undertakings and the results derived from their operation are of little value on determining the entire question of municipal ownership, or of direct value, unless permission were given to get at the actual basis of, and details followed in, their accounting.

I have never known such permission to be granted in the United Kingdom. In fact many pages of sworn testimony exist in the reports of parliamentary hearings which show that even the government auditors do not attempt to see if expenditures of municipalities are distributed to proper accounts.

The most honest, best intentioned municipal officials of the Kingdom, unconsciously perhaps, permit their public utilities to receive most important financial benefits from other branches of the city government, expenses of which are paid for out of general public funds, or they knowingly adopt a policy of this character and carry it to the extreme, considering it moral from the standpoint of municipal practice, although these same men would condemn anything of the sort attempted in ordinary private business.

For these, and kindred reasons, the best way in which to obtain some light on the net financial results derived by the municipalities from municipal ownership in the Kingdom is to inspect their financial condition before and after municipal ownership became a dominating factor therein, drawing some incidental comparisons with American conditions.

Municipal ownership in the United Kingdom has brought burdens of local debt and taxation which are hardly grasped by the average American.

To fully appreciate how onerous these burdens are, a glance should be given to those other burdens of debt and taxation which the British citizen bears in connection with his national government before the other weighs down upon him.

In 1905 the national debt of the United Kingdom averaged \$91.68 per capita of its population. That of the United States was \$11.91 per capita.

The expenses of the national government for the United Kingdom averaged \$13.80 per capita. In the United States this was \$6.67 per capita.

Turning now to municipal indebtedness and taxation, the present amount of the local indebtedness of the United Kingdom is probably not far from \$2,800,000,000, or say approximately \$98 per capita of the urban population. About one half of this has been incurred for municipal trading enterprises.

In 1903 the amount of such indebtedness was \$2,200,000,000 or approximately \$79 per capita of urban population.

In 1902 the total amount of local indebtedness of the United States was \$1,439,504,991, or \$43.53 per capita of urban population.

In contrasting the local indebtedness of the respective countries, and their expenditures for local government, it should not be forgotten that America has and does expend for school property and educational purposes, enormous sums, while such expenditures in the United Kingdom are comparatively small.

The value of school houses in the United States was approximately \$450,000,000 in 1902.

In the United Kingdom the value of similar property was about one-third that figure.

It should also be remembered that in rapidly growing American cities the legitimate demands for improvements and consequent expenditures should be far greater than in old well established British communities.

According to official estimates in 1902, the value of the realizable assets of British municipalities exceeded their indebtedness by approximately 23 per cent.

The realizable assets of American municipalities exceeded their indebtedness by about 40 per cent.

The United States Census Bureau estimates that in this country for each \$100 of national wealth there is public indebtedness of every name and nature amounting to only \$2.85. In the United Kingdom corresponding debt averages \$10.50 for each \$100 of national wealth.

In 1880 the total local debt of the United Kingdom was \$684,670,350, or about \$19.56 per capita of the total population. In 1902 it was approximately \$2,200,000,000, or about \$52.64 per capita, showing a total increase in amount of \$1,504.

MUNICIPAL OWNERSHIP IN GREAT BRITAIN AND IN THE UNITED STATES.*

BY WILLIAM J. CLARK.

Since we first met, some twenty years ago, you have accomplished more in producing local transportation facilities than has been done in all other countries of the world combined, thus promoting the public welfare, general progress and development of the country to an unprecedented degree. This brief statement in itself practically answers the question as to whether or not Municipal Ownership or private enterprise best serves public needs in that field where you have accomplished so much.

All virtues are not possessed by any particular class of mankind or are attendant upon any specific form of public policy; neither are all vices and shortcomings. Fewer serious evils exist however, in connection with the development of public utilities by private enterprise in this country than are found connected with municipal ownership and operation either here, or in its greatest stronghold, the British kingdom.

Comparison of municipal with private ownership of public utilities should naturally be made on economic grounds alone, based upon the actual results secured therefrom; for the worth of partially demonstrated theories is, of course, but speculative at best.

How impossible it is to thoroughly treat all that is covered by my text within the time allotted me here, is best illustrated by stating that there will shortly appear a printed report of nearly 3,000 pages upon "Municipal and Private Ownership," made by a committee of which I have the honor to be a member. Yet this report, voluminous as it is, does not by any means exhaust the subject.

To deal briefly with municipal ownership in this country:

Contained in the report is much valuable information concerning certain municipally owned American gas, electric light and water supply plants that were investigated, which clearly demonstrates that with the exception of city water works, municipal ownership is not a success financially or otherwise, and even as regards water supply the showing made by the municipal plants was not so favorable from either a sanitary or financial standpoint as that of the company water works which were investigated.

The baneful effects of political control and management appear in connection with the municipal plants investigated, and are quite fully set forth in the report mentioned.

Turning to United States Census Bulletins of 1902 and 1903, giving statistics upon towns and cities of 8,000 population or over, it is seen that the cost of their municipal water works was \$508,469,415, and their estimated selling value is \$499,925,742.

The cost of municipal gas works is stated as \$43,018,673; their selling value is estimated at \$30,186,567. But on municipal electric lighting plants the cost is stated as \$10,670,954 and their estimated selling value is \$13,614,064.

No further comments on the last feature are necessary other than to say that the disinterested experts of the committee found great shrinkages in values from original costs on every municipal electric lighting plant which they investigated.

The same bulletins show that the estimated value of all municipal industrial enterprises in American towns and cities of 8,000 population or over is \$707,511,949.

The annual revenue therefrom is stated as \$60,725,802; the operating expenses as \$28,352,317; earnings from operations, \$31,955,581.

According to the same United States Census Reports the average rate of interest paid on municipal loans is 4.1 per cent, so from the earnings should be deducted \$29,007,090 for interest, leaving an apparent net income of \$2,948,491.

If a depreciation of 5 per cent on the estimated value of the plants were allowed for, such depreciation would be \$35,375,597, so that the actual deficit from operating such municipally owned plants would show as \$32,427,106.

There are no municipally owned street railways in the United States, at least only one with a trifle of trackage. So, on that industry in which you are most interested, we must turn to the United Kingdom for information, and naturally you wish this feature treated more thoroughly than the other municipally owned public utilities.

Before proceeding to do this, however, a glance should be given to the comparative development of the more important other public utilities in the United Kingdom and in this country.

In the United Kingdom there are about 1,400 water supply undertakings, approximately 1,100 of which are municipally owned, and represent an investment of about \$400,-

000,000. The investment in the 300 company plants is about \$250,000,000.

In the United States there is a total of over 4,000 water supply plants, about equally divided in ownership between municipalities and companies.

The present investment of American municipalities in their water works is about \$650,000,000, or the equivalent of the entire investment in water works of the United Kingdom.

There are a total of about 730 gas plants in the United Kingdom, of which 265 are municipally owned and having an investment of approximately \$200,000,000.

The 465 company plants have invested about \$410,000,000. The total investment for gas plants in the United Kingdom is, say \$610,000,000.

There are about 1,000 gas plants in the United States, with an investment of nearly \$1,000,000,000.

In the United Kingdom there are 268 municipally owned electric lighting plants with an approximate investment of \$177,400,000.

There are 206 company plants with an approximate investment of \$110,000,000. Total investment of the United Kingdom in electric lighting, \$277,400,000.

In the United States are about 4,000 electric lighting stations representing an investment of over \$1,000,000,000.

The total kilowatt-hour output of the American stations is some eight or nine times greater than that of the British stations, so it is seen at a glance that far greater practical results are secured from the American investment in the electric lighting plants than is the case in the United Kingdom.

It is obvious that the greatest advantages and benefits which the public derive from the existence of local transportation facilities are directly proportionate to the extent that these are available to it; this to make local travel itself possible at low rates of fare, and incident thereto, aiding on such important matters as public enlightenment through readier intercommunication; redistribution and scattering of congested population; improved sanitation; making the ownership of homes possible to the humblest; extending the area available for employment to the laborer, and increasing taxation revenues through the improvement and increased values of real estate.

These are the most important economic features involved in the local transportation problem.

American progress in this respect has been accomplished by private enterprise without imposing financial burdens upon public treasuries, or increasing local taxation.

British development of local transportation has been hampered by the municipalities where undertaken by private enterprise, or favored by every unfair means at their command when undertaken by the municipalities themselves, at serious risk to and great expenditures from their treasuries, accompanied by increased taxation.

Compare the results arising in the two countries from the widely varying policies that have been respectively followed:

In 1902, the last year when official figures thereon are available, the urban population of the United Kingdom was 29,144,726; that of the continental United States was 33,850,000 and this latter included smaller communities than in the former.

The total length of tramway track in the United Kingdom was 2,336 miles or one mile of track for 12,476 of its urban population. At the same time there was only one car for each 3,760 of the urban population.

The United States then had 22,328 miles of electric railway track or one mile for 1,516 of its urban population and a car for each 574 thereof.

In short, the urban resident of the United States had comparatively $8\frac{1}{2}$ times greater trackage facilities available to him for travel than had the urban resident of the United Kingdom, and $6\frac{1}{2}$ times the number of cars.

From 1890 to 1902 the increase of trackage in the United Kingdom was but approximately 56 per cent.

During the same period the corresponding increase in the United States was about 200 per cent.

From 1902 to 1906 the length of trackage in the United Kingdom had increased 1,256 miles.

In the United States during the same period the increase was approximately 12,500 miles or ten times greater than in the United Kingdom.

In 1902 there were two cities of over 100,000 population in the United Kingdom without street railways. In the United States there was none.

In the United Kingdom there were seven cities of from 50,000 to 100,000 population without street railways. In the United States there was none.

In the United Kingdom there were 39 cities of from 25,000 to 50,000 population without street railways. In the United States there was none.

*Presented before the American Street and Interurban Railway Association at Atlantic City, N. J., October 18, 1907.

which has been assumed as ordinary local indebtedness, or partially paid for out of general local funds raised by taxation.

To put the situation more clearly, British municipalities have apparently confiscated about \$70,000,000 to \$80,000,000 in tramway values, and in stating the capital investment in their municipal tramways have omitted to say that \$70,000,000 which should have been included thereon has gone into general public improvement or similar accounts.

Consequently had British municipalities proceeded to acquire their present 2,499 miles of tramway properties on the same basis as British and American companies have been obliged to follow their total capitalization would easily reach \$330,000,000 or say \$132,000 per mile of track.

The average per mile of track in the United States of stocks and bonds issued against street and elevated railways is less than \$107,000 per mile of track.

The results from operation of British municipal tramways during the fiscal year ending 1906 were, according to official statements:

Gross receipts	\$34,267,430
Operating expenses.....	21,618,670
Net receipts	\$12,648,760
Rental of leased lines, etc.....	510,410
Income from operation.....	\$12,138,350
Interest charges	\$4,201,125
Reserve for renewal and depreciation..	3,118,085
Net income	\$4,819,140
which was applied as follows:	
To repayment of debt and sinking funds	\$3,316,680
Relief of taxation.....	1,029,905
Other matters and balance carried forward	482,935

Under the whole theory of British municipal ownership finance, ample allowance for depreciation must be made and full contributions to sinking funds maintained, or the theory absolutely fails in practice.

Inspection of the figures given reveals the fact that only 1.8 per cent on the capital investment has been allowed for depreciation and renewal.

If an allowance, for this, of 5 per cent had been made, an addition to the renewal and depreciation fund of \$5,667,840 is necessary, thus changing the net income as stated to a deficit of over \$800,000, preventing the making of legitimate contributions to sinking funds or for other purposes.

If taken into account, as should be done, that \$70,000,000 which should have been charged to tramway capital account has gone to general municipal accounts, and estimate the interest on this capital at 3 per cent, it is seen that at least \$2,100,000 should be added to the deficit resulting from the operation of tramways as shown above.

It is thus apparent that British municipal tramways taken as a whole are operated at a serious actual loss and that excepting in a few specific cases, payments to sinking funds or to relieve taxation have not been actually earned.

Based upon the official figures which have been shown to be entirely unreliable, all the financial returns received by the municipalities of the United Kingdom from the operation of both company and municipal tramways; including local taxation thereon; repayment of debt or contributions to sinking fund; reserve, depreciation and renewal funds, and relief to local taxation, etc., average but approximately \$925 per mile of track annually.

From the closest possible approximation which can be made in the United States, the average financial benefits which its municipalities receive from the taxation of and other contributions from street railways, and from taxation of their securities, the average is approximately \$1,295 per mile of track annually, or \$370 per mile of track greater than that shown as similarly received by the municipalities of Britain.

The last remaining important economic advantage claimed for municipal ownership, is improvement in the conditions of the laboring man, and with this is always coupled the statement that there are no politics in connection with British municipal affairs, and no political dangers involved by greatly increasing the number of municipal employees.

Rates of wages have increased and hours of labor have greatly decreased in connection with the operation of public utilities during recent years, both in this country and in the British Kingdom.

It is questionable if these net benefits to labor since the introduction of electricity have been greater on British municipal tramways than upon American street railways.

There is no question, however, but what British municipal

ownership has unfairly created a class of privileged municipal employees at public expense, and to the detriment of their fellow laborers not employed by municipalities. At least this has been so stated to me by prominent American and British labor leaders.

As to whether or not a grave public danger exists in connection with the creation of such a class is best illustrated by reading extracts from one of the circulars of the Municipal Employees' Association, advancing arguments for increasing its membership:

"Because unity is strength."

"Because the officers of this association have worked for years for a municipal body, and, therefore, know the way to approach and deal with local authorities for you better than others who have never worked for a public body."

"Because it is estimated that there are nearly 2,000,000 municipal employees in the United Kingdom. What could they not do for themselves, if all together?"

"Because concessions, estimated to cost the municipal authorities upwards of £2,000,000 per annum have been obtained by us."

"Because we have never been defeated by a municipal body yet. If they decline a request today, we are up and at them again tomorrow."

"Because there is no need for strikes with us. We can get what we want without them, if we are united, by returning to the councilmen who are in favor of fair conditions of employment."

"Because we get concessions; not shout and rave about them."

A still greater political and public danger rests in the Association of Municipal Corporations and Town Clerks, and kindred organizations which are more powerful in their influence on parliamentary legislation than any American party or political ring has ever been in national or state legislation.

The votes of the 2,000,000 municipal employees mentioned above are practically controlled by them.

The town clerks and other prominent salaried officials of the municipalities dominate the policy of their association.

These men also generally dominate the parliamentary politics in their respective localities and members of parliament rarely reside in the localities from which they are elected.

As a result of this condition, the political future of the great majority of parliamentary members is principally dependent upon the attitude towards them of these associations.

In addition to this, cash, legal, engineering and other talent are contributed by the members of the association for the services of some specific member in promoting or opposing legislation, affecting only the particular locality of that member.

Time does not permit me to go into the details of how these influences have placed upon private utility companies the unfairest of burdens in securing franchise rights or in conducting their business when these have been secured. Nor how these influences have obstructed progress to the great detriment of the public at large.

The unwise investment of enormous public funds with the attendant evils brought about by these influences has already been stated.

The American visitor who has been royally entertained by high class, non-salaried elective Municipal officials, and who has not gone deeply into the entire system of British Municipal Government, may doubt the existence of the situation described; but thorough investigation will reveal it in even more serious form than is here stated.

The real motives which have animated the great power behind the British municipal ownership movement, have emanated from those who expected personal benefit therefrom, and they are as intensely selfish as those which have ever led to the organization of a private company or have dictated the action of professional politicians in this country.

We have said, that is, with the co-operation of the compositor we have been made to say, there were two Stewarts. The first day it was "Stewart;" the second day it was "Stuart;" the fact is his name is "Stewart."

Garnett B. Holmes, of Holmes & Allen, Wellington, New Zealand, having come 14,000 miles, easily hold the record for long distance visitors at the convention. Mr. Holmes is the inventor of a flexible under-running trolley head and also of a non-fouling swivelling trolley head that are extensively used in New Zealand and Australia, and on account of the interest shown in these devices at the convention Mr. Holmes will endeavor to arrange to place them on the market in this country before leaving the United States.

740,825, or approximately 219 per cent, and an increase per capita of \$33.08, or 169 per cent.

In 1880 the total local indebtedness of the United States was \$724,427,848, or \$14.44 per capita of the total population. In 1902 it was \$1,439,504,991, or \$18.24 per capita, showing a total increase of \$15,077,143, or 97 per cent, and an increase per capita of only \$3.80, or 26½ per cent.

British local indebtedness is now increasing at the rate of about \$150,000,000 per year, or about \$3.25 per capita of the entire population.

The local indebtedness of the United States is increasing at the rate of about \$70,000,000 per year, or less than 90 cents per capita of the entire population.

In the fiscal year of 1881-82 the total expenditures for local government in the United Kingdom representing the amounts raised from taxation and received from the national government for local purposes also raised by taxation, amounted to \$333,327,495, or \$9.45 per capita of the entire population.

In the fiscal year of 1902-03 the total expenditures for local government were \$760,825,000, or \$18 per capita of the entire population, showing an increase in total of \$427,497,505, slightly over 128 per cent and per capita of \$8.55, or, say, 90 per cent.

During the same period the rate of taxation upon assessed valuation of property had increased over 60 per cent and the rate of assessment had been increased.

In the same period the increase in amount raised by local taxation in the United States averaged but 45 per cent per capita; and the rate upon assessed valuation had increased but 12 per cent, while rates of assessment had decreased.

These figures conclusively demonstrate the fallacy of the claim that British municipal ownership has relieved the ratepayer and improved the financial condition of municipalities. The proof is all to the contrary.

No statistics exist which fully cover all the public utility undertakings of local authorities throughout the Kingdom, but the parliamentary return of 1902 on "Municipal Corporations Reproductive Undertakings of England and Wales" shows for that part of the kingdom alone the following:

The total investment in such undertakings was.....	£121,172,372
Amount of loans repaid.....	£16,246,579
Amount of sinking funds.....	4,644,835
	20,891,414
Amount unpaid for which provision has not been made	£100,280,958
Total annual receipts from operation.....	13,040,711
Operating expenses	£8,228,706
Interest paid	2,975,906
Set apart for depreciation.....	193,274
	11,397,886
Official statement of earnings from operation, or about 1.36 per cent on the total capital invested, and 1.64 per cent on that not paid or provided for	£1,642,825
Loans were repaid to the amount of.....	1,264,544
or 1.04 per cent. on the total capital investment.	
Showing a net profit of only.....	£378,281

It should be noted that, small as the showing of profitable earnings is, it is an enormous investment thus is, less than one per cent has been allowed for depreciation in the above showing.

If an allowance of 5 per cent had been made for depreciation, a figure more nearly correct, the amount which should have been deducted for this important item would be £6,058,618, instead of £193,274 as shown by the parliamentary return. Consequently, instead of there having been earnings from operation, there was properly a deficit of £4,222,519 or about 3.45 per cent on the entire capital investment of 4.22 per cent on the remaining investment.

It should be observed in this connection also, that the actual deficit would be about 3½ times as great as the sums annually set aside for repayment of loans. These actual conditions, despite all complicated and misleading systems of accounting, must ultimately show in the general financial condition of the municipalities.

A favorite financial argument of the municipal ownership advocates is that owing to the superior credit of municipalities they can more readily secure capital for the creation of public utilities than can be done by companies, and upon more favorable basis, with less risk to the investors in

It would seemingly be so, but let us note what the

present selling value of British municipal securities are, bearing in mind that none were issued below par.

The London Stock Exchange "Daily Official List" for October 1, 1907, contains quotations upon 151 municipal securities.

Of these, 9 were quoted at par or above; 22 from 95 to 99; 9 from 90 to 94; 60 from 85 to 89; 38 from 80 to 84; 8 from 75 to 79; 4 from 70 to 74; 1 below 60.

Among these are some remarkable quotations: Certain London securities at 72 to 74; certain Glasgow securities at 77 to 79; certain Liverpool securities at 74 to 76; certain Manchester securities at 86 to 88.

It is thus seen that British investors have suffered enormous losses from the shrinkage in values of municipal securities and that the credit of the municipalities has consequently been impaired.

There is an important feature of municipal finance involved in this connection which is generally overlooked.

In all cases where parliament has authorized municipalities to make loans for public utility purposes, it is provided that a sinking fund must be set aside to ultimately pay off the indebtedness; rarely however is any provision made concerning the manner in which such sinking funds are to be invested and municipal authorities consequently handle them in accordance with their own unrestricted ideas.

It should be said also that parliament in fixing the amount to be contributed to sinking funds, and the time for their completion, rarely considers that a good share of the physical property of any public utility must be replaced one or more times before the original debt has been offset through the workings of the sinking fund.

Almost invariably these sinking funds are invested in municipal securities, and these frequently are some issue of the same municipality for other public utility purposes. Consequently shrinkage in the value of municipal securities has seriously reduced the actual amount of these existing sinking funds, yet so far as I have been able to ascertain in all official statements thereon, this fact has not been stated.

As regards municipalities investing sinking funds in their own securities, it is needless to remark that this is not in accordance with sound financial practice.

It is clear to be seen that the insufficiency of sinking funds to care for the original cost of properties, plus the additions required for renewal of certain portions thereof which have not been provided for, will ultimately create a financial condition thereon far different from that originally expected.

Once more dealing more directly with that particular public utility in which you are most interested at the latest period when official data is available thereon.

The last parliamentary report on the "Tramways and Light Railways of the United Kingdom" covering the fiscal year ending March 31, 1906, so far as municipal properties are concerned; and that ending December 31, 1905, for the tramway companies, shows that the municipalities had only 2,499 miles of track.

On a basis of \$5 to the British sovereign, the existing capital obligations of the British municipal tramways are shown as \$177,199,735 averaging say \$70,840 per mile of track.

As is well known in nearly all of the larger British cities the municipal authorities have acquired previously existing tramway systems owned by companies. This was under a form of legalized confiscation authorized by the "Scrap Iron" clause, so-called, in the Tramway Act of 1870. As a result, only \$14,896,745 of the total capital expenditures made by the municipal tramways is shown as being paid for all the pioneer work done and properties created by the tramway companies, that have since been acquired by the municipalities.

Had British municipalities been obliged to pay for what had preceded them in tramway work and investment, proportionately to what has been done in this country, their total capital investment in tramways would now be at least \$250,000,000.

In connection with the development of British tramways it has been necessary to do much street widening which should properly be charged to tramway capital accounts.

Tramway companies there have been obliged to pay for such expenditures. But it is rare where municipal tramways have had to assume much of such expense, for the total charge to the capital accounts of the municipal tramways for this item is only \$3,750,460 for the entire Kingdom.

It is an established fact, however, that in London alone about \$20,000,000 was expended for street widening on account of the tramways, which has never appeared in the tramways capital account. At Liverpool the same condition exists to the extent of about \$5,000,000.

If all the British municipally owned tramways bore a pro rata charge for street widenings to that imposed on the London United Tramways Company, Ltd., there should be added to the total of their capital account about \$70,000,000

which has been assumed as ordinary local indebtedness, or partially paid for out of general local funds raised by taxation.

To put the situation more clearly, British municipalities have apparently confiscated about \$70,000,000 to \$80,000,000 in tramway values, and in stating the capital investment in their municipal tramways have omitted to say that \$70,000,000 which should have been included thereon has gone into general public improvement or similar accounts.

Consequently had British municipalities proceeded to acquire their present 2,499 miles of tramway properties on the same basis as British and American companies have been obliged to follow their total capitalization would easily reach \$330,000,000 or say \$132,000 per mile of track.

The average per mile of track in the United States of stocks and bonds issued against street and elevated railways is less than \$107,000 per mile of track.

The results from operation of British municipal tramways during the fiscal year ending 1906 were, according to official statements:

Gross receipts	\$34,267,430
Operating expenses	21,618,670
Net receipts	\$12,648,760
Rental of leased lines, etc.	510,410
Income from operation	\$12,138,350
Interest charges	\$4,201,125
Reserve for renewal and depreciation ..	3,118,085
Net income	\$4,819,140
which was applied as follows:	
To repayment of debt and sinking funds	\$3,316,680
Relief of taxation	1,029,905
Other matters and balance carried forward	482,935

Under the whole theory of British municipal ownership finance, ample allowance for depreciation must be made and full contributions to sinking funds maintained, or the theory absolutely fails in practice.

Inspection of the figures given reveals the fact that only 1.8 per cent on the capital investment has been allowed for depreciation and renewal.

If an allowance, for this, of 5 per cent had been made, an addition to the renewal and depreciation fund of \$5,667,840 is necessary, thus changing the net income as stated to a deficit of over \$800,000, preventing the making of legitimate contributions to sinking funds or for other purposes.

If taken into account, as should be done, that \$70,000,000 which should have been charged to tramway capital account has gone to general municipal accounts, and estimate the interest on this capital at 3 per cent, it is seen that at least \$2,100,000 should be added to the deficit resulting from the operation of tramways as shown above.

It is thus apparent that British municipal tramways taken as a whole are operated at a serious actual loss and that excepting in a few specific cases, payments to sinking funds or to relieve taxation have not been actually earned.

Based upon the official figures which have been shown to be entirely unreliable, all the financial returns received by the municipalities of the United Kingdom from the operation of both company and municipal tramways; including local taxation thereon; repayment of debt or contributions to sinking fund; reserve, depreciation and renewal funds, and relief to local taxation, etc., average but approximately \$925 per mile of track annually.

From the closest possible approximation which can be made in the United States, the average financial benefits which its municipalities receive from the taxation of and other contributions from street railways, and from taxation of their securities, the average is approximately \$1,295 per mile of track annually, or \$370 per mile of track greater than that shown as similarly received by the municipalities of Britain.

The last remaining important economic advantage claimed for municipal ownership, is improvement in the conditions of the laboring man, and with this is always coupled the statement that there are no politics in connection with British municipal affairs, and no political dangers involved by greatly increasing the number of municipal employees.

Rates of wages have increased and hours of labor have greatly decreased in connection with the operation of public utilities during recent years, both in this country and in the British Kingdom.

It is questionable if these net benefits to labor since the introduction of electricity have been greater on British municipal tramways than upon American street railways.

There is no question, however, but what British municipal

ownership has unfairly created a class of privileged municipal employees at public expense, and to the detriment of their fellow laborers not employed by municipalities. At least this has been so stated to me by prominent American and British labor leaders.

As to whether or not a grave public danger exists in connection with the creation of such a class is best illustrated by reading extracts from one of the circulars of the Municipal Employees' Association, advancing arguments for increasing its membership:

"Because unity is strength."

"Because the officers of this association have worked for years for a municipal body, and, therefore, know the way to approach and deal with local authorities for you better than others who have never worked for a public body."

"Because it is estimated that there are nearly 2,000,000 municipal employees in the United Kingdom. What could they not do for themselves, if all together?"

"Because concessions, estimated to cost the municipal authorities upwards of £2,000,000 per annum have been obtained by us."

"Because we have never been defeated by a municipal body yet. If they decline a request today, we are up and at them again tomorrow."

"Because there is no need for strikes with us. We can get what we want without them, if we are united, by returning to the councilmen who are in favor of fair conditions of employment."

"Because we get concessions; not shout and rave about them."

A still greater political and public danger rests in the Association of Municipal Corporations and Town Clerks, and kindred organizations which are more powerful in their influence on parliamentary legislation than any American body, or political ring has ever been in national or state legislation.

The votes of the 2,000,000 municipal employees mentioned above are practically controlled by them.

The town clerks and other prominent salaried officials of the municipalities dominate the policy of their association.

These men also generally dominate the parliamentary politics in their respective localities and members of parliament rarely reside in the localities from which they are elected.

As a result of this condition, the political future of the great majority of parliamentary members is principally dependent upon the attitude towards them of these associations.

In addition to this, cash, legal, engineering and other talent are contributed by the members of the association for the services of some specific member in promoting or opposing legislation, affecting only the particular locality of that member.

Time does not permit me to go into the details of how these influences have placed upon private utility companies the unfairness of burdens in securing franchise rights or in conducting their business when these have been secured. Nor how these influences have obstructed progress to the great detriment of the public at large.

The unwise investment of enormous public funds with the attendant evils brought about by these influences has already been stated.

The American visitor who has been royally entertained by high class, non-salaried elective Municipal officials, and who has not gone deeply into the entire system of British Municipal Government, may doubt the existence of the situation described; but thorough investigation will reveal it in even more serious form than is here stated.

The real motives which have animated the great power behind the British municipal ownership movement, have emanated from those who expected personal benefit therefrom, and they are as intensely selfish as those which have ever led to the organization of a private company or have dictated the action of professional politicians in this country.

We have said, that is, with the co-operation of the compositor we have been made to say, there were two Stewarts. The first day it was "Stewart;" the second day it was "Stuart;" the fact is his name is "Steuart."

Garnett B. Holmes, of Holmes & Allen, Wellington, New Zealand, having come 14,000 miles, easily hold the record for long distance visitors at the convention. Mr. Holmes is the inventor of a flexible under-running trolley head and also of a non-fouling swivelling trolley head that are extensively used in New Zealand and Australia, and on account of the interest shown in these devices at the convention Mr. Holmes will endeavor to arrange to place them on the market in this country before leaving the United States.

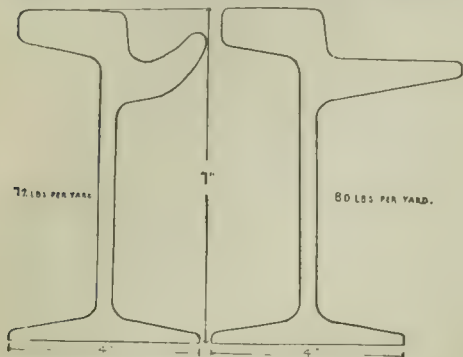
THE USE OF THE "TEE" RAIL IN CITIES.*

BY C. GORDON REEL, VICE-PRESIDENT KINGSTON CONSOLIDATED RAILROAD COMPANY.

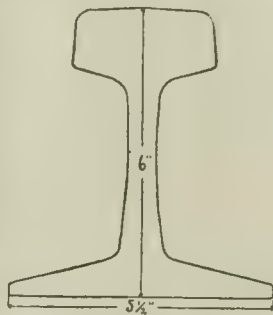
In the horse car days the equipment was so light and speeds so leisurely that the problem of a proper track was easy of solution. It was expected that wagon traffic of all kinds would follow along the car tracks and so city ordinances usually required that the street railroad companies make proper provision for the accommodation of vehicular traffic. With the introduction of electricity weights and speeds were increased enormously. The trend of development has been steadily to approach nearer and nearer to steam railroad standards. With the increase in weight of equipment and increase of speed the grooved and girder rail sections soon

this rail, there is a chance for an argument between high T sections and standard T sections. Personally I would prefer to pay more per ton for standard sections than for high T sections, although under ruling prices the high T-rails cost considerably more per ton than standard T sections.

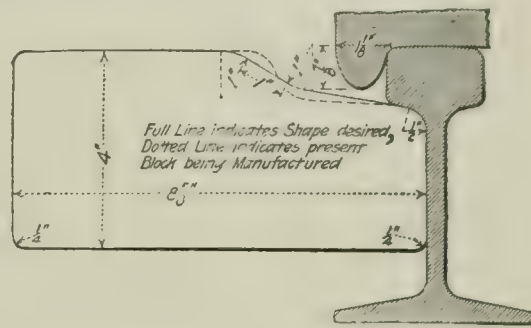
When it became necessary to renew the tracks in Kingston, I looked over the experience of other companies and concluded that the T-rail was in every way more desirable than the grooved or girder rail and proceeded accordingly. To make sure we laid an experimental piece of track using 90-pound A. S. C. E. standard rail. This gave such good results that we placed an order for several hundred tons in 60-foot lengths with a view to extending the construction. After the rails were delivered a bitter opposition was engineered by interests which formerly owned one of our roads and who seem to be sore because we have been successful. It was argued that if,



T-Rail in Cities—Grooved and Girder Sections Originally Used in Kingston, N. Y.



T-Rail in Cities—Dudley 100-pound T-Section.

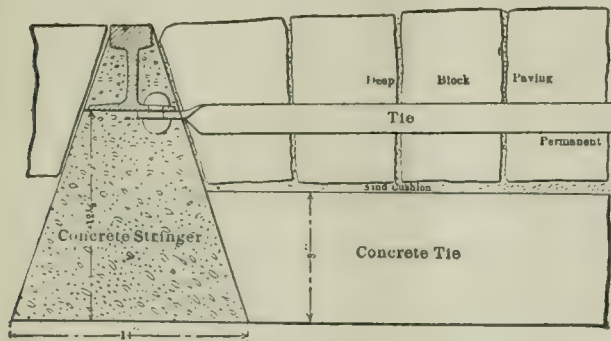


T-Rail in Cities—Type of Construction in Ft. Wayne, Ind.

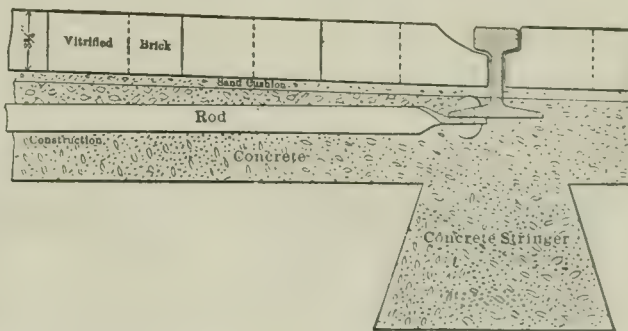
demonstrated their inability to carry the car traffic without rapid deterioration. The inefficiency of these sections was due not to the light weight so much as to their unscientific design. The vertical web of the rail was usually directly under the flange of the wheel so that the weight of the car would be carried on a sort of projecting shelf. This unsymmetrical unloading was more than the rails could stand. They pounded down rapidly at the joints and could not be held to gage. Our companies were unfortunate enough to build with 7-inch grooved and girder sections shown in the accompanying illustrations. These rails were structural wrecks at the joints long before they were worn appreciably.

In other cities similar sections have been used which overcome the inherent weakness in design by brute strength so

when they built the road, it was necessary to use an iron lip, that unless we used the iron lip, ruts would form along the track. The only difficulty about this point was that it was not necessary, in the first place, to use any iron lip because experience proves that there is no greater tendency for a rut to form along a T-rail than along the outer edges of a grooved or girder rail. They also used letters from city engineers of New York, Brooklyn and Albany, stating that no T-rails were used in those cities. This argument we easily answered by asking our opponents to produce letters from cities where T-rails had been used. The fact that they produced letters from places where they had not been used was certainly no evidence against their use. After a lot of misrepresentation and personal abuse in their newspaper we finally got consent from



T-Rail in Cities—Proposed Track Construction, With 90-pound A. S. C. E., Rail.



to speak; that is, they are rolled in weights up to 150 pound per yard, which would seem absurd to steam railroad men, especially in view of the very much heavier rolling stock used by the steam roads. It is self-evident that a proper section should not be inordinately heavy and should carry its load with no tendency to moving sideways, and furthermore that the track should stand solidly in place without having to strap the rails together every few feet. All T-rails fulfill the first two requirements, but the standard steam railroad sections would seem to serve better than the high T sections in regard to lateral stability. Just what is gained by using a high T-rail is hard to understand, still I am willing to concede that, in view of the experience in some of the larger cities which use

the city to lay T-rails in two rather important streets with the stipulation that if, after the end of a year, the city authorities so desired we would remove them and substitute the old rails. As an instance of the unfairness of the opposition, this proposed trial was fought bitterly. They well knew that if the construction was tried it would make good. Another feature which had to be overcome was a bill introduced in the legislature intended to prohibit the use of the T-rail entirely in the State of New York. Whether or not this bill had any connection with the Kingston opposition or was merely a coincidence I am unable to say. In any event the bill was easily defeated and was never reported from the committee.

Since the installation of this 90-pound standard construction in the two streets referred to, we have been granted permanent permission without any restrictions to use this 90-

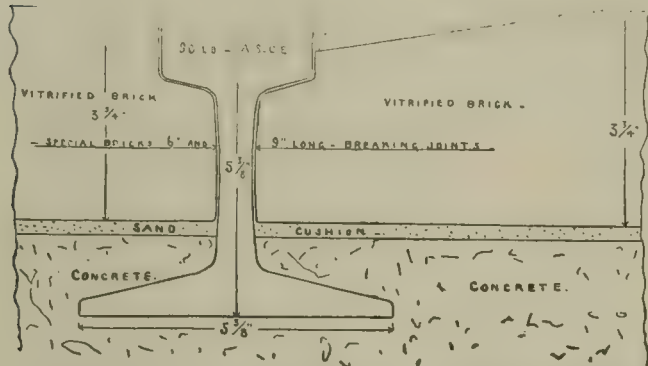
* Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

pound standard T-rail in Broadway, Main street and Fair street, which are the most important streets in the city. The opposition has simply made itself ridiculous and is now considered a joke.

We are using a special form of brick outside the rail as well as inside. It will be noted from the illustration that on the inside we will go up on the head of the rail to such a distance as to barely give room enough for our wheel flange. In this way the obstruction in the street will be much less than though the brick projected under the head of the rail and very

Tacoma, Washington....Street Railway Journal, Sept. 7, 1907.
 *Kingston, N. Y.....Street Railway Journal, Jan. 26, 1907.
 *Kingston, N. Y.....Electric Railway Review, Jan. 26, 1907.
 Indianapolis, Ind.....Electric Traction Weekly, Feb. 7, 1907.
 Seattle, Wash.....Electric Railway Review, June 29, 1907.
 Milwaukee, Wis.....Street Railway Journal, Sept. 7, 1907.
 Montreal, Canada.....Street Railway Journal, Sept. 7, 1907.

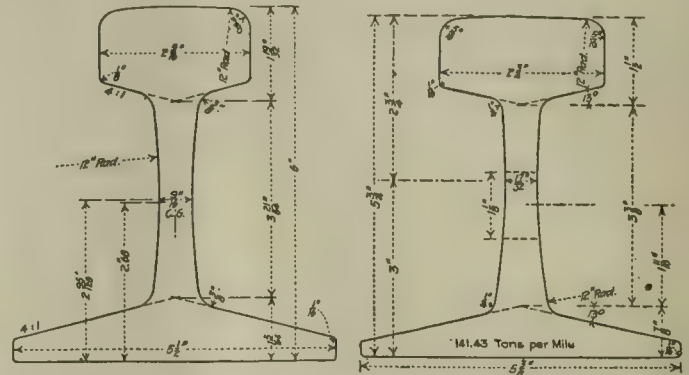
The gist of the whole T-rail matter seems to be that street railway tracks are beginning to be built to serve the companies which build them and the patrons of these companies,



T-Rail in Cities—Latest Construction in Kingston, Showing Special Brick Outside of Rail.

much less than any form of grooved or girder rail. I might say in passing, however, that it is now standard practice to use only ordinary brick. On the outside the brick is merely laid flush with the rail, and on the inside it is tucked under the head as shown in one of the illustrations, which illustrates the construction now standard in the streets of Milwaukee.

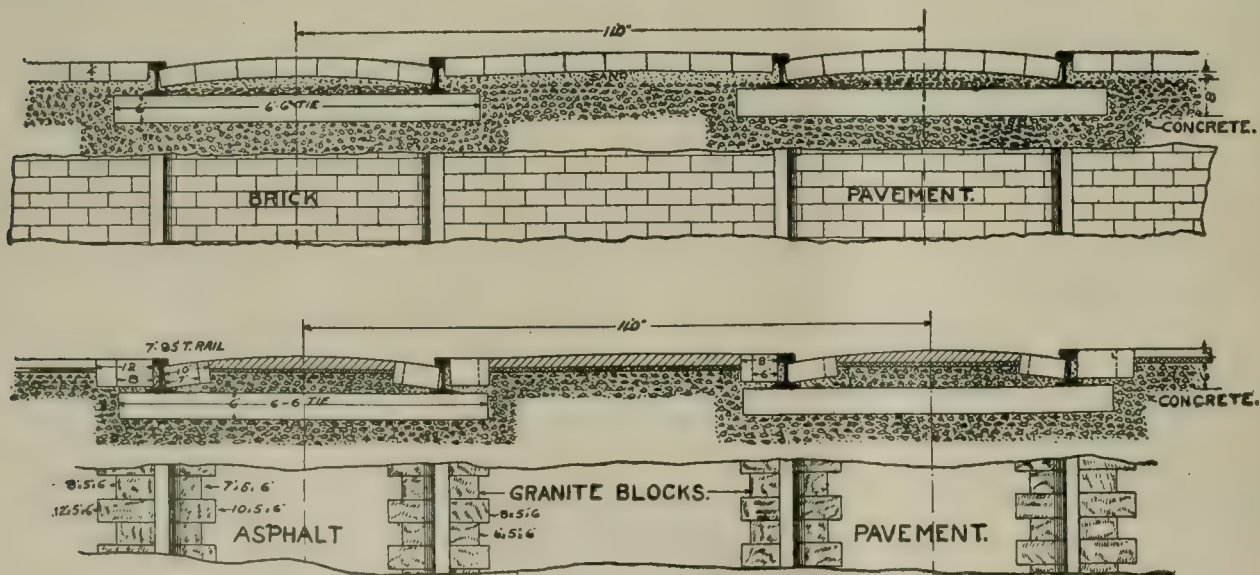
The "nose" brick extensively used heretofore has not been entirely satisfactory. By referring to the illustration, which shows the type of construction adopted in Fort Wayne, and described in the Engineering News, June 20, 1907, it will be noted that the designer desired a somewhat different form



T-Rail in Cities—Open-Hearth and Hunt Sections.

rather than every Tom, Dick and Harry of a truckman who stubbornly insists on following the car tracks instead of staying out in the roadway where he belongs. If this driving along the tracks served any economic end it might be tolerated, but it does the truckman no good and interferes with the movement and comfortable transportation of countless thousands of more important people. It would seem absurd if it were not true that any one would argue in favor of having the tracks of a street railroad reserved for the transportation of merchandise at the inconvenience and discomfort of human beings.

The horse car, the wagon on the track, slow speed, light



T-Rail in Cities—Standard Construction in Milwaukee.

than the market provided. We think that the kind we are having made for Kingston, as illustrated, combines many desirable features. In the event of heavier flanges being used experience teaches that they will cut their own way in the brick and will not crack the pavement badly.

In regard to what standard section to use we have found the 90-pound A. S. C. E. most desirable. It would seem though that the open-hearth section used by the Union Pacific and the Southern Pacific Railroads would be most desirable since it has somewhat more height and better proportions generally. If heavier rail than the 90-pound is used the Dudley 100-pound section would be excellent.

By referring to the following publications admirable types of construction will be illustrated.

equipment, grooved and girder rails bespeak the past. The electric car with the wagon in the roadway, high speed, heavy equipment on T-rails belong to the present. If any man or body of men, either through ignorance or spite, endeavor to relegate any of you gentlemen to the past and, benightedly or spitefully, attempt to require you to continue grooved and girder rails in the face of present development, you will combat and overcome this ignorance and prejudice if you have a spark of manhood, and as "Angels of Light" will fight for and achieve T-rails, thus confounding these spirits of the Dark Ages.

* This article includes a list of letters from city engineers throughout the country stating that they have adopted T-rails, explaining why they prefer them to the old grooved and girder types.

WHERE MAINTENANCE ENDS AND DEPRECIATION BEGINS.*

BY J. H. NEAL, AUDITOR OF DISBURSEMENTS, BOSTON ELEVATED RAILWAY COMPANY.

Depreciation accounting is almost entirely dependent upon estimates and uncertain elements; two features, and two only stand forth as positive factors. The first is that values are continually diminishing in practically every creation by man, and the second that maintenance is but a partial replacement of such impairment.

Strictly speaking therefore, depreciation begins before maintenance is necessary; not where maintenance ends, and as a matter of fact, there is no absolute line of demarcation between the two such as the title of this paper might imply. Custom, however, has caused certain meanings to become attached to each term which it is well to recognize in order to facilitate discussion.

Supercession and appreciation will purposely be omitted from consideration in this paper on account of the limitations of the subject.

judgment as to the economy and efficiency with which a property is being maintained. That is what they are for. Beyond question, however, something more than this is needed, for it is easy to show low maintenance cost for a period of years at the expense of the life of the property, and equally easy to unwisely expend large sums in maintaining equipment that should be discarded.

Of course it may be said that, if depreciation reserves were established, these in conjunction with maintenance accounts would render the situation complete. However, this is not at all the fact. Rather the rate of the annual charge for depreciation is often determined from accounts which involve the erroneous conditions mentioned above, with possibly others.

The seven common methods of charging depreciation are enumerated below, together with a practical illustration showing the application of a few:

1. Equal proportion annually of original cost.
2. Fixed percentage on gradually diminishing balance of original cost.
3. Fixed percentage on gross earnings.
4. Fixed percentage on net earnings.

Method No. 1. Equal proportion of original cost.		Method No. 3. Percentage on diminishing balance.		Method No. 5. Annuity system at 5 per cent. interest.	
Original cost	\$12,000 00		\$12,000 00	1st annual deposit	\$678 52
Charges first year	900 00		2,095 20	2d deposit	\$678 52
Value second year	11,100 00		9,904 80	Interest	33 92
Charges second year	900 00		1,729 38		712 44
				3d deposit	\$678 52
Value third year	10,200 00		8,175 42	Interest	69 54
Charges third year	900 00		1,427 42		\$1,390 96
				4th deposit	\$678 52
Value fourth year	9,300 00		6,748 00	Interest	106 94
Charges fourth year	900 00		1,178 20		\$2,139 02
				5th deposit	\$678 52
Value fifth year	8,400 00		5,569 80	Interest	146 21
Charges fifth year	900 00		972 48		\$2,924 50
				6th deposit	\$678 52
Value sixth year	7,500 00		4,597 32	Interest	187 45
Charges sixth year	900 00		802 68		\$3,749 23
				7th deposit	\$678 52
Value seventh year	6,600 00		3,794 64	Interest	230 75
Charges seventh year	900 00		662 53		\$4,615 20
				8th deposit	\$678 52
Value eighth year	5,700 00		3,132 11	Interest	276 21
Charges eighth year	900 00		546 86		\$5,524 47
				9th deposit	\$678 52
Value ninth year	4,800 00		2,585 25	Interest	323 95
Charges ninth year	900 00		451 37		\$6,479 20
				10th deposit	\$678 52
Value tenth year	3,900 00		2,133 88	Interest	374 08
Charges tenth year	900 00		372 55		\$7,481 67
				11th deposit	\$678 52
Value eleventh year	3,000 00		1,761 33	Interest	426 71
Charges eleventh year	900 00		307 51		\$8,534 27
				12th deposit	\$678 52
Value twelfth year	2,100 00		1,453 82	Interest	481 98
Charges twelfth year	900 00		253 82		\$9,639 50
Value for salvage at end of twelfth year....	\$1,200 00		\$1,200 00	Total amount of fund at end of twelfth year.....	\$10,800 00

Note.—Methods No. 3, No. 4, No. 6 and No. 7, are not subject to illustration in this manner.

Maintenance is generally understood to be the ordinary repairs and renewals necessary to keep property in operative condition.

Depreciation is usually defined as "ultra wear and tear" or such deterioration as may not be provided for by maintenance.

Obviously the extent of the latter is controlled by the former, although, to be sure, no amount of maintenance can entirely replace the deficiency.

Efficient management, among other qualifications, implies the ability to approximately determine the point where expense of ordinary repairs becomes abnormal and consequent renewal or substitution necessary.

On the other hand, the essence of successful accounting for depreciation lies in the degree of accuracy with which the probable life of property is determined.

At a glance then it can be seen that these problems are analogous, and that the same means must be adopted for the solution of either the one or the other, both requiring the establishing of a point where maintenance should end.

A careful analysis of the first nine accounts of our "Standard System" no doubt materially assists in forming

5. Annuity system.

6. Periodic revaluation.

7. Proportion of betterments charged to operating.

The accompanying statement shows exactly the same final results by using different methods of charging off depreciation on track valued at \$12,000, the supposed life of which is twelve years, allowing 10 per cent. for salvage at the end of that time.

None of these methods in themselves can assist in establishing the point where maintenance becomes uneconomical. In fact, they are nearly all originally based on an estimate as to where this point occurs. Whether or not their results are useful, depends entirely upon how nearly actual practice approaches the degree of maintenance calculated in the first place.

But it is not the province of this paper to discuss the advantages or disadvantages of these methods. All are more or less effective under proper conditions. One thing is certain however, that with the single exception of "periodic revaluation" each is constructed upon a basis which the progress of time and events must surely change, and as the navigator checks by celestial observation his reliance upon the compass, so the executive must frequently adjust

* Presented before the American Street and Interurban Railway Accountants' Association, Atlantic City, N. J., October 17, 1907.

the means which he adopts to conditions as they actually exist, or error and confusion will surely result.

Revaluation is in most cases impractical, at least with frequency, therefore to effect these adjustments, to establish probable life and to supply the element missing from our conventional bookkeeping accounts, continuous consideration must be given to the physical changes which take place.

It is in the light of such detail only, that a proper display of the relations between maintenance and depreciation can be obtained, because of the wide divergence in the character of equipment and the governing conditions.

It is often a source of surprise to scientists and inventors when suddenly they discover right under their noses some little thing for which they have long been searching. They wonder why they have not seen it before. It appears that this may prove to be the case with many in their consideration of depreciation.

No department head can intelligently conduct his work without a mass of detail which furnishes exactly the information desired.

The man who repairs the motors must have a knowledge of the frequency and causes of breakdowns which interrupt travel or require large expenditures. The man in charge of tracks must study the life of ties, timbers, rails, frogs, etc. The man who produces power must know when the boilers or steam piping, etc., become a menace to safety, maintained though they may be, and so right through the line, one and all are endeavoring to establish the very point at issue.

None of these men are so bold, however, as to be willing to commit themselves as to what rate of depreciation would be proper, taking all kinds of tracks, or all kinds of motors, or all kinds of power house equipment together. They wish to particularize. Permit them to do this, and the competent man can make exceedingly accurate estimates.

Just so with the general proposition. The pith of the matter is subdivision. Certainly it is not wise to trust to the generalization of others. Each property is a problem in itself and should be governed by matters of fact obtained mostly from its own experiences.

Nothing demonstrates this so clearly as opinions expressed in our trade journals together with a review of the practices pursued by a large number of English and American companies. Authorities can be found on each and every one of ten general divisions, advocating an annual charge varying from 1 to 10 per cent. Such differences are of tremendous importance when a large railway is considered and naturally cause confusion and doubt.

There is no reason to fear the detail when subdivision involves. Once a list is established it only remains for the auditor to watch and adjust it in combination with department heads. Naturally some extra time and trouble is required, but why should we expect to control so important a matter by a single table of some dozen items culled from the statements of others?

Standardizing accounts is one thing and standardizing rates of depreciation is certainly another.

On every road in existence there are conditions which furnish extremes. On one road, one extreme might prevail, on another the opposite extreme. If all the roads in the country were united then one method and one rate would accomplish good results. Individually, however, each must look out for itself.

In conclusion it may be said that corporations, like living things, increase their strength and vigor in proportion to the effort that they put forth. Now, the very effort of establishing, as perfectly as possible, the relations between maintenance and depreciation is productive of excellent management and an excellent understanding of the value and capacity of the property.

On the assumption that the title restricts such freedom, many features of interest and indeed importance have not been touched upon, nor concrete examples cited; the writer simply advocating the policy of "each road by itself, each subdivision by itself and each changing condition by itself," giving due consideration to the experiences of others, but adopting their details only where circumstances are determined to be exactly similar.

For the past 40 years Galena-Signal oils have been recognized as the standard lubricants for steam railway lubrication. About four years ago, realizing the importance of electric traction systems and the constant growing tendency to conform to steam-road standards and practices, the Galena-Signal Oil Company began to compound a line of oil on the well known Galena-Signal processes for use by electric railway companies, considering their specific requirements. In this four years' active campaign the company has been successful in securing the business of electric railway companies and it is to-day reported to be lubricating more than 40 per cent of the electric

railways of the United States and Canada, including a majority of the largest city and interurban systems. Its business in this field is continuing to grow at a wonderful rate.

PROBLEMS OF THE SMALL ELECTRIC ROAD.*

BY H. S. COOPER, MANAGER, GALVESTON ELECTRIC COMPANY.

What is a "small" electric road? What is the measure of its "smallness?" The gentlemen asking for this paper indicated that their measure was gross earnings, by the fact that they spoke of "companies with less than \$500,000 revenue per annum." That is one way of looking at it, but the writer believes that gross earnings is not a true measure of a "small" electric road; if \$500,000 gross earnings means a "small" road, does \$500,001 mean a medium-sized one? And if not, where does the medium-sized one begin and end and the big one commence. Also, at the dividing line of \$500,000—or any other amount larger or smaller—do the "problems" change suddenly—or even to any extent?

And, if a mere arbitrary sum of gross earnings is not a proper division line between the "small" road and the one above it, what is the proper measure? Is it active track-mileage, or number of cars on regular schedule or population served? It is not any one or two or all of these for, if it were, many roads would be in the "small" class which are not considered in it and several so-called "small" ones would jump out of it quickly.

For the purposes of this paper, therefore, an entirely different basis of comparison will be taken, not only because it differentiates the roads in line with the question of "problems" but also gives what the writer believes is a truer division between a "small" road and the class just above it than any arbitrary measurement financial, numerical, or statistical.

The "small" road is one whose condition is such that it will not allow of full departmental organization. That is to say, it is one that, although it might rank out of the "small" class in one or two of the items of gross earnings, track-mileage, rolling stock or population served, yet it is so situated that it is considered that it cannot afford to be, cannot be made to be, or is not divided into the proper number of clear-cut and non-interfering departments with a competent, technically practical man at the head of each. It is in such a "small" road that the manager has to be, ex-officio, foreman or superintendent of every department or of most departments; or at any rate, he has to be the expert head of departments. It is in such a road that the detail which, in one fully organized into departments, is settled by the head of that department, comes to the manager's desk or calls him away for a visual inspection and a decision. In such a road he must have "a finger in every pie" instead of merely examining or tasting the finished product. With such a road the duties of the manager are not merely managerial; they are not only a combination of the executive, legislative, judicial and administrative but also are paternal and pedagogic. Personally, the sins of every department are directly visited on him, for is he not it? To him personally come bond and stockholders, the public, the municipality and the employees. He cannot hide behind any department for he may be, or must be the decisive head of that department. He cannot take refuge behind the impersonality of an office nor a corporation title, for his personal responsibility is too well known. Even if he blames matters on a "wicked partner" such as the "Board of Directors" or the "Home Office," everyone knows that it is a subterfuge and, anyway, both of these wicked partners will quickly repudiate the blame and the "last state of that manager shall be worse than the first." This is the real mark of the "small" road as it is also its first problem, a problem that begins and ends at home and is a very vital one.

The importance of organization is not fully appreciated by the "small" or "near-small" road. To many owners and managers, organization into departments seems a useless and non-productive process, entailing no revenue and much unnecessary expense, time and labor. To the very small road where the manager is everything from engineer to bookkeeper, where the difference between bond interest and deficit is but a hairbreadth, in such a road, departmental organization seems—and probably may be—somewhat of a farce. But it must be a very small road where this really applies. Simple organization is capable of beginning much lower down in the scale of roads than is commonly practiced among owners and managers, and even a pretty full and complete organization can be started—and will prove remunerative—a great deal sooner than is generally believed.

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 17, 1907.

The simplest organization will have not less than four departments—counting the manager as one of them. These would be:

1.

Accounting	{	Bookkeeping, Car accounting, Purchasing, Correspondence,	}	Manager and clerk.
Claim department. Accidents, etc. Manager and local counsel.				
2. Generating. Power station. Chief engineer. Assistants.
3. Transportation.—Operating of cars. Inspector, or starter and trainmen.
4. Maintenance

{	Rolling stock, Buildings, Track, Line.	}	Superintendent	{	Trackmen, Barnmen, Barnmen, Linemen.	}
---	---	---	----------------	---	---	---

This simplest plan of organization is possible to any road; of course in a very small road the manager may have to be the chief engineer and the superintendent of maintenance and of transportation in addition to his other duties, but in any road having full business for six to ten regular cars on an urban line or three or four regular cars on an interurban line, the above plan of organization is none too complex.

As we go up in the scale of the smaller roads, or as a road grows in size, these departments can easily and profitably be amplified until it is—for a small road—fully organized into departments, which means into about eight, as follows:

1. Accounting and auditing. 2. Claims and legal. 3. Purchasing and stock-room. 4. Power station. 5. Shops. 6. Track. 7. Line. 8. Transportation. And if there is a "pleasure park" attachment, 9. Advertising and attractions.

That organization—those departments—will answer for a wide scope of sizes of roads. It may be that in the smaller roads the manager will again have to be the virtual head of each department; that the departments will overlap and interfere to some extent, but these are drawbacks only to be amended by increase in size, in earnings or in profits and, if properly carried out, that very organization will aid to that end.

It may seem foolish, when your trackman and lineman are one and the same person, when your winder also repairs trucks, when your carpenter repairs cars and buildings and does pipe-fitting, to ask them to bisect themselves into heads of departments while you show them how you want the work done, and, perhaps, how to do it; but, unless you expect your road to be forever stationary as to size you can afford the foolishness. In the first place it is good training for both men and manager; it leads to and teaches the proper forms and the proper use of them; it tends to exactitude in work, in authority, in responsibility and in these ways makes far better discipline and more efficient and economical operation. That is the first problem of the small road—to so organize itself that, without waste of time or energy or the unnecessary unreeling of red tape, it will have the advantage of known authority and responsibility from the track-greaser up to the manager. If the road thinks it is too small for any real departmental organization, let it "play at it" with a few simple departments and forms and in a short time that play will develop into earnest. It is good policy in all such matters to "go through the motions" for a little while before any change is really and actually started. It familiarizes those interested; it brings out faults, deficiencies and objections and puts the matter into immediate and perfect working order when it is made a fixed actuality.

The second and next most important problem of the small road is its direct and personal relation with its patrons, the municipality and—to an extent—the employees. Nothing can be done impersonally. In every move it makes there is a personal motive imputed and a personal feeling engendered. This is compelled to be the case where most of the patrons and all the municipality know the manager and other officials and many of the employees. It is especially the case if there is a local board of directors and it is a wise board, and a blessing in disguise to the manager, if it puts everything "up to him," and keeps its skirts clear of all local matters except questions of absolute policy. While a director should direct, he should not meddle and a "local" director should avoid it as the plague! (This is an "aside.")

This personal relation of the small road is not really a hard problem and if it is rightly worked out it can be made an advantage that is well worth the trouble to obtain it. In a comparatively small city, up to 50,000 or 75,000 inhabitants, the city will always regard its street railway as one of its possessions; not merely an adjunct or attribute as in the cosmogony of the big city, but as an object of personal interest or value and in the same category as its other civic

improvements. If, therefore, the road can be made in any way a credit to the city, something that it can boast of in some particular, it is a distinct advantage gained for the road.

To obtain such a condition—that most valuable asset of a public service corporation, a pleased and satisfied public—is the next problem of the small road, but to do so needs individual care and tact in a much greater degree than with the larger road, where the public is larger and the inertia, therefore, greater; where the electric road is one of many public utilities and, as a whole, less an object of personal solicitude to the citizen; where its total physical and financial condition, its rights and its franchises are not facts known to every taxpayer. In the small roads these are all matters of personal interest to the citizen, are discussed in all companies and, as this condition is handled by the road, so will they become aids or hindrances, weapons of offense or defense for the company.

And the simple solution of the matter is, perfect equity between the company, its patrons, the public and the municipality. The personal equation must "cut no ice" in matters general or matters of policy—that policy must be a straight business one requiring only the facts that, as a "public utility corporation" it has only one master, the public; only one client, the majority of its patrons, and that its only duty is to serve and keep faith with the one honestly and squarely and to impartially give the other the best service that its patronage allows. To do otherwise is to invite trouble sooner or later; to give service or facilities to one section when such are equally due to all, because the company or some of its owners or backers are interested in that section; to show partiality to any class or faction as a means of obtaining the influence—political or financial; to create exceptions in favor of or to allow privileges to individuals because of "pull" or "influence," or "graft" or favoritism are sure breeders of future difficulties in the smaller cities, for they are personally known and felt and resented.

To listen courteously and interestedly to the complaints, "kicks," hints and crude suggestions of the patrons and non-patrons of the road, to sift the wheat from the chaff and give due credit and thanks for the few poor grains found, and to pass by the bushels of husks without offense; to meet graft—open or implied—without open recognition of it and with an honesty of company policy, purpose and dealings that inoffensively disarms it; to gracefully refuse an improper or impossible request, favor or privilege asked and leave no resentment for the refusal; to explain, excuse, expound, exonerate; to do so as to leave a satisfied or convinced person; to do so as to leave no sting; to do so in a manner to satisfy the company's motives and acts—this is the second problem that the small road puts up to its managerial head. And it is no small problem, for it takes unending tact, patience, good humor and a large experience and knowledge of human nature and of all local conditions. To convert the enemies and lukewarm friends of the company into partisans for it; to keep its friends friendly; to be courteous, exact and equitable in all matters requiring it and yet be able to be liberal when occasion needs it, to be lax when it violates no law, no rule, or no policy and when it creates no precedent—this is what the small road exacts from its manager.

The third problem is a material one—one that may be divided into two heads: employees and materials. With the first, the relations of the head of the road are not only those of a—or the—superior official. They are, as I have said, pedagogic and paternal. He is seldom, if ever, "The Manager" or "Mr. So-and-So"—he is "The Boss," or "The Old Man," personally known and having a personal influence and example with them. Therefore, much is expected or exacted from him and through him from the company that is not expected from the larger road where the only "boss" is "Rules and Regulations," or an impersonal official in a swing chair before a flat-top mahogany desk; where the employee is not an individual but a unit and, in consequence, is treated by a formula with a very small variable in it. The head of the small road has the direct personal equation to meet in his discipline and in his employment. He can not be as independent of his "help" as can his brother of the larger road, for his reserve supply of trained or available men is not as large or as available. It is seldom that the "extra list" of the small road overflows; in fact, it almost always shows a hiatus at the bottom if the company is at all strict in its requirements as to its trainmen. And the small road has to be, or should be, stricter as to certain requirements than the large ones, especially among its conductors. In the large cities with their stead traffic of—to the company and its employees—strangers, the requisites for competent trainmen are, in certain directions, less and less exacting, than for those of the smaller road where a certain courteous attention to and a familiarity on the part of the trainmen with its patrons and their ways is an asset of the transportation department and the company. The public in the larger cities simply desires transportation

—rapid transit by preference. It doubtless appreciates convenience, comfort and courtesy, but it will sacrifice them all to spend in transit and be content with the change. It will not resent being asked to "Get a move on" in boarding or leaving a car; it will "move forward" mechanically when gruffly ordered to do so; it will board or leave moving cars cheerfully and without expecting a helping hand from the conductor; it is generally ready with its fare; it is at the right place to board the car and is ready to step off when the car slows or stops. Now the patrons of the small road do none of these things and, in consequence, the conductor, instead of being a fare-collecting signal-bell ringing, accident-report-filling automaton, has to be a human-being with—at least some courtesy and tact. These requisites keep the extra list of the small road gasping for breath, especially on rush days.

The other departments, with the probable exception of the power plant, are also parts of the same problem. For a large proportion of the year the line, the track, the shops and the barn can be operated with a minimum of crews and yet, at irregular intervals, and perhaps periods of some length, the force of men in one or the other of these departments could be doubled with resulting economy of operation and maintenance.

There are two horns to the dilemma, either to keep the force down to a minimum and busy, and trust to Providence for no emergency work or for outside aid when that emergency happens; or to keep a larger permanent force than is generally needed and piece out their time with the manufacture of small repair parts, or the building of rolling stock or other apparatus. Where there is a good foundry and machine shop, a good wood-working mill and a fairly good electric-working or repairing shop in the city or within quick reaching distance, the first method may be used, but small cities with such conveniences, capable of doing truck, motor and car-body work are comparatively rare, and in cities that do not boast of such it is a better solution of the problem to enlarge the different "gangs" merely as a question of schedule and car-service insurance. This, however, is entirely a matter of local conditions of traffic and climate. It is one of the real problems however that confronts nearly every small road, but is one for which no broad generalization can be laid out. Each small road must work it out "for its own hand."

In the same category comes the question of supplies, and repairs and renewal parts. Whether to keep these at an absolute minimum for ordinary conditions and to again trust in Providence, or to carry a reserve or emergency surplus—those are the questions, and they are not as simple as they look. The first means small interest on investment, less stock-room space, less handling, less insurance, less depreciation, and a more rigid economy of use—the latter because everything must be made to last to the final minute and under such a strain that the employees are more careful and economical in their use. On the other hand such a course means small-quantity purchases at small-quantity high prices and also small-quantity high freight or express rates; it also means a shortage of cars or an uneconomical "patch-up" of cars, line or track when the emergency does come.

To carry an emergency surplus means again a case of "insurance of continuity of service" and, as its proper handling will allow the buying of certain things in larger quantities, it means an economy in purchasing. On the other hand, it means an increase in investment, in depreciation and deterioration of certain supplies, and a more lavish use—at any rate a less economical use—unless life and mileages are accurately kept and applied. That means considerable additional clerical work for some one. The decision of these questions is also a local one, influenced by local traffic and geographical and climatic conditions, by the distance to large commercial centers where such supplies are always in stock and—firstly and lastly—by the financial condition of the road, by its policy and by the balanced judgment of the manager.

For it is to the actual manager of the small road—whatever his official title may be—that its success or failure is due. Its problems are his problems, his own personal problems much more than in the case of his bigger brother whose every clean-cut department can be capped with a capable head—a congress of whom, or the complete reports from which, gives the big manager a complete and instantaneous grasp of the situation at any minute; gives him a clear, complete and concise report from experts, which the small manager must—most often—work up for himself from meagre, obscure and empirical information, from imperfect data and his own observation.

But, if he has the breadth, it is a good education for him, and his road profits by it—for a while. For that is the last problem of the small road, to retain its managerial head if that head is a good one and if he has no ownership or profit-sharing financial interests in the road. To the capable manager of the successful small road, the big and the bigger roads are always beckoning, and he waves his hand in reply, for he

has his eye on the "seats of the mighty"—the swing-chair and the mahogany desk—and he intends, in time, to be an officer of the national association. He would like to be one now, to attend all its meetings, to write papers for it, to fill out promptly and fully Mr. Swenson's daily "interrogatory sheets"—but how can he? His little road takes his every minute from his early rising to his late retiring, he has to eat it, drink it, sleep it; if not, as manager, it calls him as claim agent, accountant, purchasing agent, track or line foreman, winder, car repairer or chief engineer. His public, his patrons, his municipality, his employees, his stockholders, his directors, all seem to study things for him to do to fill in his "vacant time." And a week or more absent from it, and a hundred dollars added to "General Expenses." What lots might happen in a week's absence and how many places in track, line, cars or station that hundred dollars would fill. For, of course, he attends his own local or sectional association, is an officer of it, and writes papers, and answers "Question Box" queries for it, that is not only a duty but a pleasure. He personally knows every member of it and "swaps" ideas and experiences with them; the discussions and papers are nearly all on problems that affect his road. The members have always a common interest in local legislation, in peculiar local climatic, geographical, traffic or legislative conditions. This home association uses up a great deal of his spare time and ideas and of his little company's available expense money. It is often his only "vacation," at any rate the only vacation that he thinks that he and his company can afford.

He would like to attend those national meetings, but, in addition to the above reasons, he is somewhat scared of them. The published academic papers and discussion, the high technical and mathematical exactitude of them appall him, while the well-edited, clear-cut discussions and the authoritative style and "ipse dixit" of the well-known speakers make him feel that even if he were there and knew that they were wrong, he would not dare to lift up his little voice in protest.

Of course he is wrong, if for no other reason than the attrition, with larger and broader experiences, would be of benefit to him and his little road, a benefit obtainable in no other way. And he does a wrong to the national association for it needs him and his experiences. His little road is the "dog" on which nature and municipalities and legislatures and the public "try out" their new schemes or renew their old ones. The problems of the large roads are only the problems of the smaller one condensed, intensified, made into a formula by pressure of traffic, by condensation of population, by humanity in the gross instead of in the individual. The large roads need the experience of the small one for its problems are basic ones, worked out empirically, with travail and by retail, but containing the true principles and with those principles open and apparent, so that "he who runs may read."

The national needs the small road—as much or more than the small road needs the national—but how are you going to get him? That is a problem of the big roads.

DISCUSSION ON RAIL CORRUGATION. *

After the presentation of the report the discussion was opened by G. L. Wilson (Twin City Rapid Transit Company) who said that his company had had a good deal of difficulty within the last two years, and apparently in an increasing ratio, with the corrugated rail. The trouble had developed with the more recently rolled rails, the rails which have been in service for the longest time not being the most seriously affected. As reported by the committee the girder rail seemed to be the most affected. But he found the same trouble existed with the T-rail. It appeared to him strange that while the trouble is ascribed to a defect in the foundation, yet almost all the cases of corrugated rail occurs in paved streets. On earth streets, or on open track, corrugation very seldom if ever occurred and this condition of things was not only uniform in the United States but the foreign writers on the same subject seem to find that the corrugation is confined almost entirely to streets with a very firm and solid stone ballast, or with a rigid foundation of some kind, so that it does not seem to be a question of the defective foundation altogether.

He believed that the investigation of corrugation should be continued by the committee. His company had experimented somewhat with the method of filing off the corrugations as described in the report of the Philadelphia Rapid Transit Com-

*Abstract of the discussion upon the report of the "Way Matters" committee presented before the American Street and Interurban Railway Engineering Association at Atlantic City, N. J., October 15, 1907.

pany, which was embodied in the report of the committee, and in fact had obtained the device from that company. It had given good results, so far as simply removing the evil which existed was concerned, but it did not prevent the recurrence.

There were English firms which manufactured machines for grinding off these corrugations, and his company has recently procured one of them, but it had not yet been used.

C. Voynow, Philadelphia Rapid Transit Company, said there was one cause for corrugations which he had never heard mentioned, but which it appeared as probably the most reasonable cause. He was almost convinced that it was the principal reason for the corrugation.

On tracks which are on dirt—T-rail tracks, where the rail can move in all directions, corrugations very seldom occur. The firmer the foundation of the rail the more corrugations. The firmer the foundation and the heavier the traffic the quicker the corrugations will occur. This had brought out the idea that the corrugations were caused by the elongation of the upper surface of the metal under traffic. When the rail is free to yield, the elongation might form a vertical curve; but when the foundation is firm and unyielding, the surface metal, the metal which is elongated on the upper surface, is probably pressed together in irregular humps and these irregular humps are being taken off by the rear wheels of a single truck car. He believed that to be so because after a corrugation was thoroughly filed the surface generally was hardened under the rolling, and after the corrugation was thoroughly filed, the corrugation did not occur again. He had had the experience where a new track was laid in concrete (the rail firmly bedded in concrete without any chairs) of corrugation occurring four months after the rail was laid and the corrugation became so deep that it was considered doing away with the rail in two and a half or three years after it was laid. After filing the rail thoroughly and taking off the surplus metal from the top two and a half years ago, there had been no further trace of corrugation. Then came the question—why did not the surface of the rail elongate further, and why did not the corrugation occur again? It was possible that the metal had been knitted into a more firm consistency and therefore the metal did not come up in lumps again.

W. Boardman Reed said that in his experience in New York City he had never noticed any corrugations. The track was laid on cast iron yokes, 5-foot centers. The yokes were solid and rigid, but there was an opportunity for the track to yield between the yokes, and it did so give, as a girder supported at the ends would give. He thought this went quite a distance in bearing out the theory of Mr. Voynow.

F. G. Simmons said the experience in Milwaukee with corrugated rails has been very slight, and while it would seem to bear out the remarks of Mr. Voynow there was one peculiar thing about it, which gave rise to other questions in his mind. The corrugations appeared on tracks supported on ties at the regular spacing with their method of concrete construction, which had six inches of concrete below the tie and concrete between the ties and around the rail, up to within about four inches of the surface. This track after having been in a year showed corrugations, very slight and very minor, and the city had laid the abutting pavement against the track and the concrete on the top, which came up around the rail, and this had been laid in an inferior manner. In the course of the following year this pavement, and concrete, loosened somewhat and as it loosened the corrugations disappeared. The peculiar circumstances in connection with the corrugation was that this condition appeared at three different places on the system and at these three places the rails laid were all of one rolling of rail—one certain rolling of rail received from one company showed the corrugation and that was the only one. That fact had suggested the idea that possibly something in the composition of the rail or the method of manufacturing it was at fault to some extent.

He therefore thought that the corrugation question and the question of specifications for the rail might interweave, and that the "Rail" committee would be the proper committee to carry on the further investigation of the subject.

E. W. Olds said those who had the care of the cars were interested in having smooth track, and asked Mr. Voynow if he had noticed any peculiarities of the corrugation—whether they were inclined to creep forward. Generally speaking, he understands that it was on the tracks where the cars are always operated in one direction that these corrugations appear.

Mr. Voynow replied that the formation of the corrugations was most peculiar. In the beginning the corrugations were perpendicular to the gauge line, directly across the rail. In the course of time the corrugations become at an angle (about 45 degrees) to the gauge line, and not in regular waves, but with the maximum wave about $\frac{3}{4}$ -inch from the gauge line. When the corrugation continued to increase, it became cone shaped—the form of a cone produced when the rain drops down on shallow water. It came up in cones or nipples, that was the maximum of the corrugation. While the corrugations changed in shape regularly and constantly approached the nipple form he did not recall having noticed any creeping. He had made notches opposite corrugations that occurred after the rail had been laid for four months, and a year or two later they had changed position with reference to the notches, but it was hard to tell whether they were creeping. If they take the direction of the traffic, then the corrugation in 80 per cent of the cases—because it was very seldom they actually become nipples—was at an angle to the gauge line in the direction of the traffic—the apex of the angle was nearer to the car.

I. E. Matthews said that in Rochester there had been only one case of rail corrugation that gave trouble. It was on a double track on a 3 per cent grade, and corrugations had appeared at the foot of the grade, on about 150 feet of track. Both up track and down track, seemed to be affected equally. The rail was apparently rolled out as though it were soft. Drillings were taken out at the high spots and at the low spots of the rail and chemical analyses made. There did not seem to be any difference between the high spots and the low in percentage of carbon. The rails with the corrugations showed 0.30 per cent of carbon. A rail on an adjoining track, same kind of rail, 9-inch girder, which had given good service, showed 0.51 per cent of carbon. They had concluded that the corrugated rail was low in carbon; that it was soft and the low places having been started by the spinning of a wheel or brake, the truck passing over that low spot, would set up a vibration in such a way as to carry this corrugation on.

Mr. Voynow said that the corrugation of rails had not been investigated in any systematic way. It was not a question of chemical composition of the metal; it was the physical condition more than anything else. He thought that in order to investigate the corrugations properly, the track should be built from the same class of rail, from the same manufacture, laid in different ways, concrete tie or otherwise; that these various sections ought to be placed in the same service and under these conditions only can any results, absolute results, be attained in the investigation.

The Bayonet Trolley Harp Company, of Springfield, O., which is represented by J. M. Olinger, R. A. Garlough and G. W. Olinger, is showing a new roller bearing trolley base that has attracted no little amount of attention. The base is designed to operate in conjunction with this company's detachable pole clamp by means of which a bent or broken pole can be exchanged for a good one in less than three minutes. The base has anti-friction bearings so constructed that the base will not bind or seat itself even under long and severe wear. The Bayonet Trolley Harp Company is also the manufacturer of the detachable harp which bears its name.

REPORT OF THE COMMITTEE ON CONSTRUCTION OF STANDARD RAILWAY CAR STORAGE AND OPERATING HOUSES.*

Your committee appointed to consider the subject of the "Construction of Standard Railway Car Storage and Operating Houses" held two meetings in conjunction with a similar committee appointed by the National Fire Protection Association.

One of these meetings was held in New York on May 21, 1907, at the association's headquarters. All the members of the committee were present at that time and received a report from the committee of the National Fire Protection Association, covering rules for the construction of buildings of this character.

After a thorough consideration of the rules submitted, your committee made a number of changes and suggestions which were then submitted to the committee of the National Fire Protection Association. These suggestions and corrections were, in turn, submitted by this last named committee to their association at meetings held in New York on May 22, 23 and 24, 1907, and the suggestions made by your committee were practically agreed to.

The second meeting was held in Baltimore on September 19, at which Messrs. Porter, Pumfrey, Parker and Adams were present, representing the American Street & Interurban Railway Association, and Messrs. Patton and Townsend, representing the National Fire Protection Association.

At this meeting the rules and regulations for the construction of car houses which follow were finally agreed upon. These rules have received the approval of the National Fire Protection Association and they are respectfully submitted by this committee to the association for consideration.

H. H. ADAMS, Chairman.
A. V. PORTER,
E. J. COOK,
E. L. PARKER,
CHAS. F. FERRIN,
THOS. PUMFREY.

Requirements for the Construction of Standard Railway car Storage and Operating Houses.

A standard railway car storage house should be so constructed and protected that it may not contribute in any manner toward the spread of fire therein, and contribute only, in case of fire, not to exceed sectional losses of the structure. One single division should not exceed dimensions to expose to any one fire a greater number of cars therein than would represent a valuation of \$200,000 of combustible rolling stock, or a total interior trackage of not more than 1,800 feet.

(The following are recommendations from the standpoint of fire protection only, and are in no way intended as a detailed guide to architects, or mill engineers with reference to the actual strength which any building may require due to size or occupancy).

Section 1, Walls.

Walls to be of good hard burned brick, laid in best of lime and cement mortar. (Concrete construction is not covered under this specification.)

(a) Outside Walls.

To be not less than 12 inches thick, and when walls are over 60 feet in length, to be strengthened by piers or pilasters not less than 20 by 20 inches, spaced not over 20 feet, center to center the walls between piers being not less than 12 inches thick. When without piers to be not less than 16 inches thick.

Where exposed, to be carried full thickness of wall, at least 5 feet above roof, and to be provided with a durable and non-combustible coping. Where roof is of fire-resistive construction, walls to extend to roof. If exposed, walls to be solid, or any openings therein to be protected in a standard manner.

(b) Cut-Off of Division Walls of Fire Sections.

To be not less than 12 inches thick, and when walls are over 60 feet in length, to be strengthened by piers or pilasters not less than 20 by 20 inches, spaced not over 20 feet, center to center, the walls between piers to be not less than 12 inches thick. When without piers to be not less than 16 inches thick.

To be not less than 5 feet parapet, carried full thickness, projecting through and beyond cornice eight inches, with a durable and non-combustible coping. Where roof is of fire-resistive construction parapet may be modified.

To be no openings in division walls separating car storage sections, except that for every 100 feet of length, there may be one opening in the wall, of an area not exceeding 28 square

feet, the same to be protected with a standard automatic sliding fire door on each side of wall. End walls to have no openings within 5 feet of division walls.

Section 2, Height.

One story, without basement or space below, except at pits. Height of walls not to exceed 20 feet at eaves line, or 25 feet at peak of roof above the floor level, the slope being from one-half inch to one inch per foot. (Where it is necessary to exceed 25 feet in height, this may be increased by permission of inspection departments having jurisdiction, but in no case should this height exceed 30 feet.)

Section 3, Area.

Sections between standard cut-off or division walls to contain not over 20,000 square feet of floor area. Distance between centers of adjacent tracks to be not more than 12 feet or less than 10 feet.

Section 4, Roof and Roof Supports.

(a) Post or Column Covering. (When of fire-resistive type). All vertical metal supports to be insulated by not less than four inches of concrete, or of terra-cotta, or of such other approved insulating material as is recommended in the building code of the National Board of Fire Underwriters, independent of any air space next to the metal. Well-laid brick is strongly preferred for column covering.

(b) Girder and Beam Covering. (When of fire-resistive type). All metal girders and beams to be insulated on the sides by not less than four inches, and on the top and bottom by not less than two inches of concrete, or of terra-cotta, or of such other approved insulating material as is recommended in the building code of the National Board of Fire Underwriters.

(1) No plaster of Paris or lime mortar shall be used for the purpose of insulating material, nor shall any plaster, whether or not on metal lathing, be considered a part of the covering required.

No single block or unit of insulating material used for column covering shall have a greater vertical dimension than 12 inches when placed in position, nor shall the shells and web of hollow tile or terra-cotta blocks be less than 1 inch in thickness, and these blocks shall be well laid up with Portland cement mortar, and the said blocks be suitably tied or anchored together.

(2) The quality, design and weight of all metal structural parts and supports, the necessary tie rods, bearing plates, wall templates, and the riveting, bolting, connecting, and anchoring of structural parts, to be in accordance with requirements as recommended in the building code of the National Board of Fire Underwriters.

(c) Roof. (When of fire-resistive type). To be of an approved system of brick, concrete or terra-cotta, or other non-combustible material, with approved insulation of special supports or tie rods, as recommended in the building code of the National Board of Fire Underwriters for such purpose. Roof covering to be tar and gravel or approved composition.

(d) Roof and Roof Supports. (When of slow burning type). Roof planking to be not less than 3-in. spliced timber. To have timbers (preferably single stick) not less than 6 by 12 inches, spaced not less than 6, nor more than 10 feet on centers, supported by wooden posts, not less than 10 by 10 inches, and without trusses. Where roof timbers enter walls at opposite side, they should be self-releasing, and have at least eight inches of brick work between ends of beams. To be without monitors. Roof covering to be of tar and gravel or approved composition.

Section 5, Skylights and Ventilators.

Skylights to be of flat type, wired glass and metal frames, constructed in accordance with the rules and requirements of the national board of fire underwriters covering their installation. Ventilators, if any, to be of metal. It is advisable to provide skylights with fuse-releasing attachments in order that in case of fire skylights may open and carry off heat and smoke. A metal ventilator set in each skylight is also advisable.

Section 6, Cornice.

Cornice, if any, to be of non-combustible material and plain finish.

Section 7, Finish.

Finish (interior trim), if any, to be non-combustible and without concealed space.

Section 8, Floors.

To be of brick, concrete, stone, cinders or earth.

* Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

Section 9, Pits.

To have brick, stone or concrete retaining walls or piers; brick or concrete floors; steps of stone, concrete or iron; the rails to be supported on brick, stone, concrete or wood stingers exposed on one side only, and to have not more than four track sections communicating.

Section 10, Tracks.

To run clear from building, without break or transfer table. To be terminated by suitable bumpers, so that there will be a clear space of not less than three feet between bumpers and wall of building. Special track work in front of building to be provided with guard rails, where necessary.

Section 11, Track Doors.

Track doors to be in pairs to be arranged so that whether open or closed any door of one pair will not interfere with the operation of any other pair. When within 10 feet of cut-off walls, to be constructed and hung as for a standard swinging fire door. Approved metal roller doors may also be used.

Section 12. Hazards.

All electrical, heating, power and occupancy hazards to be installed and maintained, and where necessary to be cut off, to be in accordance with the rules and requirements of the National Board of Fire Underwriters, as published in specific pamphlets by the National Fire Protection Association.

Section 13. Exposures.

Buildings should be so located that there may be but a minimum exposure only from other property.

Section 14. Reinforced Concrete or Concrete-Steel Constructed Buildings.

Reinforced concrete construction may be accepted in instances where tests and inspections of the material and structural supports are properly made under provisions as set forth in section 110, pages 153 to 159 of the building code of the National Board of Fire Underwriters: (This is an easily obtainable reference and therefore not included here. Eds.)

Rules and Requirements for Installation of Automatic Sprinkler Equipments in Railway Car Storage Houses.

The rules and requirements of the National board of fire underwriters for sprinkler equipments, automatic and open systems, as recommended by the National Fire Protection Association in published edition of 1905 (or as may be covered by later issues), are to be observed in protecting this class of property, and in addition thereto the special features as herein recommended are to apply.

Attention is also called to the necessity of sub-dividing the areas of street railway property, so that an excessive amount of value shall not be exposed to any one fire.

Section 1. Ceiling Curtains.

Permanent ceiling curtains are recommended in buildings having a height of over 25 feet from floor to ceiling. These curtains may be constructed of non-combustible material, or of not less than 1-inch tongued and grooved boards, coated on both sides with non-inflammable paint; curtains to sub-divide ceiling into pocket areas not exceeding 5,000 square feet each, and be of a depth from ceiling to trolley wire. Underwriters having jurisdiction should be consulted as regards the specific location of these curtains.

Section 2. Aisle Sprinklers.

(a) In addition to the regular ceiling installation, sprinklers to be placed on both sides of each track, in an upright position, on horizontal pipe lines parallel with tracks, and to be so located that water will spray directly into cars through side windows of car bodies; the sprinklers to be at such a height that their deflectors will be from two to four inches below the upper sash rail of car windows.

(b) Distance between sprinklers on aisle lines not to exceed 8 feet.

(c) The standard pipe schedule to govern installation of aisle lines, except that no pipe smaller than one inch to be used.

(d) When the distance between sides of cars on adjacent tracks does not exceed 4 feet, one line of sprinklers to be placed in the center of each aisle between tracks.

(e) When the distance between sides of cars on adjacent tracks exceeds 4 feet, two lines of sprinklers to be installed. Sprinklers to be placed not less than 6 inches nor more than 12 inches from the sides of cars to be protected. (When the distance between the sides of cars in adjacent tracks is less than 12 inches, or where aisle lines in accordance with this section may not be practicable, as at curves, switches, transferables, car elevators, repair and paint shops, special instructions from underwriters having jurisdiction should be obtained as regards installing raised or altered lines.)

(f) Sprinklers to be placed between cars and partitions,

division or outer walls, not less than 6 inches nor more than 12 inches from the sides of cars to be protected.

(g) Sprinklers on all aisle lines to be staggered spaced. (It is recommended that aisle sprinklers be provided with a shield to protect them from spray of over-head sprinklers and to serve as a means of banking heat waves. Underwriters having jurisdiction should in all cases be consulted as to whether or not these shields should be provided).

Section 3. Supply Mains to Aisle Sprinklers.

(a) Aisle sprinklers to be supplied through independent connection from main risers, taken from above and close to dry pipe valves; shut-off valves to be provided for ceiling and aisle systems, so arranged that either may be controlled independently. (Ceiling and aisle systems should preferably be installed upon separate dry valves.)

(b) Aisle lines not to be supported by nor connected to ceiling sprinkler piping. Special hangers or supports to be provided that aisle lines may be rigidly secure.

(c) Ceiling sprinkler lines to be protected against contact with trolley poles.

Section 4. Pits and Under Floor Space.

Where the under floor space does not communicate with the pits, is tightly enclosed, and is not used for any purpose, sprinklers may be omitted in such under floor space by special consent, in each instance, of the underwriters having jurisdiction.

Section 5. Additional Hand Fire Appliances.

Auxiliary hand fire appliances are deemed essential, as fires within car bodies must not be expected to be extinguished minutely by sprinklers, and the following equipment should be provided:

(a) **Extinguishers.** To be one approved and labeled three-gallon chemical fire extinguisher for each 2,500 square feet of floor area; extinguishers to be uniformly distributed in permanent locations.

(b) **Sand Pails.** In rooms containing pits, or where any wiping up or cleaning is done, to be six pails to each 2,500 square feet of floor area. Pails to be of galvanized iron, painted red, with the word "Fire" in black letters 3 inches long. Pails to be of three gallons capacity and provided with scoops.

(c) **Small Hose.** Fifty feet of one and one-half inch approved linen hose to be provided for each 6,000 square feet of floor area. Hose to be provided with three-eighths-inch nozzle, and to be in lengths of not over 50 feet, the same to be kept folded and attached to a 2-inch stand-pipe, which shall have an adequate supply of water at not less than 50 pounds pressure.

Where an approved water supply is not available and building is not over 12,000 square feet of floor area, additional approved and labeled chemical extinguishers may be accepted in place of each hose connection. (Underwriters having jurisdiction should be consulted as to stand pipe and hose layouts.)

At the conclusion of his arduous duties as chairman of the entertainment committee, Mr. A. L. Whipple, who has during the last few days been the recipient of compliments enough to make any man proud of himself, said last evening to a representative of the Electric Railway Review: "While I cannot express my personal feeling for the very pleasing remarks made by Mr. Beggs, president of American Street and Interurban Railway Association, and also for the vote of thanks by the American Street and Interurban Railway Manufacturers' Association in session yesterday, as well as for the many personal remarks made, still the honor does not belong to me alone. I wish to take this opportunity of thanking each and every member of the entertainment committee for their loyal support and for their efforts to make the entertainment the success that it apparently was. The various sub-committees did most excellent work, and I would especially mention the several chairmen, J. H. Thomas of the roller chair committee, W. H. Heulings of the reception committee, C. R. Ellicott of the Ladies' Afternoon committee, N. M. Garland of the golf committee, W. R. Kershner of the trolley committee, and each member of all the above committees. Nor would I forget the ladies' committee of general arrangements consisting of Mrs. Richard McCulloch, Mrs. J. W. Porter, Mrs. C. C. Castle, Mrs. D. B. Dean, Miss Reed, Mrs. Ada Reed, Mrs. G. Cox, and several others who were of great assistance to the committee. Then I would not forget the assistance we have had from the daily edition of the Electric Railway Review in making it possible to inform our people of the happenings of each day. The fact that our delegates and guests were satisfied with what we were able to provide more than compensates for all of the necessary time required to carry out our program."

REPORT OF THE COMMITTEE ON MUNICIPAL OWNERSHIP.*

In August last your committee in a circular letter to the members of the association asked as to the status of the municipal ownership movement in their respective localities. Among other questions to which replies were solicited were the following:

"What, if any, agitation or movement has arisen or been in progress during the past year for the extension of municipal public utilities?"

"Has there been any movement looking toward the municipalization of your company's business or any part thereof?"

"If any such agitation has arisen, please state its cause or causes."

"What seems to be the present status of public opinion in your vicinity touching municipal ownership of public utilities such as street railroads and lighting companies?"

To our inquiries 132 replies were received, of which 55 represented city lines alone, 15 represented interurban lines alone, 62 represented both city and interurban lines.

The number of states represented by replies was 37 states and territories and four Canadian provinces. The number of cities covered by these replies of over 50,000 population was 73, and of those under 50,000 population 332. The number of municipally-owned utilities in cities represented by the replies was as follows:

1. Street railway systems, 2, one of which was in Canada.

2. Electric lighting plants, 29.

3. Gas plants, 4.

4. Water works, 69.

The answer to the question as to whether there had been any agitation regarding the municipal ownership of street railway lines in the field covered by our membership during the past year elicits an almost universal negative. We quote a few of the answers returned:

The manager of a line operating in one of the largest cities represented in our membership states:

"In answer to No. 7 as to the present status of public opinion I may say that the public mind of * * * on the question of municipal ownership has had a very serious set-back, as was demonstrated pretty conclusively by the mayoralty election last spring when the question of municipal ownership was the dominant issue. It should be stated in this connection that the result came principally from the non-partisan effort of a large number of the better class of citizens to educate the public, and their very thorough efforts were effectual in disabusing their minds of the many glittering fallacies that demagogues, yellow journals and mistaken zealots had built up in their fancy. It occurs to me that the average voter is thoroughly convinced of the rottenness of municipal politics in this country especially, and it is easy to convert him to the fact that graft and perpetuity in office would be the result of municipal ownership."

The president of a large company in a southern state says:

"Much less said now in regard to it than there was a year or two since. The public seems to have lost interest in the subject."

Still another manager reports:

"Less favorable to lighting than a year ago, and not considering railroads at all."

From central New York the word is sent that the business men of that locality are adverse to the experiment, and from a growing city in the far north a manager of a combined company writes:

"Decidedly against municipal ownership. Three newspapers adverse to it and also the best business people."

A company in Ohio reports:

"Authorities are not inclined to municipal ownership, they had a sad experience with the gas plant."

Another company in the same state replies:

"The public do not want it."

From the far south word is sent that public sentiment is against municipal ownership, and a Virginia company reports that the scheme is not looked upon with favor by the more intelligent citizens of the city. Two companies report that there has been some talk about it, and give as reasons therefor the desire for political preferment on the part of some politicians, but qualify the statement by saying that the taxpayers are taking no active steps in support of the movement. One company admits that by reason of poor service which they have been obliged to give there has been some newspaper talk about the city taking over the railroad lines, and

another one speaks of the municipal ownership scheme being used as a threat to obtain certain reductions in fare.

The condition as revealed in the answers with reference to lighting, gas and water works is not quite so favorable, although even with reference to such public utilities, a number of the replies are to the effect that with existing municipal plants in their cities the people are becoming disgusted with the operation and the service they afford, and to that extent are being turned against further extension of the municipal ownership scheme.

From a careful reading of these replies, which have been placed by the committee on file with the secretary of the association, we feel safe in making the assertion that municipal socialism as affecting street or interurban railway properties in the sense of the taking over by municipalities of the ownership and operation of such properties, has as a social doctrine and as a political text quite considerably decreased in force during the past year. This decadence of the municipal ownership idea may be ascribed to several causes. A year ago the propaganda seemed to be the tide of a great movement which, on account of its utility as a political doctrine and its popularity with the masses because of its promises of reduced cost of service and an extension of opportunities for labor, was sweeping on largely unopposed, to the ultimate confiscation of our properties. The glories of its conquests abroad had been for some years rehearsed and the blessings which it would introduce here in this country proclaimed from political platforms and through socialistic publications. But during the last 12 months the people at home and abroad have given to the subject a careful and critical examination of its principles and an analytic study of the facts as developed here and abroad through the trial of the scheme, with the consequence that the weaknesses and the fallacies of the proposition as a social economic theory, and especially the dangers of attempting to introduce to any great extent the practice it advocates in municipalities with the political complexion of American cities, have been shown and what might be termed at least the radical and bald theory of municipal ownership and operation by the people of a municipality of such utilities as those of transportation and to some extent of light, has been marked doubtful and is no longer in a general way being urged.

We believe that the campaign of education which has been in progress during the past year against the theory and principles of municipal ownership, a campaign to which doubtless the members of this association have contributed in public and in private, has shorn the idea of much of its strength and to that extent has weakened its force both as a political and a social enemy. This change of sentiment finds its illustration in the result of the elections in London last March and Chicago in April of this year, both of which contests turned on the questions of municipal trading and municipal ownership, and which as precedent to the vote, involved a very complete collation of statistics touching the practical result of municipally owned utilities, and as well a great deal of illuminating academic discussion as to the principles and effects of the doctrine. At the London election out of 118 candidates 84 were unconditionally opposed to municipal trading, and the candidates in general in their addresses absolutely condemned competition with private enterprises. In Chicago also the issue was practically the same, the line of separation being clearly drawn between those who believed and those who did not believe in the wisdom of placing in the hands of the municipality the transportation business of that city. Thus we think we are safe in the conclusion that municipalization, involving the ownership of a public utility property and its operation by a municipality, has during the last year received a very considerable set-back and it is pleasing to feel that in the long run the pendulum of justice and fairness, which may at times of frenzied reform swing to the extreme point of danger, will after a while return to a normal and safe position.

It must not be concluded, however, that the dangers to our corporate life are at present so greatly lessened as to be unworthy of our constant care and effort. In the stead of the socialistic theory of municipal ownership there has of late arisen the doctrine of public regulation, which has sprung into such popularity as to have become the favorite measure of legislation in almost every state in the union during the past 12 months. Perhaps we are trespassing upon the preserves of our co-committee—that of Public Relations—in advertising to this matter, but as it is so intimately related and apparently is, to a large extent, the outgrowth of the movement for municipal or state ownership of public utilities, we may be forgiven for devoting a page or two to its consideration.

The past year bears many resemblances to the period of the Granger agitation. Railroad legislation in the states has been, however, far more widespread. Not only in the central

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

Section 9, Pits.

To have brick, stone or concrete retaining walls or piers; brick or concrete floors; steps of stone, concrete or iron; the rails to be supported on brick, stone, concrete or wood stingers exposed on one side only, and to have not more than four track sections communicating.

Section 10, Tracks.

To run clear from building, without break or transfer table. To be terminated by suitable bumpers, so that there will be a clear space of not less than three feet between bumpers and wall of building. Special track work in front of building to be provided with guard rails, where necessary.

Section 11, Track Doors.

Track doors to be in pairs to be arranged so that whether open or closed any door of one pair will not interfere with the operation of any other pair. When within 10 feet of cut-off walls, to be constructed and hung as for a standard swinging fire door. Approved metal roller doors may also be used.

Section 12, Hazards.

All electrical, heating, power and occupancy hazards to be installed and maintained, and where necessary to be cut off, to be in accordance with the rules and requirements of the National Board of Fire Underwriters, as published in specific pamphlets by the National Fire Protection Association.

Section 13, Exposures.

Buildings should be so located that there may be but a minimum exposure only from other property.

Section 14, Reinforced Concrete or Concrete-Steel Constructed Buildings.

Reinforced concrete construction may be accepted in instances where tests and inspections of the material and structural supports are properly made under provisions as set forth in section 110, pages 153 to 159 of the building code of the National Board of Fire Underwriters: (This is an easily obtainable reference and therefore not included here. Eds.)

Rules and Requirements for Installation of Automatic Sprinkler Equipments in Railway Car Storage Houses.

The rules and requirements of the National board of fire underwriters for sprinkler equipments, automatic and open systems, as recommended by the National Fire Protection Association in published edition of 1905 (or as may be covered by later issues), are to be observed in protecting this class of property, and in addition thereto the special features as herein recommended are to apply.

Attention is also called to the necessity of sub-dividing the areas of street railway property, so that an excessive amount of value shall not be exposed to any one fire.

Section 1, Ceiling Curtains.

Permanent ceiling curtains are recommended in buildings having a height of over 25 feet from floor to ceiling. These curtains may be constructed of non-combustible material, or of not less than 1-inch tongued and grooved boards, coated on both sides with non-inflammable paint; curtains to sub-divide ceiling into pocket areas not exceeding 5,000 square feet each, and be of a depth from ceiling to trolley wire. Underwriters having jurisdiction should be consulted as regards the specific location of these curtains.

Section 2, Aisle Sprinklers.

(a) In addition to the regular ceiling installation, sprinklers to be placed on both sides of each track, in an upright position, on horizontal pipe lines parallel with tracks, and to be so located that water will spray directly into cars through side windows of car bodies; the sprinklers to be at such a height that their deflectors will be from two to four inches below the upper sash rail of car windows.

(b) Distance between sprinklers on aisle lines not to exceed 8 feet.

(c) The standard pipe schedule to govern installation of aisle lines, except that no pipe smaller than one inch to be used.

(d) When the distance between sides of cars on adjacent tracks does not exceed 4 feet, one line of sprinklers to be placed in the center of each aisle between tracks.

(e) When the distance between sides of cars on adjacent tracks exceeds 4 feet, two lines of sprinklers to be installed. Sprinklers to be placed not less than 6 inches nor more than 12 inches from the sides of cars to be protected. (When the distance between the sides of cars in adjacent tracks is less than 12 inches, or where aisle lines in accordance with this section may not be practicable, as at curves, switches, transferables, car elevators, repair and paint shops, special instructions from underwriters having jurisdiction should be obtained as regards installing raised or altered lines.)

(f) Sprinklers to be placed between cars and partitions,

division or outer walls, not less than 6 inches nor more than 12 inches from the sides of cars to be protected.

(g) Sprinklers on all aisle lines to be staggered spaced. (It is recommended that aisle sprinklers be provided with a shield to protect them from spray of over-head sprinklers and to serve as a means of banking heat waves. Underwriters having jurisdiction should in all cases be consulted as to whether or not these shields should be provided.)

Section 3, Supply Mains to Aisle Sprinklers.

(a) Aisle sprinklers to be supplied through independent connection from main risers, taken from above and close to dry pipe valves; shut-off valves to be provided for ceiling and aisle systems, so arranged that either may be controlled independently. (Ceiling and aisle systems should preferably be installed upon separate dry valves.)

(b) Aisle lines not to be supported by nor connected to ceiling sprinkler piping. Special hangers or supports to be provided that aisle lines may be rigidly secure.

(c) Ceiling sprinkler lines to be protected against contact with trolley poles.

Section 4, Pits and Under Floor Space.

Where the under floor space does not communicate with the pits, is tightly enclosed, and is not used for any purpose, sprinklers may be omitted in such under floor space by special consent, in each instance, of the underwriters having jurisdiction.

Section 5, Additional Hand Fire Appliances.

Auxiliary hand fire appliances are deemed essential, as fires within car bodies must not be expected to be extinguished minutely by sprinklers, and the following equipment should be provided:

(a) **Extinguishers.** To be one approved and labeled three-gallon chemical fire extinguisher for each 2,500 square feet of floor area; extinguishers to be uniformly distributed in permanent locations.

(b) **Sand Pails.** In rooms containing pits, or where any wiping up or cleaning is done, to be six pails to each 2,500 square feet of floor area. Pails to be of galvanized iron, painted red, with the word "Fire" in black letters 3 inches long. Pails to be of three gallons capacity and provided with scoops.

(c) **Small Hose.** Fifty feet of one and one-half inch approved linen hose to be provided for each 6,000 square feet of floor area. Hose to be provided with three-eighths-inch nozzle, and to be in lengths of not over 50 feet, the same to be kept folded and attached to a 2-inch stand-pipe, which shall have an adequate supply of water at not less than 50 pounds pressure.

Where an approved water supply is not available and building is not over 12,000 square feet of floor area, additional approved and labeled chemical extinguishers may be accepted in place of each hose connection. (Underwriters having jurisdiction should be consulted as to stand pipe and hose layouts.)

At the conclusion of his arduous duties as chairman of the entertainment committee, Mr. A. L. Whipple, who has during the last few days been the recipient of compliments enough to make any man proud of himself, said last evening to a representative of the Electric Railway Review: "While I cannot express my personal feeling for the very pleasing remarks made by Mr. Beggs, president of American Street and Interurban Railway Association, and also for the vote of thanks by the American Street and Interurban Railway Manufacturers' Association in session yesterday, as well as for the many personal remarks made, still the honor does not belong to me alone. I wish to take this opportunity of thanking each and every member of the entertainment committee for their loyal support and for their efforts to make the entertainment the success that it apparently was. The various sub-committees did most excellent work, and I would especially mention the several chairmen, J. H. Thomas of the roller chair committee, W. H. Heulings of the reception committee, C. R. Ellicott of the Ladies' Afternoon committee, N. M. Garland of the golf committee, W. R. Kershner of the trolley committee, and each member of all the above committees. Nor would I forget the ladies' committee of general arrangements consisting of Mrs. Richard McCulloch, Mrs. J. W. Porter, Mrs. C. C. Castle, Mrs. D. B. Dean, Miss Reed, Mrs. Ada Reed, Mrs. G. Cox, and several others who were of great assistance to the committee. Then I would not forget the assistance we have had from the daily edition of the Electric Railway Review in making it possible to inform our people of the happenings of each day. The fact that our delegates and guests were satisfied with what we were able to provide more than compensates for all of the necessary time required to carry out our program."

REPORT OF THE COMMITTEE ON MUNICIPAL OWNERSHIP.*

In August last your committee in a circular letter to the members of the association asked as to the status of the municipal ownership movement in their respective localities. Among other questions to which replies were solicited were the following:

"What, if any, agitation or movement has arisen or been in progress during the past year for the extension of municipal public utilities?"

"Has there been any movement looking toward the municipalization of your company's business or any part thereof?"

"If any such agitation has arisen, please state its cause or causes."

"What seems to be the present status of public opinion in your vicinity touching municipal ownership of public utilities such as street railroads and lighting companies?"

To our inquiries 132 replies were received, of which 55 represented city lines alone, 15 represented interurban lines alone, 62 represented both city and interurban lines.

The number of states represented by replies was 37 states and territories and four Canadian provinces. The number of cities covered by these replies of over 50,000 population was 73, and of those under 50,000 population 332. The number of municipally-owned utilities in cities represented by the replies was as follows:

1. Street railway systems, 2, one of which was in Canada.

2. Electric lighting plants, 29.

3. Gas plants, 4.

4. Water works, 69.

The answer to the question as to whether there had been any agitation regarding the municipal ownership of street railway lines in the field covered by our membership during the past year elicits an almost universal negative. We quote a few of the answers returned:

The manager of a line operating in one of the largest cities represented in our membership states:

"In answer to No. 7 as to the present status of public opinion I may say that the public mind of * * * on the question of municipal ownership has had a very serious set-back, as was demonstrated pretty conclusively by the mayoralty election last spring when the question of municipal ownership was the dominant issue. It should be stated in this connection that the result came principally from the non-partisan effort of a large number of the better class of citizens to educate the public, and their very thorough efforts were effectual in disabusing their minds of the many glittering fallacies that demagogues, yellow journals and mistaken zealots had built up in their fancy. It occurs to me that the average voter is thoroughly convinced of the rottenness of municipal politics in this country especially, and it is easy to convert him to the fact that graft and perpetuity in office would be the result of municipal ownership."

The president of a large company in a southern state says:

"Much less said now in regard to it than there was a year or two since. The public seems to have lost interest in the subject."

Still another manager reports:

"Less favorable to lighting than a year ago, and not considering railroads at all."

From central New York the word is sent that the business men of that locality are adverse to the experiment, and from a growing city in the far north a manager of a combined company writes:

"Decidedly against municipal ownership. Three newspapers adverse to it and also the best business people."

A company in Ohio reports:

"Authorities are not inclined to municipal ownership, they had a sad experience with the gas plant."

Another company in the same state replies:

"The public do not want it."

From the far south word is sent that public sentiment is against municipal ownership, and a Virginia company reports that the scheme is not looked upon with favor by the more intelligent citizens of the city. Two companies report that there has been some talk about it, and give as reasons therefor the desire for political preferment on the part of some politicians, but qualify the statement by saying that the taxpayers are taking no active steps in support of the movement. One company admits that by reason of poor service which they have been obliged to give there has been some newspaper talk about the city taking over the railroad lines, and

another one speaks of the municipal ownership scheme being used as a threat to obtain certain reductions in fare.

The condition as revealed in the answers with reference to lighting, gas and water works is not quite so favorable, although even with reference to such public utilities, a number of the replies are to the effect that with existing municipal plants in their cities the people are becoming disgusted with the operation and the service they afford, and to that extent are being turned against further extension of the municipal ownership scheme.

From a careful reading of these replies, which have been placed by the committee on file with the secretary of the association, we feel safe in making the assertion that municipal socialism as affecting street or interurban railway properties in the sense of the taking over by municipalities of the ownership and operation of such properties, has as a social doctrine and as a political text quite considerably decreased in force during the past year. This decadence of the municipal ownership idea may be ascribed to several causes. A year ago the propaganda seemed to be the tide of a great movement which, on account of its utility as a political doctrine and its popularity with the masses because of its premises of reduced cost of service and an extension of opportunities for labor, was sweeping on largely unopposed, to the ultimate confiscation of our properties. The glories of its conquests abroad had been for some years rehearsed and the blessings which it would introduce here in this country proclaimed from political platforms and through socialistic publications. But during the last 12 months the people at home and abroad have given to the subject a careful and critical examination of its principles and an analytic study of the facts as developed here and abroad through the trial of the scheme, with the consequence that the weaknesses and the fallacies of the proposition as a social economic theory, and especially the dangers of attempting to introduce to any great extent the practice it advocates in municipalities with the political complexion of American cities, have been shown and what might be termed at least the radical and bald theory of municipal ownership and operation by the people of a municipality of such utilities as those of transportation and to some extent of light, has been marked doubtful and is no longer in a general way being urged.

We believe that the campaign of education which has been in progress during the past year against the theory and principles of municipal ownership, a campaign to which doubtless the members of this association have contributed in public and in private, has shorn the idea of much of its strength and to that extent has weakened its force both as a political and a social enemy. This change of sentiment finds its illustration in the result of the elections in London last March and Chicago in April of this year, both of which contests turned on the questions of municipal trading and municipal ownership, and which as precedent to the vote, involved a very complete collation of statistics touching the practical result of municipally owned utilities, and as well a great deal of illuminating academic discussion as to the principles and effects of the doctrine. At the London election out of 118 candidates 84 were unconditionally opposed to municipal trading, and the candidates in general in their addresses absolutely condemned competition with private enterprises. In Chicago also the issue was practically the same, the line of separation being clearly drawn between those who believed and those who did not believe in the wisdom of placing in the hands of the municipality the transportation business of that city. Thus we think we are safe in the conclusion that municipalization, involving the ownership of a public utility property and its operation by a municipality, has during the last year received a very considerable set-back and it is pleasing to feel that in the long run the pendulum of justice and fairness, which may at times of frenzied reform swing to the extreme point of danger, will after a while return to a normal and safe position.

It must not be concluded, however, that the dangers to our corporate life are at present so greatly lessened as to be unworthy of our constant care and effort. In the stead of the socialistic theory of municipal ownership there has of late arisen the doctrine of public regulation, which has sprung into such popularity as to have become the favorite measure of legislation in almost every state in the union during the past 12 months. Perhaps we are trespassing upon the preserves of our co-committee—that of Public Relations—in advertising to this matter, but as it is so intimately related and apparently is, to a large extent, the outgrowth of the movement for municipal or state ownership of public utilities, we may be forgiven for devoting a page or two to its consideration.

The past year bears many resemblances to the period of the Granger agitation. Railroad legislation in the states has been, however, far more widespread. Not only in the central

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

and far west but in the supposedly more conservative Atlantic seaboard states, a large part of legislative effort has been devoted to passing railroad laws. To be sure, these have referred to the steam companies but the agitation which has given rise to them has also borne fruit in the passage of certain legislative bills which have included public utility corporations such as trolley, gas, electric light and telephone companies. It has been calculated that the number of such laws affecting railroads passed within the last year is about 300. Ten state legislatures alone at their recent session passed 177 different laws with reference to the control of steam railroad corporations and dealing with almost every department and innumerable details of railroad operation and management, from the reduction of passenger fares to dusting of passenger cars, from establishing railroad commissions more powerful than any ever before created to requiring railroads to run only 8-wheel cabooses. This legislative activity, as is usual in matters of this sort, is largely based upon the ambition of politicians to be known as reformers and to foist themselves into the public.

Public utility corporations, therefore, are just now passing through a crisis in their history, the result of which is difficult to predict. The socialistic and political organization through which perhaps more than from any other source the municipalization of street railway companies was preached and to some extent promoted a year ago has, it is true, during the past year shown less strength and declined to a marked degree, but on the other hand, as we have mentioned above, socialistic legislation instigated and promoted by both political parties, has been prevalent both in congress and in state legislatures to a degree exceeding that of any other period in the country's history. When corporate interests were obliged to face what seemed to be an un-American doctrine, radical in its tendencies and quite opposed to the character of our institutions, the socialism which, unaffiliated with other political organizations, demanded that all public utilities of every name and nature be turned over to the general government and the state or municipality, the fight was largely in the open and to that extent lacked some of the elements of danger which are present in the more covert and at the same time more generally popular movement which has of late been instituted by both democratic and republican organizations for the publicly proclaimed purpose of controlling the corporations for the people, but which it seems to us in many instances, if the provisions embodied in various bills are to be literally carried out, would mean, practically, confiscation. The socialists in this country find their work being done for them and the rather anomalous spectacle is presented of the decline of a party whose avowed doctrines and policies are at the same time being supported. The condition is one which represents a drift that may become mischievous and dangerous unless we are fully alive to the forces which animate and vitalize it and are willing to meet it fairly and patriotically. Unless we are greatly mistaken, invective and stubborn opposition to the principle of regulation by commission or in some other way will not turn the tide which is setting in favor of that sort of control. That corporate offences have been committed in the haste for extension and for the occupancy of alluring fields which this country has presented, is a fact not to be controverted, and we respectfully submit that it is possible that some proper form of regulation, which shall on the one hand prevent ruinous competition to what are natural monopolies and on the other assure to investors the proper handling of their funds, would be helpful to all our interests. We must not deceive ourselves into believing that the spirit of socialism in this country has suffered such a decided reverse that it is entirely relegated to the rear. It is true its army is clad in a somewhat different uniform than formerly and marches under banners with new devices, but unless it is met with the same sort of intelligent study and a willingness to fairly discuss the questions such as has characterized our municipal ownership campaign during the past year, we shall fall short, we fear, of properly safeguarding our interests.

In an excellent report upon this subject, made to the National Electric Light Association at its recent convention by the committee on municipal ownership, and reporting, of course, on municipal lighting utilities only, it was stated: "Municipal ownership is not discredited, it is merely in abeyance. It would be a serious error to assume that the present movement of public sentiment toward public regulation signifies that municipal ownership is now or is soon going to be consigned to the limbo of discredited theories along with such past crazes as free coinage of silver at a ratio of sixteen to one. If public regulation shall fail to establish a good understanding between the corporations operating public utilities and the customers of those corporations, we shall inevitably have a revival of the cry for municipal or state ownership."

At the risk of repetition, your committee wish to em-

phasize their feeling that while municipal ownership as a socialistic scheme has been greatly weakened, it reappears in many of its essential features in some of the schemes which have been legislated upon for what is properly known as "Public Regulation," and it is our business to meet it on the open platform of discussion with the idea of accepting that which it presents which is fair and just, and to the elimination from it of such elements as are unjust and confiscatory. Respectfully submitted, C. D. WYMAN, chairman; J. A. BEELER, H. M. SLOAN, J. J. STANLEY.

INSURANCE.*

Your insurance committee has held three meetings since its appointment a year ago, has sent one circular-letter (with data-sheet No. 17) to every member of the association, and to other street railway companies, and has analyzed the data received in response thereto. The filling out of the data-sheet involved considerable work, and for this reason, as well as because the subject of insurance still receives less attention from street railway companies than any other part of their business, the number of blanks returned was much smaller than the committee had hoped to receive.

The seventy-odd reports received show insurance premiums amounting to more than \$3,000,000, losses of \$1,482,600, and payments of the insurance companies of \$1,360,000 in adjustment of the losses, or 45 per cent of the premium paid, indicating that, while rates on many large properties have been reduced, there is still considerable profit in the business.

A large part of the cost of conducting insurance business consists of commissions paid to agents, brokers and solicitors. It is evident from these figures that if this item of expense could be eliminated, either by co-operation among traction companies to mutually insure their own properties, or by direct arrangement with existing insurance companies to do the business directly with the traction companies without the intervention of middle-men, a substantial additional saving in premiums might be obtained.

Of course, if full reports had been received from all the members of the association the ratio of loss to premiums might have been greater. On the other hand, it might have been smaller. Some of the companies that reported gave figures for only a part of the period called for by the blank. If even these companies had made full report for each of the seven years the result indicated might have been changed. It may be that all the losses suffered by these companies are not included in their reports; but the large losses suffered by the Baltimore, Cleveland and St. Louis companies within that period are included, and these three losses alone amounted to more than \$800,000.

Some of the companies reporting are setting aside from their earnings an insurance reserve or fund, in lieu of insurance, or in addition to insurance. The amounts so set aside are not included in the premiums on which the foregoing calculations are based. If they were included the percentage of loss would be smaller.

Members that did not fill out data-sheet No. 17 are urged to do so, and to mail it to Secretary Swenson as soon as possible, so that the association may have the information on file for the benefit of its members.

The committee recommends that the secretary of the association send out a blank, soon after the close of each calendar year, asking the members to give him the data called for by questions 5, 6 and 7 of this year's data-sheet, and that he tabulate the information received, so that the association may know at all times the gross cost of insurance, the losses, and the causes of fires. It was very difficult for members to get together all the data asked for by the data-sheet; it will be comparatively easy for them to make a report for a single year at a time.

Your committee received in response to its circular letter, more than fifty insurance forms or descriptions of property. A sub-committee was appointed to make examination and study of these, and to prepare a general form that would aid the members of the association in negotiating for insurance. This work has not yet been completed.

The reports show that the causes of fires have been various—some from lightning, some from defective wiring, some from short-circuits in cars, some from electric heaters, one from the upsetting of a car-stove caused by the derailment of a car, one from placing wet horse blankets in an armature-oven to dry, and others from other causes. Most of the fires started in cars, and a large portion of the car-fires occurred in cars in service on the road. Several of the fires reported occurred in theatres or other park properties.

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

and one was in a storage warehouse owned, but not occupied, by the street-railway company that reported the fire. The losses of these fires are included in our statement of losses, although the properties destroyed or damaged were not, strictly speaking, street-railway properties.

Responding to suggestions made to the association by representatives of the old-line insurance companies at the Columbus convention, your committee invited the eastern and western associations of those companies to meet with it in New York, at the office of this association, on September 23d. The meeting was attended by Messrs. H. A. Smith, vice-president of the National fire insurance company, Hartford, Conn.; C. G. Smith, secretary of the German-American Insurance Company, New York; C. H. Holaman, assistant manager of the Commercial Union Insurance Company, Hartford, Conn.; E. H. A. Correa, vice-president of the Home Insurance Company, New York; Fred. S. James, Western manager of the National Fire Insurance Company, Chicago; Edward Milligan, vice-president of the Phoenix Insurance Company, Hartford, Conn.; J. W. G. Coffran, western manager of the Hartford Insurance Company, Chicago; William Hare, assistant manager of the Norwich Union Fire Insurance Society, New York; J. H. Stoddard, general agent of the New York Underwriters, New York; Bruce E. Loomis, manager of the Fire Underwriters' Electrical Bureau, of New York, and three members of your committee.

The Insurance committee of this association has from the start urged that the prevention of fires was more important, and more economically financially, than the collection of losses. While the work of your committee has brought about reductions in rates, and a more intelligent and careful consideration by traction managers of the subjects of insurance against fire losses and the prevention of such losses, the effect of the work, it is believed, has been greater upon the insurance companies than upon the traction companies. This was made manifest at the meeting of your committee last month. The old-line insurance companies have lately been giving much attention to traction properties. They are coming to look upon them as less hazardous than they had supposed them to be. They have recommended improvements in the construction and protection of many street-railway plants. They are treating our properties in a class by themselves. They have done a great deal to educate street-railway companies to guard their properties against damage by fire, and a great deal more to educate themselves on this subject, and on the subject of the cost of insuring such properties as a class. They admit that mistakes have been made in the insurance business, as in all businesses; that the business has been too much localized; that it has been difficult to break away from century-old customs and to adopt more modern methods. They propose a more intelligent and expert inspection of traction properties. The representatives of the companies present at the September meeting of your committee stated that they were ready and able to quote rates which were fair, and which they could convince us were fair; that they were ready to offer inspection and supervision that could not be excelled; that they had substantially completed a new schedule for rating street-railway properties which would make like rates upon like properties throughout the country that could not be seriously criticised; that they had made arrangements for an efficient inspection service; that they were devoting more money, more thought and more time to inspection than in former years, and that they much preferred a low rate, with a sure, though small, margin of profit, to a high rate, with big margins in certain years, and big losses in other years; that they proposed to keep regularly employed a bureau of experts under the direction of Bruce E. Loomis to advise street-railway companies in regard to construction of buildings, and in regard to devices and means for preventing fires and minimizing losses; that the rates made would include the services of this expert bureau, which would take the place of the numerous inspectors heretofore sent out by insurance companies, so that there should not be variations in recommendations, and so that rates on like properties would be uniform.

Your committee is convinced that these insurance companies are sincere in their statements of willingness to co-operate with the traction companies in improving their risks, and to write insurance at rates that will give them a comparatively small margin of profit. In return for the high-class inspection and supervision, and this reduction in rates, they hope to obtain substantially all the insurance of traction companies, and they think that, with their new machinery and organization, they will be able to furnish good service at a cost lower than the street-railway companies can obtain by any other instrumentality.

Your committee is of the opinion that, while this association should acknowledge obligation to the stock insurance companies for their present lively interest in the traction insur-

ance business, and for the efforts they are making to so improve street-railway properties as to enable them to reduce rates, the street-railway companies of the country should so construct, equip and protect their properties as to invite competition in insurance, and should be prepared to carry all of their own insurance whenever rates are too high, and prepared at once and at all times to carry at least enough of their own insurance to make the rates. To this end we recommend most earnestly your support of the insurance companies that have been organized by about thirty of the traction companies. This association ought to have the means of knowing, through its own bureau or through a bureau maintained by an insurance company or insurance companies organized and conducted in the interest solely of street-railway companies, and not for profit, the exact cost of insurance and the best methods of construction and protection, so as to be able to give intelligent consideration to the rates charged or asked by the old-line companies, or by other companies, and, if they appear exorbitant, to be able to present reasons why they should be lowered.

The action of the stock companies since you began the construction of the subject of insurance, three years ago, in reducing rates, especially to the companies that have been most active in forming organizations for mutual insurance at cost, indicates, first, the effectiveness of the work of your committee, and, secondly, a determination on the part of the old-line companies to retain the business of the traction companies, even if they have to do some of it at a loss. This is emphasized by their statement to your committee that rates ridiculously low—so low as to show no possibility of profit—have been made to certain street-railway companies. Their purpose in making these low rates was to prevent those companies from carrying their own insurance, or from uniting with other companies for mutual insurance at cost. As your committee pointed out last year, rates lower than cost are unwise for both insurer and insured.

The old-line companies express a willingness, even an anxiety, to co-operate with the traction companies to bring about or secure better protection and lower rates of insurance, being actuated, they say, by a desire to benefit the traction companies. The real fact is that they realize that such co-operation and such intelligent treatment of the subject are necessary in order to enable them to retain the business they have, to say nothing of enlarging their lines of insurance. Some of their representatives intimated to your committee that they would be willing to do business with the traction companies at a net profit of ten per cent of the premium, or even a smaller percentage; but they declined to consider a proposition to return to the policyholder any net earnings in excess of that profit, and they are unable to eliminate from their expenses the commissions of agents and brokers.

The mutual-insurance plan recommended by your insurance committee has been favorably considered by the Central Electric Railway Association, the National Electric Light Association and the Association of Edison Illuminating Companies, each of which has appointed an insurance committee, with duties similar to those devolving upon this committee.

A great many properties are under-insured. In case of loss on such properties, a part of the loss would have to be sustained by the insured. A lower rate of insurance, to which the figures compiled by your committee indicated that the railway companies, as a whole, are entitled, and which any company that will make the improvements now recommended by most of the insurance companies ought certainly to receive, will enable companies to carry large amounts of insurance for the same amount of premium. On the other hand, full valuation of properties, especially of well-protected properties, ought, and is likely, to bring reduced rates. We recommend to the members, therefore, a more careful valuation of their properties for insurance purposes, and that a refund or reserve be established to cover losses in excess of valuations—the difference, for illustration, between the 80 per cent usually carried on certain classes of property and the full value of such property.

The number and value of cars subject to destruction at any one fire is oftentimes too great. It is essential to the operation of the road that rolling stock of a very great aggregate value be stored in one locality, the storage-house or yard should be divided by fire walls, or otherwise, so that a total destruction of the property in any one location or unit will not tie up the road, or seriously cripple it. The fewer cars there are in each unit the less will be the likelihood of a disastrous fire, and the lower should be the rate of insurance.

We trust that our work and this report will receive your entire approval.

H. J. DAVIES, G. L. ESTABROOK, A. H. FORD, CHAS. O. KRUGER, R. B. STEARNS, Committee of Insurance.

and far west but in the supposedly more conservative Atlantic seaboard states, a large part of legislative effort has been devoted to passing railroad laws. To be sure, these have referred to the steam companies but the agitation which has given rise to them has also borne fruit in the passage of certain legislative bills which have included public utility corporations such as trolley, gas, electric light and telephone companies. It has been calculated that the number of such laws affecting railroads passed within the last year is about 300. Ten state legislatures alone at their recent session passed 177 different laws with reference to the control of steam railroad corporations and dealing with almost every department and innumerable details of railroad operation and management, from the reduction of passenger fares to dusting of passenger cars, from establishing railroad commissions more powerful than any ever before created to requiring railroads to run only 8-wheel cabooses. This legislative activity, as is usual in matters of this sort, is largely based upon the ambition of politicians to be known as reformers and to foist themselves into the public.

Public utility corporations, therefore, are just now passing through a crisis in their history, the result of which is difficult to predict. The socialistic and political organization through which perhaps more than from any other source the municipalization of street railway companies was preached and to some extent promoted a year ago has, it is true, during the past year shown less strength and declined to a marked degree, but on the other hand, as we have mentioned above, socialistic legislation instigated and promoted by both political parties, has been prevalent both in congress and in state legislatures to a degree exceeding that of any other period in the country's history. When corporate interests were obliged to face what seemed to be an un-American doctrine, radical in its tendencies and quite opposed to the character of our institutions, the socialism which, unaffiliated with other political organizations, demanded that all public utilities of every name and nature be turned over to the general government and the state or municipality, the fight was largely in the open and to that extent lacked some of the elements of danger which are present in the more covert and at the same time more generally popular movement which has of late been instituted by both democratic and republican organizations for the publicly proclaimed purpose of controlling the corporations for the people, but which it seems to us in many instances, if the provisions embodied in various bills are to be literally carried out, would mean, practically, confiscation. The socialists in this country find their work being done for them and the rather anomalous spectacle is presented of the decline of a party whose avowed doctrines and policies are at the same time being supported. The condition is one which represents a drift that may become mischievous and dangerous unless we are fully alive to the forces which animate and vitalize it and are willing to meet it fairly and patriotically. Unless we are greatly mistaken, invective and stubborn opposition to the principle of regulation by commission or in some other way will not turn the tide which is setting in favor of that sort of control. That corporate offences have been committed in the haste for extension and for the occupancy of alluring fields which this country has presented, is a fact not to be controverted, and we respectfully submit that it is possible that some proper form of regulation, which shall on the one hand prevent ruinous competition to what are natural monopolies and on the other assure to investors the proper handling of their funds, would be helpful to all our interests. We must not deceive ourselves into believing that the spirit of socialism in this country has suffered such a decided reverse that it is entirely relegated to the rear. It is true its army is clad in a somewhat different uniform than formerly and marches under banners with new devices, but unless it is met with the same sort of intelligent study and a willingness to fairly discuss the questions such as has characterized our municipal ownership campaign during the past year, we shall fall short, we fear, of properly safeguarding our interests.

In an excellent report upon this subject, made to the National Electric Light Association at its recent convention by the committee on municipal ownership, and reporting, of course, on municipal lighting utilities only, it was stated: "Municipal ownership is not discredited, it is merely in abeyance. It would be a serious error to assume that the present movement of public sentiment toward public regulation signifies that municipal ownership is now or is soon going to be consigned to the limbo of discredited theories along with such past crazes as free coinage of silver at a ratio of sixteen to one. If public regulation shall fail to establish a good understanding between the corporations operating public utilities and the customers of those corporations, we shall inevitably have a revival of the cry for municipal or state ownership."

At the risk of repetition, your committee wish to em-

phasize their feeling that while municipal ownership as a socialistic scheme has been greatly weakened, it reappears in many of its essential features in some of the schemes which have been legislated upon for what is properly known as "Public Regulation," and it is our business to meet it on the open platform of discussion with the idea of accepting that which it presents which is fair and just, and to the elimination from it of such elements as are unjust and confiscatory. Respectfully submitted, C. D. WYMAN, chairman; J. A. BEELER, H. M. SLOAN, J. J. STANLEY.

INSURANCE.*

Your insurance committee has held three meetings since its appointment a year ago, has sent one circular-letter (with data-sheet No. 17) to every member of the association, and to other street railway companies, and has analyzed the data received in response thereto. The filling out of the data-sheet involved considerable work, and for this reason, as well as because the subject of insurance still receives less attention from street railway companies than any other part of their business, the number of blanks returned was much smaller than the committee had hoped to receive.

The seventy-odd reports received show insurance premiums amounting to more than \$3,000,000, losses of \$1,482,600, and payments of the insurance companies of \$1,360,000 in adjustment of the losses, or 45 per cent of the premium paid, indicating that, while rates on many large properties have been reduced, there is still considerable profit in the business.

A large part of the cost of conducting insurance business consists of commissions paid to agents, brokers and solicitors. It is evident from these figures that if this item of expense could be eliminated, either by co-operation among traction companies to mutually insure their own properties, or by direct arrangement with existing insurance companies to do the business directly with the traction companies without the intervention of middle-men, a substantial additional saving in premiums might be obtained.

Of course, if full reports had been received from all the members of the association the ratio of loss to premiums might have been greater. On the other hand, it might have been smaller. Some of the companies that reported gave figures for only a part of the period called for by the blank. If even these companies had made full report for each of the seven years the result indicated might have been changed. It may be that all the losses suffered by these companies are not included in their reports; but the large losses suffered by the Baltimore, Cleveland and St. Louis companies within that period are included, and these three losses alone amounted to more than \$800,000.

Some of the companies reporting are setting aside from their earnings an insurance reserve or fund, in lieu of insurance, or in addition to insurance. The amounts so set aside are not included in the premiums on which the foregoing calculations are based. If they were included the percentage of loss would be smaller.

Members that did not fill out data-sheet No. 17 are urged to do so, and to mail it to Secretary Swenson as soon as possible, so that the association may have the information on file for the benefit of its members.

The committee recommends that the secretary of the association send out a blank, soon after the close of each calendar year, asking the members to give him the data called for by questions 5, 6 and 7 of this year's data-sheet, and that he tabulate the information received, so that the association may know at all times the gross cost of insurance, the losses, and the causes of fires. It was very difficult for members to get together all the data asked for by the data-sheet; it will be comparatively easy for them to make a report for a single year at a time.

Your committee received in response to its circular letter, more than fifty insurance forms or descriptions of property. A sub-committee was appointed to make examination and study of these, and to prepare a general form that would aid the members of the association in negotiating for insurance. This work has not yet been completed.

The reports show that the causes of fires have been various—some from lightning, some from defective wiring, some from short-circuits in cars, some from electric heaters, one from the upsetting of a car-stove caused by the derailment of a car, one from placing wet horse blankets in an armature-oven to dry, and others from other causes. Most of the fires started in cars, and a large portion of the car-fires occurred in cars in service on the road. Several of the fires reported occurred in theatres or other park properties.

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

and one was in a storage warehouse owned, but not occupied, by the street-railway company that reported the fire. The losses of these fires are included in our statement of losses, although the properties destroyed or damaged were not, strictly speaking, street-railway properties.

Responding to suggestions made to the association by representatives of the old-line insurance companies at the Columbus convention, your committee invited the eastern and western associations of those companies to meet with it in New York, at the office of this association, on September 23d. The meeting was attended by Messrs. H. A. Smith, vice-president of the National fire insurance company, Hartford, Conn.; C. G. Smith, secretary of the German-American Insurance Company, New York; C. H. Holaman, assistant manager of the Commercial Union Insurance Company, Hartford, Conn.; E. H. A. Correa, vice-president of the Home Insurance Company, New York; Fred. S. James, Western manager of the National Fire Insurance Company, Chicago; Edward Milligan, vice-president of the Phoenix Insurance Company, Hartford, Conn.; J. W. G. Coffran, western manager of the Hartford Insurance Company, Chicago; William Hare, assistant manager of the Norwich Union Fire Insurance Society, New York; J. H. Stoddard, general agent of the New York Underwriters, New York; Bruce E. Loomis, manager of the Fire Underwriters' Electrical Bureau, of New York, and three members of your committee.

The Insurance committee of this association has from the start urged that the prevention of fires was more important, and more economically financially, than the collection of losses. While the work of your committee has brought about reductions in rates, and a more intelligent and careful consideration by traction managers of the subjects of insurance against fire losses and the prevention of such losses, the effect of the work, it is believed, has been greater upon the insurance companies than upon the traction companies. This was made manifest at the meeting of your committee last month. The old-line insurance companies have lately been giving much attention to traction properties. They are coming to look upon them as less hazardous than they had supposed them to be. They have recommended improvements in the construction and protection of many street-railway plants. They are treating our properties in a class by themselves. They have done a great deal to educate street-railway companies to guard their properties against damage by fire, and a great deal more to educate themselves on this subject, and on the subject of the cost of insuring such properties as a class. They admit that mistakes have been made in the insurance business, as in all businesses; that the business has been too much localized; that it has been difficult to break away from century-old customs and to adopt more modern methods. They propose a more intelligent and expert inspection of traction properties. The representatives of the companies present at the September meeting of your committee stated that they were ready and able to quote rates which were fair, and which they could convince us were fair; that they were ready to offer inspection and supervision that could not be excelled; that they had substantially completed a new schedule for rating street-railway properties which would make like rates upon like properties throughout the country that could not be seriously criticised; that they had made arrangements for an efficient inspection service; that they were devoting more money, more thought and more time to inspection than in former years, and that they much preferred a low rate, with a sure, though small, margin of profit, to a high rate, with big margins in certain years, and big losses in other years; that they proposed to keep regularly employed a bureau of experts under the direction of Bruce E. Loomis to advise street-railway companies in regard to construction of buildings, and in regard to devices and means for preventing fires and minimizing losses; that the rates made would include the services of this expert bureau, which would take the place of the numerous inspectors heretofore sent out by insurance companies, so that there should not be variations in recommendations, and so that rates on like properties would be uniform.

Your committee is convinced that these insurance companies are sincere in their statements of willingness to co-operate with the traction companies in improving their risks, and to write insurance at rates that will give them a comparatively small margin of profit. In return for the high-class inspection and supervision, and this reduction in rates, they hope to obtain substantially all the insurance of traction companies, and they think that, with their new machinery and organization, they will be able to furnish good service at a cost lower than the street-railway companies can obtain by any other instrumentality.

Your committee is of the opinion that, while this association should acknowledge obligation to the stock insurance companies for their present lively interest in the traction insur-

ance business, and for the efforts they are making to so improve street-railway properties as to enable them to reduce rates, the street-railway companies of the country should so construct, equip and protect their properties as to invite competition in insurance, and should be prepared to carry all of their own insurance whenever rates are too high, and prepared at once and at all times to carry at least enough of their own insurance to make the rates. To this end we recommend most earnestly your support of the insurance companies that have been organized by about thirty of the traction companies. This association ought to have the means of knowing, through its own bureau or through a bureau maintained by an insurance company or insurance companies organized and conducted in the interest solely of street-railway companies, and not for profit, the exact cost of insurance and the best methods of construction and protection, so as to be able to give intelligent consideration to the rates charged or asked by the old-line companies, or by other companies, and, if they appear exorbitant, to be able to present reasons why they should be lowered.

The action of the stock companies since you began the construction of the subject of insurance, three years ago, in reducing rates, especially to the companies that have been most active in forming organizations for mutual insurance at cost, indicates, first, the effectiveness of the work of your committee, and, secondly, a determination on the part of the old-line companies to retain the business of the traction companies, even if they have to do some of it at a loss. This is emphasized by their statement to your committee that rates ridiculously low—so low as to show no possibility of profit—have been made to certain street-railway companies. Their purpose in making these low rates was to prevent those companies from carrying their own insurance, or from uniting with other companies for mutual insurance at cost. As your committee pointed out last year, rates lower than cost are unwise for both insurer and insured.

The old-line companies express a willingness, even an anxiety, to co-operate with the traction companies to bring about or secure better protection and lower rates of insurance, being actuated, they say, by a desire to benefit the traction companies. The real fact is that they realize that such co-operation and such intelligent treatment of the subject are necessary in order to enable them to retain the business they have, to say nothing of enlarging their lines of insurance. Some of their representatives intimated to your committee that they would be willing to do business with the traction companies at a net profit of ten per cent of the premium, or even a smaller percentage; but they declined to consider a proposition to return to the policyholder any net earnings in excess of that profit, and they are unable to eliminate from their expenses the commissions of agents and brokers.

The mutual-insurance plan recommended by your insurance committee has been favorably considered by the Central Electric Railway Association, the National Electric Light Association and the Association of Edison Illuminating Companies, each of which has appointed an insurance committee, with duties similar to those devolving upon this committee.

A great many properties are under-insured. In case of loss on such properties, a part of the loss would have to be sustained by the insured. A lower rate of insurance, to which the figures compiled by your committee indicated that the railway companies, as a whole, are entitled, and which any company that will make the improvements now recommended by most of the insurance companies ought certainly to receive, will enable companies to carry large amounts of insurance for the same amount of premium. On the other hand, full valuation of properties, especially of well-protected properties, ought, and is likely, to bring reduced rates. We recommend to the members, therefore, a more careful valuation of their properties for insurance purposes, and that a refund or reserve be established to cover losses in excess of valuations—the difference, for illustration, between the 80 per cent usually carried on certain classes of property and the full value of such property.

The number and value of cars subject to destruction at any one fire is oftentimes too great. It is essential to the operation of the road that rolling stock of a very great aggregate value be stored in one locality, the storage-house or yard should be divided by fire walls, or otherwise, so that a total destruction of the property in any one location or unit will not tie up the road, or seriously cripple it. The fewer cars there are in each unit the less will be the likelihood of a disastrous fire, and the lower should be the rate of insurance.

We trust that our work and this report will receive your entire approval.

H. J. DAVIES, G. L. ESTABROOK, A. H. FORD, CHAS. O. KRUGER, R. B. STEARNS, Committee of Insurance.

INTERURBAN FARES.*

BY THEODORE STEBBINS, NEW YORK, N. Y.

The subject of interurban fares is one of immediate interest because matters connected with the transportation of persons and property by railroads have been the subject of very active and even violent popular discussion. The state legislatures have been taking blind actions and state executives have been advocating and adopting arbitrary measures with the railroads. Twenty state legislatures have passed restrictive legislation on passenger rates, and fourteen states now limit passenger rates to two cents a mile. In this situation, it is important to understand the position of the interurban railway.

All interurbans are anxious to serve the public and to earn reasonable dividends for stockholders. It is not so clear, however, how rates shall be adjusted to satisfy these ends. It is customary to measure the service and its cost on the basis of cents per passenger-mile. The charges range from three cents per mile in unsettled sections down to half a cent per mile for commuters, in thickly settled districts, who use the cars twice each working day, or where excursions are handled in bulk. The ordinary range of fare, however, is between two cents and one cent per mile. We find the two cents per mile charge prevailing in the Middle West, and the one cent rate common in thickly settled districts, mostly in the East. Tables have been published showing the charges made by various roads. For example, the convention issue of the Street Railway Journal for October, 1906, on page 672, gives the rates for various classes of tickets charged in Ohio and adjoining states, and shows that the average single trip fare in this locality is upward of two cents per mile. It will also be observed, however, that other and lower rates are made on such roads for regular daily passengers down to about one cent per mile. These western roads sell forms of tickets and make rates corresponding in a variety of forms and variation of rates with the steam roads.

At the other extreme we find certain interurban roads charging one cent per mile, and the majority of such roads make this a uniform charge to all adults, and their character of travel approaches that of the ordinary street railway company.

Tables can be prepared, giving the rates charged by the various companies, but these are meaningless without knowing at the same time the conditions under which such roads are operating, and so we will seek to indicate the justification for these variations in fares.

The cost per car-mile of operation does not afford a direct measure of the rates that should be charged to passengers. The density of travel has a far greater influence on rates. The road must be built and furnish a service to suit the distribution and density of population and the fares that can be collected follow as a consequence of this environment. The cost per car-mile may not vary much between properties quite different in character, but it is the commercial and social habits of the people which determine the quantity and times of traveling as well as the percentage of the car-load (that is, passenger-miles divided by seat-miles) and thus the passenger rates are determined.

Cost of Service.

The seat-mile cost can be figured as shown for illustration in the following table which indicates also the effect on such cost of more frequent service:

Annual cost per mile of track	A	B	C
Headway (minutes)	60	30	15
Car-miles (plus extras)	15,000	30,000	60,000
Cost of operating	\$1,800	\$3,600	\$7,200
Interest and depreciation	2,700	8,600	4,500
	\$4,500	\$7,200	\$11,700
Cost per car-mile (cents)	30	24	20
Car seating capacity	40	40	40
Car seat-mile cost (cents)	75	6	5

The actual passenger rate per mile must be more than the car-seat cost as a minimum in proportion as the passenger-miles are less than the car-seat miles. If the passenger-load averages 40 per cent of the seating capacity then, on a 60-minute headway, the average cost would be 100/40 times 0.75 cents, or 1 3/4 cents per mile. This indicates how much rates might be decreased if full loads were constantly carried and why some roads can afford to make mileage rates less than other roads.

The distribution and occupations of the population along the line are the powerful elements affecting the percentage of load. Assume two roads, each 15 miles long; the first joining two cities of large size with little intermediate popu-

lation, and the second leaving a city and traversing a succession of villages growing smaller and terminating in a country hamlet. The first road may prosper on one cent per mile and the second starve on two cents even though operating the same number of cars with the same number of passengers to and from the principal terminal. In the first, the loads are carried through; in the second case, two-thirds of the load may be dropped within the first four miles. Assume a third case where a succession of towns of equal importance are traversed. The cars may load and unload several times in the course of the trip and this makes for an intermediate policy on rates.

Density of Travel.

To give some idea of the variation in density of travel on electric railways, the following figures are given.

Territory.	Passenger per mile.	Average fare.	Receipts per mile.
United Kingdom	939,658	2.26 cents	\$21,240
United States	333,862	3.76 "	12,553
Indiana	133,000	5.6 "	7,500

The above figures for the United States and Indiana include all electric railways; that is, both city and interurban. The density of travel on the Ohio interurbans is indicated in the following table, grouping them together according to principal terminal:

Principal terminal.	Its population.	Receipts per mile.
Cleveland	500,000	\$5,045
Columbus	200,000	3,829
Toledo	225,000	3,257
Dayton	90,000	3,137
Miscellaneous		3,542

Twenty-eight interurbans in this same section are classified in annual receipts as follows:

0	\$2,000	4	8	19
2,000	2,500	4		
2,500	3,000	7	11	
3,000	3,500	4		
3,500	4,000	1	4	9
4,000	4,500	3		
4,500	5,000	1	5	
5,000	up	4		
		28		

Most of these roads furnish hourly service so that by making some additions for limited and excursion cars, the receipts per car-mile can be calculated and, assuming the average rate to be 1.5 cents per mile, the number of passenger-miles and its relation to the car-seat mile capacity can be determined.

As indicating the variation in car-miles per mile of road, it may be stated that the elevated roads in New York operate 1,635,000 miles per mile of road, as against 15,000 or less for the ordinary interurban road in the Middle West, while the expenses per car-mile on the elevated are nine cents per mile, as compared with about 14 cents for the Middle West interurban.

The expenses per car-mile and per seat-mile for a known service are capable of calculation with mathematical precision, but the density of the traffic can only be learned by experience and this experience indicates how much the rates charged must be increased beyond the basic seat-mile cost.

Western Interurbans.

For the average conditions prevailing throughout the Middle West and other sections of medium density of population, a large amount of testimony is available to show that the basic single trip rate should be upwards of two cents per mile. If less is charged, not enough additional travel is secured to increase the gross receipts. If more is charged, travel is curtailed and the gross is reduced. In stating this it must be understood that mileage, commuter and other lower rates are granted and maintained at proper relation to the single trip rate.

The widest consensus of opinion on the subject is found in a resolution passed by the Ohio Interurban Railway Association on May 25, 1905. This association represented about two thousand miles of interurban roads and the matter was given earnest consideration in private discussion between the members and in the open meeting. The resolution reads:

Whereas: A demand for improved service on interurban roads has very largely increased the operating expenses of such roads, and many roads have met this demand; and, Whereas, in order to obtain their share of the business many other roads contemplate improving their service in like manner, and, Whereas, the prevailing low rate of fare on most interurban roads will not permit of such improvement in service, therefore, be it resolved, that the Ohio Interurban Railway Association recommend a uniform base rate of two cents per mile, and a minimum charge of 10 cents."

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

A. H. Royce, secretary and treasurer of the Canadian Street Railway Association, writes:

"Since the reduction to two cents a mile (by legislative act) the companies have done away with all commutation tickets and charge a flat rate of two cents a mile. We find that it is impossible to operate a road properly and keep up the rolling stock and equipment even at less rate.

In the other provinces of Canada, the rates of fare are regulated by agreements with the municipalities through which they operate. There is no legislation affecting these rates, and as a rule the charge is three cents a mile."

J. McM. Smith, general manager of the Southern Michigan Railway Company, writes:

"We started out a year or two ago on the rate basis of one and one-half and one and three-quarters cents per mile, but we found this to be entirely too low, and accordingly we made a uniform raise. It is my belief, based on long years of experience in this business, that a road must be exceptionally well located if it can be made profitable on a rate less than two cents per mile."

S. Hendrie, general manager of the Grand Rapids, Holland & Chicago Railway, writes:

"I am inclined to think that all our interurban passenger fares in Michigan are too low in view of the increase in the wages and in the cost of all materials which enter into the construction and operation of electric roads to-day. In 1894-96 I took franchises for a road on the average of one cent per passenger mile, but new steel then cost \$16 per ton, copper 13 cents per pound, number one standard ties, 35 cents each, common labor \$1.50 per day, etc. At that time, conductors and motormen were paid 17.5 cents per hour, and other labor in proportion. The same road could not be built to-day for twice its cost, and although the fixed charges are low, the present owners are not satisfied with its net earnings."

H. H. Polk, president of the Interurban Railway Company of Des Moines, Iowa, writes:

"The rates generally charged are as follows: 2 cents a mile for single trip tickets, 1.5 cents for round trip tickets, good for one day, 1.25 cents for mileage.

"(These mileage books are for any three people, and good until used).

"However, I am of the opinion that our round trip and mileage rates are too low, and we are seriously considering the raising of these rates. With the universal two cent fare now forced on the steam railroads by state legislatures, I am of the opinion that it will be rather up-hill work for interurbans to exist at the present rates."

C. N. Wilcoxon, general manager of the Cleveland & Southwestern Traction Company, writes:

"There are but very few roads in this state operating at less than two cents per mile, with the usual reduction for commuters' tickets, etc. The average rate obtained by the Ohio roads is approximately 1.65 cents per mile. To attempt to operate on a 1.25 cents per mile basis would mean bankruptcy to the interurban roads of this state."

H. A. Nicholl, of the Indiana Union Traction Co., writes: "Our single trip tickets are 1.5 cents per mile. This is as low a rate as I believe any electric road can carry passengers with a reasonable profit."

Eastern Interurbans.

From the average conditions prevailing in Massachusetts, New Jersey, some parts of Pennsylvania and other sections with considerable density of population, a large amount of testimony is available to show that the heavier travel, the more frequent trips, the shorter rides, and repeated loading and unloading in a trip, make profitable and advisable no variety of tickets but only a single adult rate."

M. C. Brush, vice-president of the Newton Street Railway Co., and associated companies, writes:

"I find upon careful investigation that on about 50 per cent of our lines our fares vary from 1 cent per mile to 1.5 cents per mile. On the remaining 50 per cent it varies from 0.4 to 0.9 of a cent per mile. The average New England street railway manager does not believe that under present operating conditions it is possible to carry a patron more than five or six miles for 5 cents. That is, I think you will find that the average New England manager believes that one cent per mile is a fair charge in this territory."

Note.—The Massachusetts law requires half rate for school tickets.

F. L. Fuller, vice-president and general manager of the New York & Queens County Railway Co., writes:

"The rates on Long Island are one cent per mile collected in five cent zones."

F. W. Bacon, general manager of the New Jersey & Hudson River Railway & Ferry Co., writes:—

"I do not think the rates in New Jersey on interurban roads are in excess of 1.25 cents per mile and our average rate is 1.15 cents per mile, but we do not issue commutation tickets

or other forms at any cheaper rates and only make 25 per cent reduction on school tickets."

Californian Interurbans.

The extremes on rates seem to exist in California. A. D. Schindler, general manager Northern Electric Railway, of Chico, California, makes most interesting statements. His line, in the Sacramento Valley, has steam railroad conditions, and charges three cents per mile, and his patrons are well satisfied. In the southern part of the state, business is done mostly on round trip tickets at 0.6 of a cent per mile. He states:

"It is a curious fact that in the southern territory where existing rates are already extremely low, there is a strong movement toward a further reduction of rates; while here where the highest rates exist, the public is generally well satisfied."

The above quotations are taken from letters on the subject of "Rates" addressed to our secretary, Professor Swenson, to whom I am much indebted for this and some statistical information.

Examination shows a clear distinction in conditions and practice between the two and one cent rates per mile.

The one cent rate applies to conditions approaching those of the city railway, five cent zones, no tickets, a succession of towns, with contiguous population limits.

The two cent rate applies to cities and towns considerably separated, where passengers may travel, 25, 50, 100 or 200 miles, and this rate applies to occasional travelers on single trip or interline tickets. Tickets are also sold and gradations of adult rates for commuter and school travel are made down to one cent per mile. For interurbans of this character, we will describe the kind of tickets sold.

Kind of Tickets.

1. The single trip ticket (good between specified points for an adult) is the basis of maximum charge on each interurban line. Occasionally, a higher rate is charged for fare paid on the cars, but this practice is diminishing, because it entails a greater variety of fares and discriminates against the farm community boarding the cars where ticket offices cannot be maintained, and this farm community is often the most important class of customers for the road. To increase the sale of tickets in order that cash may be taken at the offices and not by conductors, it has been proposed to charge higher cash fares on the cars and give receipts with a redeemable value to any ticket office the same as some steam railroads do, but this is impracticable for interurban conditions and in one case only to my knowledge has been adopted.

2. The round trip ticket good for an adult, is the most common form of ticket, in fact is sold by some roads where single trip tickets are not sold, and is ordinarily sold at a 10 per cent reduction over double the single trip rate. In a few cases the reduction is 20 per cent.

3. Interline tickets are those sold by one road for transportation over its own line and one or more connecting lines, usually not more than three. Such a ticket, when sold for a round trip, may be nearly a yard long and practically correspond in form and appearance to the familiar steam railroad ticket. The interurbans of the Central West sell large numbers of these tickets and they are essential in competition with the steam railroads.

4. Mileage books, so-called, are sold at 16 2/3 per cent to 33 1/3 per cent reduction from the base rate. If such books are good, for a specified number of miles, 500 or 1,000, then the conductor must carry a sheet of mileage distances between points and detach coupons accordingly. The reservation is commonly made that no less than five coupons shall be detached. Since the rates per mile charged on different roads and often on various sections of the same road vary for franchise or other reasons, it has therefore been found expedient to issue "Mileage Books" not for a specified number of miles but containing a certain number of five cent coupons. This avoids the necessity of conductors carrying mileage cards, permits detaching coupons of a face value equal to the single trip ticket; reduces the complexity of accounting and in general is practical where mileage coupons are impracticable. Properly these are called Coupon Ticket Books and if good on one road "Local;" if good on a group of roads, "interchangeable;" but we continue to speak of them in common parlance, as "Mileage Books." Such interchangeable books issued by certain members of the Central Electric Railway Association contain 240 five-cent coupons, face value \$12, sold at a net price of \$10. These books are good for use over some thirty-seven railways and their underlying companies all operating several thousand miles of track. This book is good for one person only, usable within one year and not less than two five-cent coupons are detached for any ride, no matter how short. Each individual company is free to issue, also, mileage books good over its own line under such conditions as it may see fit. In some cases

INTERURBAN FARES.*

BY THEODORE STEBBINS, NEW YORK, N. Y.

The subject of interurban fares is one of immediate interest because matters connected with the transportation of persons and property by railroads have been the subject of very active and even violent popular discussion. The state legislatures have been taking blind actions and state executives have been advocating and adopting arbitrary measures with the railroads. Twenty state legislatures have passed restrictive legislation on passenger rates, and fourteen states now limit passenger rates to two cents a mile. In this situation, it is important to understand the position of the interurban railway.

All interurbans are anxious to serve the public and to earn reasonable dividends for stockholders. It is not so clear, however, how rates shall be adjusted to satisfy these ends. It is customary to measure the service and its cost on the basis of cents per passenger-mile. The charges range from three cents per mile in unsettled sections down to half a cent per mile for commuters, in thickly settled districts, who use the cars twice each working day, or where excursions are handled in bulk. The ordinary range of fare, however, is between two cents and one cent per mile. We find the two cents per mile charge prevailing in the Middle West, and the one cent rate common in thickly settled districts, mostly in the East. Tables have been published showing the charges made by various roads. For example, the convention issue of the Street Railway Journal for October, 1906, on page 672, gives the rates for various classes of tickets charged in Ohio and adjoining states, and shows that the average single trip fare in this locality is upward of two cents per mile. It will also be observed, however, that other and lower rates are made on such roads for regular daily passengers down to about one cent per mile. These western roads sell forms of tickets and make rates corresponding in a variety of forms and variation of rates with the steam roads.

At the other extreme we find certain interurban roads charging one cent per mile, and the majority of such roads make this a uniform charge to all adults, and their character of travel approaches that of the ordinary street railway company.

Tables can be prepared, giving the rates charged by the various companies, but these are meaningless without knowing at the same time the conditions under which such roads are operating, and so we will seek to indicate the justification for these variations in fares.

The cost per car-mile of operation does not afford a direct measure of the rates that should be charged to passengers. The density of travel has a far greater influence on rates. The road must be built and furnish a service to suit the distribution and density of population and the fares that can be collected follow as a consequence of this environment. The cost per car-mile may not vary much between properties quite different in character, but it is the commercial and social habits of the people which determine the quantity and times of traveling as well as the percentage of the car-load (that is, passenger-miles divided by seat-miles) and thus the passenger rates are determined.

Cost of Service.

The seat-mile cost can be figured as shown for illustration in the following table which indicates also the effect on such cost of more frequent service:

Annual cost per mile of track	A	B	C
Headway (minutes)	60	30	15
Car-miles (plus extras)	15,000	30,000	60,000
Cost of operating	\$1,800	\$3,600	\$7,200
Interest and depreciation	2,700	3,600	4,500
	\$4,500	\$7,200	\$11,700
Cost per car-mile (cents)	30	24	20
Car seating capacity	40	40	40
Car seat mile cost (cents)	75	6	5

The actual passenger rate per mile must be more than the car-seat cost as a minimum in proportion as the passenger-miles are less than the car-seat miles. If the passenger-load averages 40 per cent of the seating capacity then, on a 60-minute headway, the average cost would be 100/40 times 0.75 cents, or 1 3/4 cents per mile. This indicates how much rates might be decreased if full loads were constantly carried and why some roads can afford to make mileage rates less than other roads.

The distribution and occupations of the population along the line are the powerful elements affecting the percentage of load. Assume two roads, each 15 miles long; the first joining two cities of large size with little intermediate popu-

lation, and the second leaving a city and traversing a succession of villages growing smaller and terminating in a country hamlet. The first road may prosper on one cent per mile and the second starve on two cents even though operating the same number of cars with the same number of passengers to and from the principal terminal. In the first, the loads are carried through; in the second case, two-thirds of the load may be dropped within the first four miles. Assume a third case where a succession of towns of equal importance are traversed. The cars may load and unload several times in the course of the trip and this makes for an intermediate policy on rates.

Density of Travel.

To give some idea of the variation in density of travel on electric railways, the following figures are given.

Territory.	Passenger per mile.	Average fare.	Receipts per mile.
United Kingdom	939,658	2.26 cents	\$21,240
United States	333,862	3.76 "	12,553
Indiana	133,000	5.6 "	7,590

The above figures for the United States and Indiana include all electric railways; that is, both city and interurban. The density of travel on the Ohio interurbans is indicated in the following table, grouping them together according to principal terminal:

Principal terminal.	Its population.	Receipts per mile.
Cleveland	500,000	\$5,045
Columbus	200,000	3,829
Toledo	225,000	3,257
Dayton	90,000	3,137
Miscellaneous .....	.....	3,542

Twenty-eight interurbans in this same section are classified in annual receipts as follows:

0	\$2,000	4	8	19
2,000	2,500	4		
2,500	3,000	7	11	9
3,000	3,500	4		
3,500	4,000	1	4	5
4,000	4,500	3		
4,500	5,000	1	5	9
5,000	up	4		
28				

Most of these roads furnish hourly service so that by making some additions for limited and excursion cars, the receipts per car-mile can be calculated and, assuming the average rate to be 1.5 cents per mile, the number of passenger-miles and its relation to the car-seat mile capacity can be determined.

As indicating the variation in car-miles per mile of road, it may be stated that the elevated roads in New York operate 1,635,000 miles per mile of road, as against 15,000 or less for the ordinary interurban road in the Middle West, while the expenses per car-mile on the elevated are nine cents per mile, as compared with about 14 cents for the Middle West interurban.

The expenses per car-mile and per seat-mile for a known service are capable of calculation with mathematical precision, but the density of the traffic can only be learned by experience and this experience indicates how much the rates charged must be increased beyond the basic seat-mile cost.

Western Interurbans.

For the average conditions prevailing throughout the Middle West and other sections of medium density of population, a large amount of testimony is available to show that the basic single trip rate should be upwards of two cents per mile. If less is charged, not enough additional travel is secured to increase the gross receipts. If more is charged, travel is curtailed and the gross is reduced. In stating this it must be understood that mileage, commuter and other lower rates are granted and maintained at proper relation to the single trip rate.

The widest consensus of opinion on the subject is found in a resolution passed by the Ohio Interurban Railway Association on May 25, 1905. This association represented about two thousand miles of interurban roads and the matter was given earnest consideration in private discussion between the members and in the open meeting. The resolution reads:

Whereas: A demand for improved service on interurban roads has very largely increased the operating expenses of such roads, and many roads have met this demand; and, Whereas, in order to obtain their share of the business many other roads contemplate improving their service in like manner, and, Whereas, the prevailing low rate of fare on most interurban roads will not permit of such improvement in service, therefore, be it resolved, that the Ohio Interurban Railway Association recommend a uniform base rate of two cents per mile, and a minimum charge of 10 cents."

*Presented before the American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

A. H. Royce, secretary and treasurer of the Canadian Street Railway Association, writes:

"Since the reduction to two cents a mile (by legislative act) the companies have done away with all commutation tickets and charge a flat rate of two cents a mile. We find that it is impossible to operate a road properly and keep up the rolling stock and equipment even at less rate.

In the other provinces of Canada, the rates of fare are regulated by agreements with the municipalities through which they operate. There is no legislation affecting these rates, and as a rule the charge is three cents a mile."

J. McM. Smith, general manager of the Southern Michigan Railway Company, writes:

"We started out a year or two ago on the rate basis of one and one-half and one and three-quarters cents per mile, but we found this to be entirely too low, and accordingly we made a uniform raise. It is my belief, based on long years of experience in this business, that a road must be exceptionally well located if it can be made profitable on a rate less than two cents per mile."

S. Hendrie, general manager of the Grand Rapids, Holland & Chicago Railway, writes:

"I am inclined to think that all our interurban passenger fares in Michigan are too low in view of the increase in the wages and in the cost of all materials which enter into the construction and operation of electric roads to-day. In 1894-96 I took franchises for a road on the average of one cent per passenger mile, but new steel then cost \$16 per ton, copper 13 cents per pound, number one standard ties, 35 cents each, common labor \$1.50 per day, etc. At that time, conductors and motormen were paid 17.5 cents per hour, and other labor in proportion. The same road could not be built to-day for twice its cost, and although the fixed charges are low, the present owners are not satisfied with its net earnings."

H. H. Polk, president of the Interurban Railway Company of Des Moines, Iowa, writes:

"The rates generally charged are as follows: 2 cents a mile for single trip tickets. 1.5 cents for round trip tickets, good for one day. 1.25 cents for mileage.

"(These mileage books are for any three people, and good until used).

"However, I am of the opinion that our round trip and mileage rates are too low, and we are seriously considering the raising of these rates. With the universal two cent fare now forced on the steam railroads by state legislatures, I am of the opinion that it will be rather up-hill work for interurbans to exist at the present rates."

C. N. Wilcoxon, general manager of the Cleveland & Southwestern Traction Company, writes:

"There are but very few roads in this state operating at less than two cents per mile, with the usual reduction for commuters' tickets, etc. The average rate obtained by the Ohio roads is approximately 1.65 cents per mile. To attempt to operate on a 1.25 cents per mile basis would mean bankruptcy to the interurban roads of this state."

H. A. Nicholl, of the Indiana Union Traction Co., writes: "Our single trip tickets are 1.5 cents per mile. This is as low a rate as I believe any electric road can carry passengers with a reasonable profit."

Eastern Interurbans.

From the average conditions prevailing in Massachusetts, New Jersey, some parts of Pennsylvania and other sections with considerable density of population, a large amount of testimony is available to show that the heavier travel, the more frequent trips, the shorter rides, and repeated loading and unloading in a trip, make profitable and advisable no variety of tickets but only a single adult rate."

M. C. Brush, vice-president of the Newton Street Railway Co., and associated companies, writes:

"I find upon careful investigation that on about 50 per cent of our lines our fares vary from 1 cent per mile to 1.5 cents per mile. On the remaining 50 per cent it varies from 0.4 to 0.9 of a cent per mile. The average New England street railway manager does not believe that under present operating conditions it is possible to carry a patron more than five or six miles for 5 cents. That is, I think you will find that the average New England manager believes that one cent per mile is a fair charge in this territory."

Note.—The Massachusetts law requires half rate for school tickets.

F. L. Fuller, vice-president and general manager of the New York & Queens County Railway Co., writes:

"The rates on Long Island are one cent per mile collected in five cent zones."

F. W. Bacon, general manager of the New Jersey & Hudson River Railway & Ferry Co., writes:—

"I do not think the rates in New Jersey on interurban roads are in excess of 1.25 cents per mile and our average rate is 1.15 cents per mile, but we do not issue commutation tickets

or other forms at any cheaper rates and only make 25 per cent reduction on school tickets."

Californian Interurbans.

The extremes on rates seem to exist in California. A. D. Schindler, general manager Northern Electric Railway, of Chico, California, makes most interesting statements. His line, in the Sacramento Valley, has steam railroad conditions, and charges three cents per mile, and his patrons are well satisfied. In the southern part of the state, business is done mostly on round trip tickets at 0.6 of a cent per mile. He states:

"It is a curious fact that in the southern territory where existing rates are already extremely low, there is a strong movement toward a further reduction of rates; while here where the highest rates exist, the public is generally well satisfied."

The above quotations are taken from letters on the subject of "Rates" addressed to our secretary, Professor Swenson, to whom I am much indebted for this and some statistical information.

Examination shows a clear distinction in conditions and practice between the two and one cent rates per mile.

The one cent rate applies to conditions approaching those of the city railway, five cent zones, no tickets, a succession of towns, with contiguous population limits.

The two cent rate applies to cities and towns considerably separated, where passengers may travel, 25, 50, 100 or 200 miles, and this rate applies to occasional travelers on single trip or interline tickets. Tickets are also sold and gradations of adult rates for commuter and school travel are made down to one cent per mile. For interurbans of this character, we will describe the kind of tickets sold.

Kind of Tickets.

1. The single trip ticket (good between specified points for an adult) is the basis of maximum charge on each interurban line. Occasionally, a higher rate is charged for fare paid on the cars, but this practice is diminishing, because it entails a greater variety of fares and discriminates against the farm community boarding the cars where ticket offices cannot be maintained, and this farm community is often the most important class of customers for the road. To increase the sale of tickets in order that cash may be taken at the offices and not by conductors, it has been proposed to charge higher cash fares on the cars and give receipts with a redeemable value to any ticket office the same as some steam railroads do, but this is impracticable for interurban conditions and in one case only to my knowledge has been adopted.

2. The round trip ticket good for an adult, is the most common form of ticket, in fact is sold by some roads where single trip tickets are not sold, and is ordinarily sold at a 10 per cent reduction over double the single trip rate. In a few cases the reduction is 20 per cent.

3. Interline tickets are those sold by one road for transportation over its own line and one or more connecting lines, usually not more than three. Such a ticket, when sold for a round trip, may be nearly a yard long and practically correspond in form and appearance to the familiar steam railroad ticket. The interurbans of the Central West sell large numbers of these tickets and they are essential in competition with the steam railroads.

4. Mileage books, so-called, are sold at 16 2/3 per cent to 33 1/3 per cent reduction from the base rate. If such books are good, for a specified number of miles, 500 or 1,000, then the conductor must carry a sheet of mileage distances between points and detach coupons accordingly. The reservation is commonly made that no less than five coupons shall be detached. Since the rates per mile charged on different roads and often on various sections of the same road vary for franchise or other reasons, it has therefore been found expedient to issue "Mileage Books" not for a specified number of miles but containing a certain number of five cent coupons. This avoids the necessity of conductors carrying mileage cards, permits detaching coupons of a face value equal to the single trip ticket; reduces the complexity of accounting and in general is practical where mileage coupons are impracticable. Properly these are called Coupon Ticket Books and if good on one road "Local;" if good on a group of roads, "interchangeable;" but we continue to speak of them in common parlance, as "Mileage Books." Such interchangeable books issued by certain members of the Central Electric Railway Association contain 240 five-cent coupons, face value \$12, sold at a net price of \$10. These books are good for use over some thirty-seven railways and their underlying companies all operating several thousand miles of track. This book is good for one person only, usable within one year and not less than two five-cent coupons are detached for any ride, no matter how short. Each individual company is free to issue, also, mileage books good over its own line under such conditions as it may see fit. In some cases

these are good for use without restriction as to name and number of persons and at a slightly lower rate.

5. Commuter books are also sold, good commonly only for either thirty days or a calendar month, and containing forty, fifty or sixty rides, each book limited to one name. Such books are not in as common use now as the writer believes they will be in the future, as they form a means of building up a steady suburban travel, the same as steam roads operate so profitably out of our large cities and without interfering with higher charges for occasional travelers.

6. Book tickets are sold for ten, twenty, thirty, forty, fifty, or one hundred rides with or without limitation as to name or family, or length of use and on some roads serve the same purpose as commuter books.

7. Excursion tickets are sold by almost all roads for special occasions, usually limited to one day and issued for summer riding to parks, church picnics, political meetings, city shopping, and a great variety of purposes.

8. Half rate tickets are sold for single and round trips of children from five to twelve years of age.

9. Party tickets are sold for a specified number of persons traveling together between specified points within a time limit.

10. Special car-load rates are made for excursions at the lowest rates. The car is permitted to carry a full seated load and usually a limited additional number of standing persons.

Twenty-six interurbans in Ohio, Indiana and Michigan are reported to sell these kinds:—

Tickets.	No. of Companies.
Single trip	24
Round trip	24
Commutation (individual)	13
Commutation (family)	11
School tickets	14
Mileage books	10
Interchangeable coupons	15
Sunday	7
Week-end	4
Not selling tickets	2

All the above and many more forms of paid transportation are used in the development of the interurban business. The writer, on undertaking the management of an interurban system, found in use tickets of as many as 400 kinds; that is, differing in form and points between which they were usable.

Gradation of Rates.

The gradation of price between these various forms of tickets must follow a consistent sequence in order that each ticket may find its proper use. To illustrate: If the mileage book price is less than the commuter rate there would be no sale for commuter books. The gradation is commonly something like this: Assume the base rate for a single trip ticket is two cents per mile, round trip ticket will be 10 per cent off, or 1 8-10 cents; the interline single trip ticket will be the sum of the single trip rates of the connecting roads and the interline round trip ticket will likewise be the sum of the round trip rates of the connecting roads, or less if there is a competitive route; the mileage book will be 16 2/3 per cent off or 1 2/3 cents per mile net; the commuter book ticket rates will be about 1.25 cents; the school rate will be one cent and the excursion rate and party rate will vary from 0.5 cents to 1.5 cents, according to distance, size of excursion and other conditions. This gives a general idea of the consistent relationship between these various rates, but, of course, there are considerable departures from this practice in individual cases.

The average gradation of rates in cents per mile, in three western states is shown in figures as follows:—

	Ohio		Michigan		Indiana	
	Issued by.		Issued by.		Issued by.	
Cash fare	1.84	23	1.58	5	1.68	8
Single trips	1.77	17	1.48	4	1.68	6
Round trip	1.63	20	1.34	4	1.45	6
Commuters (family)	1.45	12	1.10	2	1.23	3
Commuters (individual)	1.09	17	1.00	2	1.20	5
Mileage	1.37	6	1.25	1	1.22	2
Interline coupons	1.48	10	1.30	1	1.67	1
School	1.03	12	0.87	2	0.94	4

The Establishment of Rates.

C. L. S. Tingley, Vice-President of the American Railways Company, speaking of Pennsylvania conditions states:—

"The whole thing is a matter of ordinance regulation and not a question of scientific rate making."

This is true for many roads elsewhere.

For the short interurban, with the dense traffic, five cent zones and no tickets are clearly indicated.

For the long interurban, experience has clearly indicated the expediency of a mileage basis of charge with tickets and a gradation of rates for different classes of travel. The western interurban connection with other interurbans and having steam or electric competitors will need (a) cash receipts for use on the car, (b) single and round trip tickets; (c) interline single and round trip tickets; (d) interchangeable coupon

books; (e) commuter or book tickets; (f) school tickets; and (g) excursion tickets. A consistent relation in rates for each kind of ticket has been specified in the preceding sections.

The interline tickets and interchangeable coupon books are required for steam competitors. The commuters tickets are required to build up a travel of wage earners working in one place and living in another. Excursion tickets are required for those who might not otherwise ride, and school tickets are ordinarily an unprofitable concession to education.

The profit from traffic should not be estimated too narrowly on a cents per passenger-mile basis. If a car receives all its load at the terminal and does not pick up passengers along the way, the space taken by the passengers is worth as much whether he rides all or part of the trip; or to make specific application, commuter rates should be determined more by what the passenger can afford from his daily wage and by seat-trip cost than by mileage rates.

Excursion rates and car-load rates are subject to the greatest variation and the cost of such business may be figured progressively lower as one in turn omits interest, depreciation, general expense, track maintenance and other items that are not affected sensibly by the operation of an additional car over the road. If platform wages, power and car repairs are figured as the only cost of the additional service, very low mileage rates may be made. Such reduction of excursion rates is justified within limits to the extent upon which the largest annual receipts may be secured.

A company may make money on excursions at half a cent a mile where it is losing on regular travel at two cents a mile. For the same reason, commuter travel at a cent may be a desirable addition to the business where general travel will hardly yield a profit at a cent and a half. By commuters we mean those persons traveling back and forth between work and home every working day. The lower rate enables certain people to take employment in the city when they could not afford to pay fares at full rates out of their daily wage, and enables workmen in the city to move to the country when otherwise they would locate along some city line reached by a five cent fare.

Roads differ greatly in regard to the possibilities of commuter travel. On some a large feature can be made of this business; on others, it is not worth while to even put the books on sale. In conclusion, we may state the rate which may be profitable for one road may be unprofitable for another and, in each case, the distribution of the population along the road and the character of the travel must be studied carefully to determine the rates charged. The heavier the travel and the more miscellaneous its character, the greater reason for making a uniform and low rate for all classes of travel. On the other hand, the less the density of the population, the greater reason for making an initial single trip high rate for the occasional traveler and creating in addition, a large regular travel by other forms of lower rate tickets.

In conclusion we may state, that before attempting to fix rates, the first thing is to study the density of the population along the line, and its location, to estimate how much will be through travel, how much short ride travel out of the terminals, how much loading and reloading of passengers will occur in the course of the trip, what pleasure resorts exist, or may be built up, what commuter travel will be created, that is, working people in the city drawn into the country to live, and country people secure employment in the city, and all of these and other elements are more vital in determining the rates of fare than the car-mile cost, trip-seat cost, or the seat-mile cost. In fact, the character of the travel should determine the kind of road built, and the choice of rolling stock. After a study of all the conditions a determination must be made of various kinds of tickets to be sold and the gradation of rates between them.

Ticket offices should be established wherever ticket sales will justify it, and in the Middle West, about 60 per cent of receipts are collected through such offices. Reasonable care will insure that such receipts reach the treasury of the company. Tickets have the advantage of keeping money out of the conductors' hands, but, as a considerable amount will be collected by the conductors, it is of vast importance to secure a proper account of it.

Large sums remain to be collected by the conductors on the cars from passengers boarding them where ticket offices cannot be maintained, and from passengers failing to buy tickets where they are sold. Every safeguard should be provided in order to check fully the work of the conductors.

The cash fare receipts issued on the cars should show at least from what point to what point fare is paid and the auditor's stub must give corresponding information. The tickets and stubs turned in by the conductor will then show how many passengers should be in the car at each point along its trip. An actual count of passengers at one or more points thus affords an exact check on the conductor's returns.

Among the Exhibits

One of the sources of annoyance to operating officials of railways on which the modern headlights are used is the matter of properly adjusting the reflector so that the greatest intensity of light may be reflected at a point on the tracks where it will be the greatest aid in detecting obstructions. To make this question less difficult the United States Headlight Company, for whom the Adams & Westlake Company of Chicago, is sole agent, has recently perfected a headlight adjustable holder that is attracting a good deal of favorable attention. The device is practical for hanging arc headlights on the dash of street or interurban cars and allows the motorman to direct the light's rays to the right or left as the occasion may demand.

In addition to the steel trolley poles, manufactured by it, the Pittsburg Pole and Forge Company, Pittsburg, Pa., exhibited at the convention blue prints of high tension steel insulator pins, brackets and brake arms. This company also handles a complete line of rail benders.

Many street railway men thought it a joke that they could heat an operating street car 24 hours for 10 cents, but after calling at the booth of the Cooper Heater Company, of Dayton, O., their prejudices gave way to conviction. This company is willing to place sample heaters on any sized car without charge and demonstrate that a dime's worth of fuel will do as stated.

At the booth of the Lumen Bearing Company, of Buffalo, N. Y., the company's Ideal trolley wheel attracted a good deal of attention during the convention. The Ideal wheel is now being made for the first time in the six-inch size. Heretofore only the four-inch wheel has been made, but it was found desirable to double the capacity of the manufacturing plant and make the larger sized wheel. The company also had on exhibition a truck-bearing with an oil pocket which collects the oil and distributes it against the lower edge of the bearing. A model box showing the oil pressure on this bearing, which is sufficient to force the oil through a hole to the top of the bearing, was on exhibition. The booth was in charge of E. P. Sharp and C. W. Stimpson.

Among the recent installations of Mason safety treads are the following: New York City Railway, 600 square feet on the Williamsburg bridge; American Car & Foundry Company, St. Louis, steps and thresholds of 90 cars; Delaware, Lackawanna & Western, shops at Scranton, the ferry houses at New York City and Newark, the Hoboken terminals of the Hudson Companies, the union station of the Maine Central at Bangor, Me. In addition to the above the new Washington tunnel at Boston is being equipped throughout with Mason Safety Tread carborundum-filled and steel base. Most of the latter is being installed in concrete.

F. M. Root, of Kalamazoo, says that "when they don't knock but all root for the Root scraper," then it looks good to him. He is enthusiastic with regard to this Atlantic City convention.

The R. D. Nuttall Company showed a full line of samples of metal gears, pinions and trolleys. The products of this company are well known everywhere so that a lengthy description is entirely uncalled for. It may be interesting, however, to refer to the fact that the gear business developed by the Nuttall Company dates back to the early days of electric traction. Nuttall gears early gained recognition as standard and have maintained a foremost position ever since. Its

establishment for gear cutting is believed to be the largest in the world. Nuttall gears are constructed on scientific principles and have a reputation for extremely long life under the most severe conditions, being made of the highest grade of cast steel, of high tensile strength and elastic limit. The Nuttall Company originated pinions made from the hammered billet. The company has Nuttall sleet wheels or Nuttall sleet scrapers. Nuttall trolley wheels are made in 30 different designs. Another branch which has been developed to a most complete degree is that of providing trolley repair parts. The Nuttall exhibit is represented by F. A. Estep, president, and Milton Rupert, works manager.

LOST: H. C. Houck, of the General Electric Company, at Cincinnati, has lost a small gold locket bearing the monogram "H. C. H." He will appreciate it if the finder will communicate with him at Cincinnati.

One of the very neat and attractive exhibits at the convention is that of Pratt & Lambert of Buffalo. The visitor at this booth finds comfortable chairs in which to rest, and those cross sections of roots of California redwood trees finished in varnish and highly polished are truly ornamental.

The Rail Joint Company, of New York, in its large, handsome booth showed the various types of rail joints. This company's exhibits always attract attention at conventions, but there seemed to be more interest taken in the exhibit this year than ever before. This is probably owing to the fact that traction managers are more fully recognizing the importance of the rail joint subject. The company is represented by B. M. Barr, Wm. A. Chapman, H. C. Holloway, Geo. W. Smith, G. M. Hagar.

As usual the Sherwin-Williams Company, manufacturers of paints and varnish of all kinds have a very attractive exhibit. The fence or railing of this booth as well as the display racks, all of the mission style, are of the knock down kind and this booth can be prepared for the convention almost as easily and readily as the savage could pitch his tent for the night. This year an insulating varnish display is added to general exhibit of car body finishes for interior and exterior finishes.

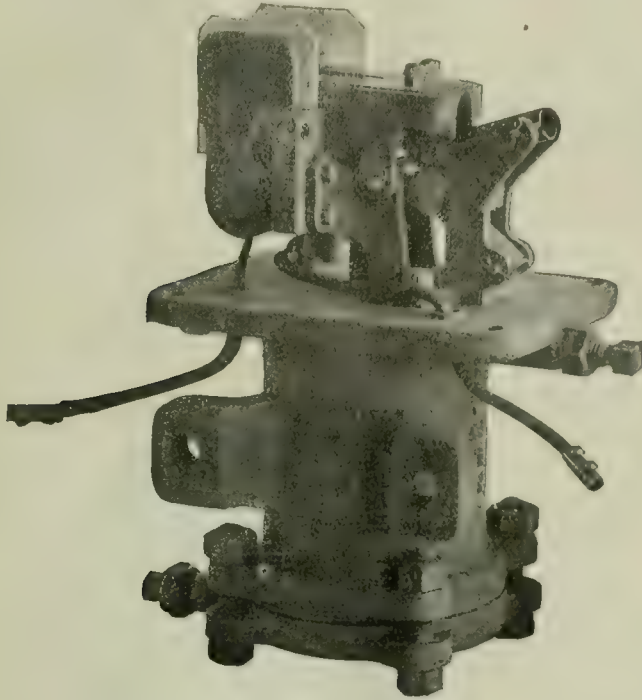
The Kinnear Manufacturing Company is exhibiting a full sized car barn steel rolling door which can be operated at will either by motor or hand. The operation is effected by means of an operating box placed at either side of the door. The operating crank is located in the box. The regular chain hoist door is also an exhibit. Many car houses are equipped with these doors and they are well known by most of the visiting delegates.

The various departments of the Electric Service Supplies Company of Philadelphia, Chicago and Keokuk were well represented at Atlantic City. The attractive exhibit of this company included the following: Protected rail bonds, Keystone overhead insulation, Lyon sheet steel gear cases automotoneers, Garton-Daniels lightning arresters. International cash registers, Locke high tension insulators, Keystone vestibule shades, Nuttall trolley bases, Keystone telephones, Philadelphia fenders, Knutson trolley retrievers, Helios arc lamps, Imperial headlights, National trolley guard. The company was represented by Charles J. Mayer, J. W. Porter, A. H. Englund, J. V. E. Titus, M. A. Berg, E. R. Mason, Ernst Boehme, H. G. Lewis, John McSorley, F. C. Peck, T. F. McKenna, W. A. Armstrong, F. B. Massey, Edward Hammett, Vincent Rhea, George Watts, H. R. Swartley, E. B. Ross, C. B. Harvey, G. C. Hart, C. H. Bristol, W. D. Hamer.

ALLIS-CHALMERS TYPE OB PNEUMATIC GOVERNOR.

It is recognized that the reliable operation of an air-brake equipment depends largely upon the governor, which, by automatically controlling the compressor, maintains the supply of air at any pressure required. After entering upon the manufacture of complete air-brake equipments under the Christensen patents the Allis-Chalmers Company directed its engineers to design a governor which would overcome the objectionable features experienced heretofore. How well they succeeded may be shown in a reference to the first trial which this apparatus sustained outside of the company's own works.

Prior to the placing of a very large order it was given an exhaustive test by the engineering department of the Manhattan Elevated Railway, New York City, in a series of 284,000 continuous operations, breaking a current of 35 to 40 amperes, at 600 volts, without any attention whatever during the period of the test, which would be equivalent to about two and one-half years' service under ordinary conditions.



Allis-Chalmers Type OB Pneumatic Governor With Insulating Block Removed.

One of the chief merits of this device is the simplicity of design. There are no small ports, slides or check valves, such as have ever been a source of trouble in the ordinary automatic governor. It is also very positive in its operation. For example, the switch arm, engaged by the pressure piston is held in contact by our special spring device until the instant of the quick "snap" break, and this, together with a powerful magnetic blow-out made in accordance with the latest designs, prevents sparking or burning of contacts and consequent pitting.

The type OB governor is light, compact and substantial; suited to severe continuous service. Its merits may be better understood from a careful reading of the following detailed description.

Construction and Operation.

A sectional view of the type OB governor is shown herewith. The main body (1) contains a compression spring (4) and piston (3) upon which the air pressure acts. The cap (2) is machined to receive and secure the diaphragm (5); it is bolted to the main body and tapped for pipe to connect to the main reservoir. The cap is so arranged that pipe connections may be brought from any side to the governor, which is in direct communication with the main reservoir.

The diaphragm is made of pure rubber, specially prepared, insuring long life and flexibility and avoiding the leaks that so commonly occur where piston packing rings or leather gaskets are used. The piston and rod are made of steel. The compression spring, which is enclosed within the main body and well protected against tampering, acts upon

the piston. The pressure is varied by adjustment of screws (7) acting upon the spring washer (6) whereby the spring may be compressed or relieved to suit requirements. The piston rod end is so shaped as to engage with a trip hammer, (8) and moves this over the center position past the pivot point (9). When the pressure in the cap chamber above the diaphragm increases, the piston is forced downward, compressing the spring.

The hammer being forced by the piston rod past the dead center, and aided by a spring (13) in housing (11) delivers a sharp blow to the yoke, carrying the contact blades (16) through which the current is opened and closed, which are made of bronze metal and well insulated against short circuit or ground. The copper tips (14) are quickly separated and the arc completely extinguished by the powerful magnetic field. These contact tips are of liberal area, presenting large radiating surface. A separating shield prevents the arc jumping across when the circuit is broken.

As the air pressure is reduced, the compressed spring at once commences to return to its former position; the piston rod again comes in contact with the trip hammer and



Insulating Block.

reverses the movement of the latter; the yoke being carried over the center line of pivot point by the hammer, returns with a snap, aided by springs and closes the circuit. This quick return is important, as it prevents arcing and gives a wiping effect to the contact tips. The yoke is firmly held in either position by the tension spring and, in addition, is securely locked by the trip hammer.

The quick brake mechanism is mounted upon a substantial brass frame (12) and securely fastened to the main body (1). The blow-out coil (16) and chute (20) are mounted upon an insulating block (19) which in turn, is attached to the frame.

The small tension springs are protected by brass tubing, and are interchangeable, without affecting the accelerating action of the mechanism.

The electric terminals (22) are brought out through the governor body and are well insulated by means of insulating bushings. They may be connected to either side of the line.

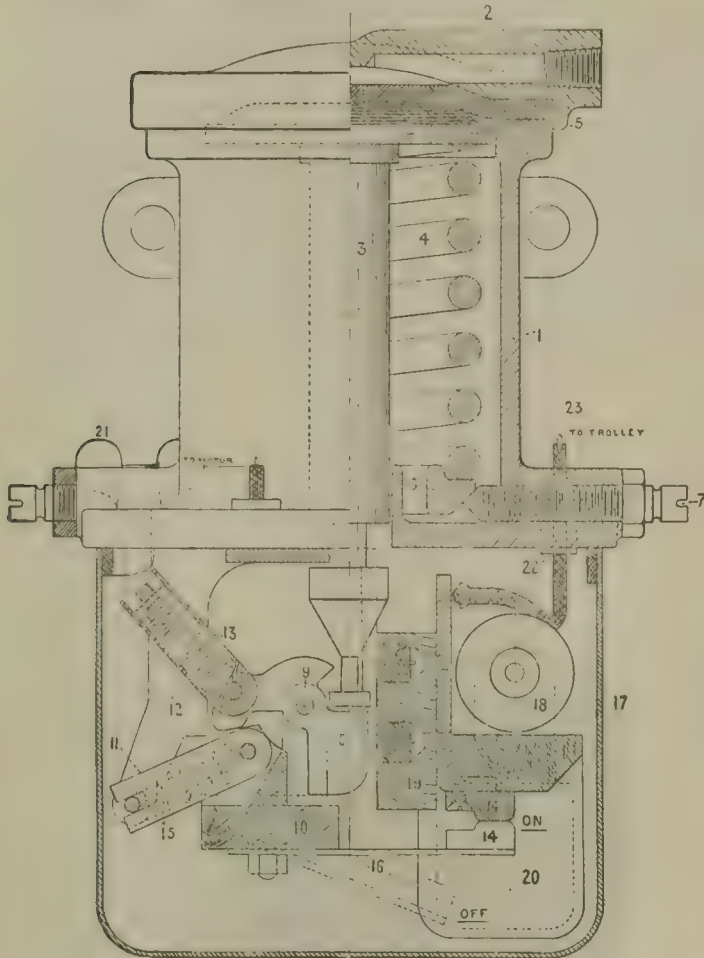
All pins and moving parts are made of hard brass, thus preventing corrosion. No lubrication to moving parts is necessary. The mechanism is protected against dust and water by a neat, light and strong cover, easily removable, which permits free access to the moving parts.

The governor may be set between the pressure of 65 and 95 pounds with an operating margin of 10 pounds. For example, the governor can be adjusted to cut out at 85 pounds pressure, and it will automatically cut in and start the compressor when the pressure drops to 75 pounds.

Care should be exercised in connecting the governor to

the air reservoir. The piping must be carried directly from reservoir and insulation coupling inserted in the line.

The governor will operate successfully in any position,



Sectional View of Allis-Chalmers Type OB Pneumatic Governor.

and can be mounted below the cars or under a car seat. It occupies a space of 12 inches in height, 7 inches in length and 5½ inches in width.

The Dayton Manufacturing Company has a new enameled-iron water closet for steam and electric cars, which can be changed instantly from a water to a dry closet, can be used with either gravity or air pressure and requires but a small amount of water to flush it. The new catalogue illustrating and describing this closet will be ready for distribution in a few days. Anyone who is interested can obtain a copy of this catalogue by writing for same.

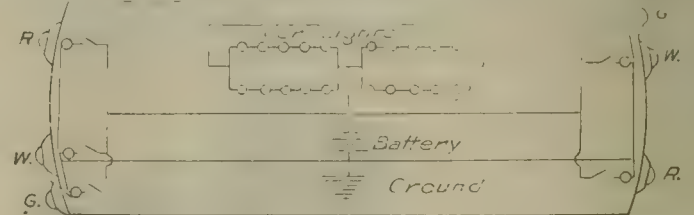
The Niles Car & Manufacturing Company, Niles, O., recently delivered to the Camden Interstate Railway, of Huntington, W. Va., eight handsome, light interurban cars equipped with Baldwin class 72-20 interurban trucks. The car bodies have 13 windows and are 37 feet in length between corner posts, and 47 feet 8 inches over buffers. The seats in the smoking compartment and near the rear door are longitudinal, all others being Hale & Kilburn No. 99-A type with rattan covering. The seating capacity is 52 persons.

There may be at this convention many who have never heard of the town of Kewanee, however familiar they are with the union of that name, or have a hazy impression that it is a "little one-horse town, anyway." Whether you know anything about Kewanee or not, the Western Tube Company invites you to Booth 918 to see a "history of evolution." The history of town and "Tube" go hand in hand. The Western Tube Company has a most interesting series of pictures of its plant at different periods. In the first year of its existence (1870) it was truly a one-horse" concern (to be quite

correct "one mule"); such was its "power plant equipment," and its "buildings" consisted of one low building, where less than thirty men were employed. Today the Western Tube Company furnishes nearly five thousand men to the prosperity of the town, and covers nearly twenty-one acres of floor space.

LINTERN CAR SIGNAL SYSTEM.

As a method of car classification and rear-end signalling, the Lintern car signal system exhibited by The Ohio Brass Company, Mansfield, O., possesses a number of unique and desirable features. This system is the only one thus far devised by which electric current can be utilized for signal purposes. This is accomplished by means of an auxiliary battery of dry cells which makes the signal lamps entirely



Lintern Signal System.—Double-end Car with One Rear End and Two Classification Signals on Each End.

independent of the fluctuations of the trolley voltage and renders them operative for hours at a time, even if the trolley supply is shut off altogether. The operation of the system is clearly shown at the exhibit booth where a complete installation is in operation, showing the method of connection to the car lighting circuit and the equalizing effect of the auxiliary battery. Various types of lanterns are used with this system, one of the most popular being the tri-colored combination lantern shown herewith. All signals are illuminated by two-



Lintern Signal System.—Classification Lantern.

candle-power incandescent lamps. One illustration shows the method of connection for two classification and one rear-end signal on each end of a double-ended car. The location of the auxiliary battery with reference to the car lighting circuit and the signal circuit, is clearly shown in this diagram, and it will be readily observed that the battery floats on the line much the same as a storage-battery booster on a railway circuit. This display forms part of the exhibit of the Car Equipment Division in charge of Nathan Shute.

John N. Akarman, formerly general superintendent Public Service Corporation of New Jersey, and for nine years general manager of the Worcester Consolidated Street Railway Company, has now gone over to the manufacturers' side of the field, and is attending the convention as the representative of the National Brake Company, of Buffalo, New York.

Recent orders to the J. G. Brill Company of Philadelphia include 2094 Mason safety car treads, carborundum-filled with steel base.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 16

CHICAGO, OCTOBER 19, 1907

WHOLE No. 234

TABLE OF CONTENTS.

Editorial:

—Pit Design and Quick Repairs.....	663
—Comfort in the Pit.....	663
—Light Pits a Help.....	663
—Accidents at Sidings.....	663
—Concrete Elevated Structures.....	664
—Headways in Congested Districts.....	664
—Express Business on Interurban Railways.....	665
The Richmond & Chesapeake Bay Railway (Illustrated).....	666
Regulation Versus Municipal Ownership. By H. J. Gonden.....	670
A New Energy Diagram for Steam. By Henry F. Schmidt (Illustrated). With inset.....	671
Los Angeles Interurban and Pacific Electric Railways—Bridges and Culverts (Illustrated).....	674
Painting Steel Passenger Cars.....	677
Grain Traffic on the Inland Empire System (Illustrated).....	678
New Sanding Apparatus in Liverpool (Illustrated).....	678
Practical Views on Trucks for Electric Motor Service. By Franklin M. Nicholl.....	679
Cost of Concrete Posts.....	679
Piping and Power Station Systems—LVIII. By W. L. Morris, M. E. (Illustrated).....	680

Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	681
News of the Week:	
—The Chicago Traction Litigation.....	683
—State of the Copper Market.....	683
—Joint Rates and Routing Required Under New Michigan Railroad Law.....	683
Construction News:	
—Franchises.....	685
—Recent Incorporations.....	686
—Track and Roadway.....	686
—Power Houses and Substations.....	688
Personal Mention.....	689
Financial News.....	689
Manufactures and Supplies:	
—Rolling Stock.....	690
—Shops and Buildings.....	690
—Trade Notes.....	690
—Advertising Literature.....	692
New Cars for the Toledo Railways & Light Company (Illustrated).....	692
General Electric Company's Factory.....	692

Until recently the influence of the track pit upon the speed of repairs and inspection of cars has been but slightly appreciated. In the designs of recent shops, however, the pit question is being worked out in a very satisfactory manner, though practice cannot be said to have become standard except in so far as it involves the use of concrete for pit walls, columns or floors. Even here individual designs vary throughout wide limits as regards details of reinforcement, cross sections and general arrangement. A year or two ago a great deal was said by master mechanics about the advantages of inspection and repairs on the floor in broad daylight, and in some quarters the use of the pit was not a little discredited. Today a casual examination of the under side of a high-powered car or electric locomotive is enough to convince one that both the pit and the level floor are necessary for the quickest inspection and repair work. The car house or shop which does not provide both pits and inspection floors is sure to be handicapped in the maintenance of rolling stock.

Whatever may be the details of pit design it should by this time be clear that the pit must be made a comfortable place in which to work if the best results are to be secured. The pit floor ought to be drained to a sewer, and if the floor is inclined slightly toward the catch basins cleaning can be easily accomplished with an ordinary hose. A daily or even a weekly flushing of a pit reduces the chances of annoyance to employees' health and likewise eliminates the fire risk, which always is present in the bottoms of wooden or earth pits in ill-kept car houses. Pits should be provided with steam coils valved in sections to meet the conditions of cold weather in northern climates, and the installation of a considerable number of lighting and possibly power outlets is also a desirable feature. Without good lighting facilities pit work, even in the daylight, is certain to proceed more slowly than is economical. Flexible lighting cables and plugs, with shaded lamps fitted with hooks

or magnets to enable them to be attached anywhere, are worth many times their cost. Pit work is hard enough at best to justify every reasonable facility.

In one repair pit design recently noted a gap of perhaps a foot or eighteen inches was left between the pit tracks and the outside bordering floor to enable the shop men to sit on the edge of the floor, facing the trucks on the outside of the car. This gave room between the floor and the rail for a man's legs to swing downward in comfort, and greatly facilitated inspection. A man standing in the pit could also get hold of the outside of the trucks and car readily by standing between the rail and the floor. The floor border was made of plank about an inch thick and a foot wide on top, giving a much more comfortable seat than concrete. A concrete border soon becomes chipped and ragged by metal parts and tools dropped upon it, but the wooden border withstands much more abuse, with little injury to its appearance. There is no doubt that in many pits the installation of tool shelves at intervals would save a good deal of time. These could be attached either to the columns or sides, and would do away with one of the most awkward phases of pit work. It ought not to be necessary to point out the advantage of installing switches to cut out sections of pit lights not in use, but in more than one car shop this waste of current and filament life is constantly allowed to go on.

A recent accident on the Lake Shore Electric Railway near Toledo, in which two lives were lost and several persons seriously injured, when a car was derailed and overturned at a switch, calls attention to the practice of running through spring switches. This has long been in disfavor with many high-speed railways. The demand for high speeds, and therefore few stops, may be said to have been one of the causes of this wreck. A fast service

makes it imperative that the number of stops shall be reduced to a minimum and that slow-downs shall be eliminated wherever possible. It is this necessity for reducing running time that has led to practices that, while under normal conditions are safe, are liable to cause disastrous wrecks if the mechanism of an automatic device fails to work properly. The main fault to be found with automatic signals, switches and other such appliances lies in the fact that they are automatic with regard to action, but non-automatic with regard to maintenance. Chances for a bent switch rod or displaced switch-stand allowing a positive throw switch to partially open are always present, but the probability of this happening is not so great as the likelihood of a stray stick or stone getting into a spring switch. By making it necessary for a conductor to throw the switches by hand he is in a position to inspect the mechanism in such a way that he can quickly note any fault that may exist. When spring switches are passed at speed no method of knowing that the switch is working freely and positively is possible. The safety of an automatic switch then depends largely on the manner and frequency of its inspection. When in good condition the spring switch is an excellent device for promoting the rapid handling of traffic, but, on the other hand, is a lurking danger if not in perfect condition. For several years past, as line after line has had trouble with spring switches, they have been discarded as being untrustworthy and positively dangerous. It has been felt that the gain in time was not worth the very great danger of serious accidents. The best practice now is to use manually operated switches and stub-end sidings, requiring that all cars head in and back out at meeting points. While these movements undoubtedly take more time than is required when spring switches and through sidings are used, the chance for derailment at a switch or the unintentional switching of a car at high speed into a siding is greatly reduced. Considering the long list of wrecks caused by defective switches, both spring and hand operated, it would seem that every effort should be made toward a reduction in the number of switches and the elimination of the very dangerous features of the present forms of spring switches. By the use of stub-end sidings and hand-operated switches, always securely locked in their proper positions, there should be but few accidents caused by cars at high speeds splitting switches.

In determining the kind of material to be used in the viaduct for the Richmond & Chesapeake Bay Railway, described later in this issue, nearly all the usual classes of construction for elevated structures were considered. The first design suggested was a timber trestle, but on account of its necessarily temporary nature and the danger of its being destroyed by fire, the wooden structure was not used. A steel viaduct was also considered, but it did not seem to satisfactorily meet the conditions. The accepted design as built is of reinforced concrete. In considering the use of concrete for this long viaduct, permanency was given the first consideration. This requisite quality of long life should outweigh to a considerable extent the increase in the first cost of structures vital to continued operation. By building bridges or elevated roadways of this kind as permanently as possible there is not the possibility that the long chances sometimes taken with old timber trestles will exist and in failing bring about a heavy loss of life and property. Permanency and maintenance costs are closely related. With a concrete viaduct of this kind there are no exposed metallic surfaces that must be protected by paint to prevent deterioration. It is generally recognized that the expense of keeping structures of this kind well painted is a heavy item in the maintenance charges. The ease with which the Richmond viaduct may be widened to accommodate two tracks also was partly responsible for the choice of reinforced concrete as a

construction material. Provision was made, at a comparatively small expense, in the foundations and on the girders for the addition of columns and girders necessary to support another track. Another advantageous feature which perhaps was not so conspicuous in the consideration of designs for this viaduct as it would have been if the structure were in a large city is the question of noise. Concrete structures absorb much of the noise made by passing trains and therefore have on this, as well as other scores as stated, a decided advantage for railway use.

HEADWAYS IN CONGESTED DISTRICTS.

The printed copy of the decision of the railroad commission of Wisconsin in the case relating to the service of the Milwaukee Electric Railway & Light Company embodies the text of a report on the headway of cars made by George Weston of Chicago. The report was based on an investigation made for the commission. It applies to traffic at the intersection of Third street and Grand avenue, which is the most congested point in Milwaukee. At this intersection there are double tracks crossing double tracks and a double track curve in four quadrants, commonly known as a "grand union intersection."

Mr. Weston holds that the minimum practical headway that can be operated upon a fairly busy street with cars making ordinary service stops and running at a maximum speed of from six to eight miles an hour in the congested district is 20 seconds. This headway might be reduced or increased by varying conditions of vehicular traffic. The safe minimum distance between 41-foot cars, running at eight miles per hour with a brake retardation of $1\frac{1}{2}$ miles per hour per second, was computed by Mr. Weston at 100 feet, as follows: Length of car, 41 feet; minimum speed between cars at stop, 15 feet; one second of time running at a speed of eight miles per hour before applying brake, 12 feet; distance run by car after brake is applied, 32 feet; total, 100 feet. Therefore Mr. Weston figured that the maximum number of cars that could be operated in safety at eight miles per hour passing a given point in an hour, in one direction and upon a clear street without stopping, would

$$\frac{8 \times 5,280}{100} = 422 \text{ cars, or a headway of about 9 seconds. To}$$

lower the speed and make stops would affect the headway. Congestion in the street would reduce the running speed, which Mr. Weston states could possibly be taken at five miles an hour in a congested district, and the number of cars, with-

$$\frac{5 \times 5,280}{82} = 322 \text{ cars, or a headway of 11 seconds.}$$

Adding to this time the time of the average stop at street crossings, for which he allowed from 9 to 10 seconds, Mr. Weston figured that a headway of 20 seconds could be attained, or a total of 180 cars passing a given point in one direction in an hour.

The realization of this result would be prevented if some cars were switched at the crossings, but computing that about one-tenth of the cars take the curves Mr. Weston figured that the average intersection headway should be 21 seconds, or 171 cars for each track, making a total of 684 cars in all directions per hour.

During a New York investigation in 1903 it was observed that in rush hours the number of cars passing a given point on Broadway in an hour in one direction averaged from 176 to 190.

Testimony bearing on the New York situation was presented during the hearing before the Wisconsin commission by C. N. Duffy, comptroller of the Milwaukee Electric Railway & Light Company. Mr. Duffy said that the most severe congestion of which he knew is at Broadway and Thirty-fourth street, New York City. Oren Root, Jr., then vice-

president and general manager of the New York City Railway, had told Mr. Duffy that he would not undertake to operate more than three cars a minute each way over a double crossing. Allowing for north and south bound cars on Broadway and east and west bound cars on Thirty-fourth street, this would make 12 cars per minute over that crossing. Mr. Duffy testified that the Milwaukee company operates nearly one-half that number of cars over the Third street and Grand avenue crossing with the turning in and out of cars three ways in addition.

During the present investigation of New York street railways by the public service commission, an employee of the commission testified that on one day between 5:30 and 6 p. m. 171 cars passed east and west and 104 cars north and south at the intersection of Madison avenue and Twenty-third street.

It should be understood clearly that the use of curves at intersections in congested districts involves the interruption of a large number of cars when traffic conditions are most severe. If all motormen were thoroughly familiar with the requirements of the service, the delays could be minimized, but in spite of all that operating officials can do, men who have not had long training lose time and waste minutes which nullify the best efforts of their superiors to produce adequate service when the crowds fill the cars.

EXPRESS BUSINESS ON INTERURBAN RAILWAYS.

Three principal considerations appear to be involved in determining the desirability of freight and express handling on interurban railways. These are, first, whether in the case of any individual line it is desirable to handle such business at all; second, whether, if it is determined that such business shall be undertaken, it shall be handled under an arrangement with existing "old-line" express companies as it is now handled on steam roads, or whether the work shall be done by an interurban express company or companies to be organized for this purpose; or, third, by a combination of the two methods involved in the second consideration.

One manager who is quoted in a report on this subject recently presented to the Central Electric Railway Association sums up the general situation clearly in the following words: "The matter is one which depends largely on local conditions as to the advisable course to pursue, and furthermore is one which requires careful investigation of costs and revenue to be derived from the service. It is a question of similar interest to that of the interchange of freight with steam roads and into both must necessarily enter a question of policy, which would naturally be governed by not only the existing revenue from and cost of the service, but also the effect it would have on interurban companies with the public, with the steam roads, and the laws bearing on both."

With reference to the profitability of the service, it appears as a general conclusion from the best information obtainable that while it is often and perhaps generally the case that such service is at the outset of an unprofitable nature, it is also equally apparent that its profitability is in an ascending ratio, the rapidity of which ascent depends upon the length of time the service has been in operation as an element second in force only to the efforts that are exerted toward its popularization. It seems logical, also, to conclude—and there are numerous pieces of evidence in support of the conclusion—that the efforts that are made in the direction of popularizing this branch of interurban service will redound to a considerable extent to the benefit of the passenger business of the company carrying it on and to the establishment of a favorable attitude of patrons on account of the completeness of the service as a whole. In the same manner in which the United States rural free delivery mail service has added greatly to the volume of business of the postoffice department, though in this instance the question of revenue

is on a different basis and the cases otherwise are not wholly parallel, the extension of the lines in which an interurban railway company is prepared to serve its patrons increases the net volume of its business and in all but exceptional cases should increase its net revenue if at all judiciously handled. With the natural growth of business as a result of building up new populations and with the necessary increases of connections with other systems, the profitable character of the business should become more marked.

As to the method of handling: One important objection at once appears to the plan of handling by independent interurban companies. Separate companies, at this stage of the development of connecting systems of interurban railways, would involve the establishment of such a number of auditing centers as to complicate settlements between companies so as to be almost prohibitive. On the other hand, it appears objectionable in some quarters to enter into contracts with the old-line express companies for the reason that the latter give what is practically express service to a considerable volume of small freight which could not conveniently or profitably be handled by interurban companies. Likewise, under conditions which are by no means of infrequent occurrence, the old-line companies do not display any great alacrity in their efforts to make individual contracts with interurban railways and the steam roads over which such companies' business is now carried on can hardly be expected to exert influence in favor of such an extension of the express business.

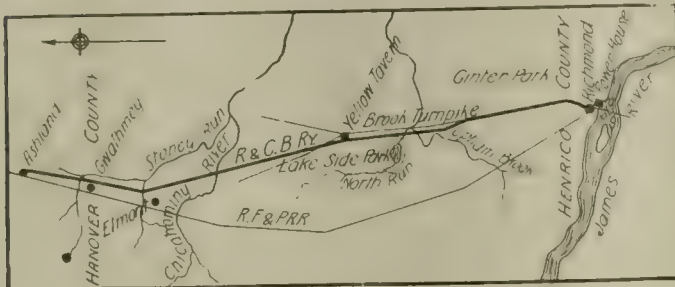
There remains, then, to be considered the possibility and probable result of the establishment of a general interurban railway express company having such relations with the old-line express companies as to make feasible the exchange of business at points convenient to each. This not only, as stated in the quotation given at the beginning of this article, is "a question of similar interest to that of the interchange of freight with the steam roads," but its practical operation would doubtless be surrounded with many of the same difficulties and objections. From an academic standpoint, however, there appears to be at least one feature of the plan which would remove many of the objections mutually raised to the establishment of relations between individual interurban railway companies and the old-line express companies. This is the possibility, in the case of a general interurban express company of which electric railways could become members as their expansion and connections should indicate as desirable, of the establishment of a uniform basis of interchange like that now existing between one express company and another. This would seem to be a vital necessity in any attempt to the establishment of interurban express business on anything like a permanent and profitable basis, except possibly in a few instances where conditions are especially favorable.

It appears then, in conclusion, that there are very many interurban roads upon which the installation of an express service should be practicable and profitable; that with the rapid increase of mileage of such roads, the opening up of new territory and the closing up of gaps in the network of existing systems, such service should become increasingly profitable and indirectly promote the growth of passenger business; and that the establishment of a satisfactory system requires only an agreement upon certain general principles recognized as fundamental by the various interests involved and the application of which in detail may be modified to suit local conditions. And meanwhile the inevitable tendency of interurban electric railway progress is in the extension of lines of activity as well as in physical extensions of the plant.

The Chicago South Bend & Northern Indiana Railway Company has established through fast service between South Bend and Warsaw, Ind., and between South Bend, Elkhart and Goshen.

THE RICHMOND & CHESAPEAKE BAY RAILWAY.

The Richmond & Chesapeake Bay Railway, a single-phase line, was projected in 1906 by Frank J. Gould, who is now



Richmond & Chesapeake Bay Railway—Map of Richmond-Ashland Division.

president. It was decided to construct an electric railway of the most modern type for the purpose of hauling passengers and freight and that every effort should be made until a high-

Lakeside Park, then through several small villages to Ashland, the end of the first division.

Ashland is a strictly residential town of 1,500 to 2,000 people and nearly all have their business in Richmond, going and coming on the trains of the Richmond Fredericksburg & Potomac Railroad (steam). The electric line is over a mile shorter than the steam line and it is proposed to make a much faster schedule and run more trains.

The roadway has been built in the most substantial manner. The grades are all light, being less than 1 per cent, with long, easy curves. Where streams had to be crossed concrete arches of 4, 6, 8, 40 and 60 foot span were used. It is noticeable that though the company could have found a different location which would have cost much less, the present location was chosen in order to facilitate higher speed. The track was laid with 80-pound T-rail and ballasted with gravel from a large pit near the main line. Near Lakeside Park it was found necessary to have a double-track cut one mile long and 25 feet deep in order that the grade might not be too heavy at this point.

In order to keep the grades less than 1 per cent in Richmond it was necessary to build a viaduct of considerable



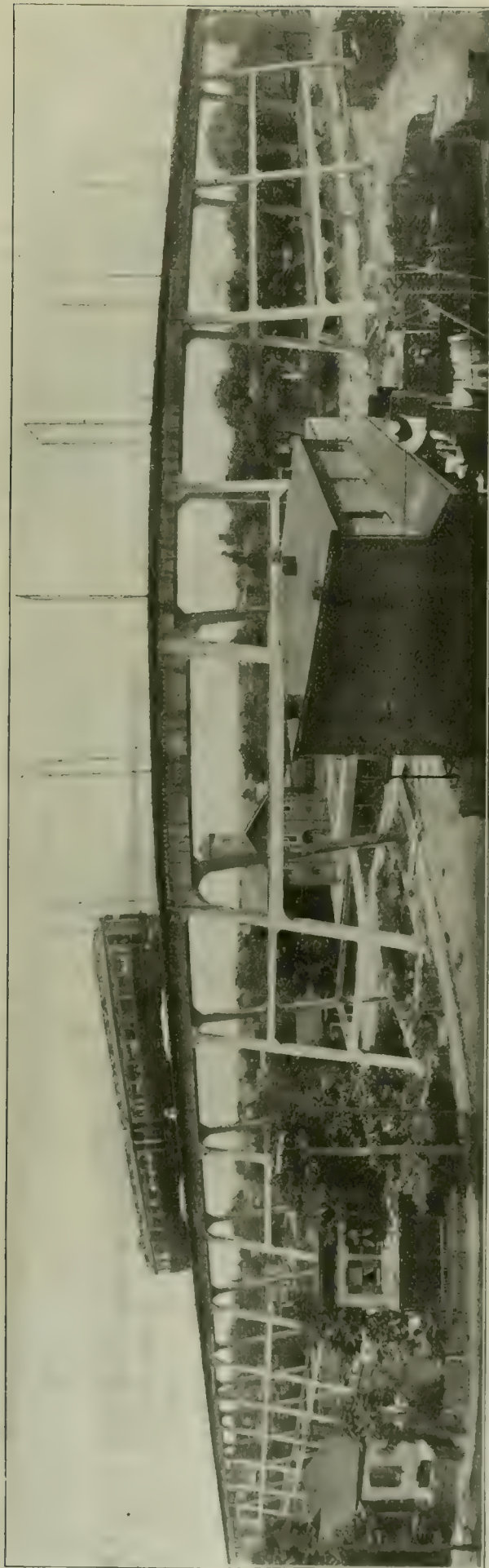
Richmond & Chesapeake Bay Railway—View of Finished Viaduct Bents, Struts and Girders.

speed line was completed, affording quick transportation from Chesapeake Bay to Richmond, Va. The first division of 14.8 miles is now completed. It is proposed to begin construction on the remaining part and surveys have already been made for that purpose. Altogether the line will be about sixty miles in length.

The line leaves Richmond from West Broad street, where a handsome depot has been built, over a concrete viaduct varying in height from 14 to 70½ feet, 2,800 feet in length, then runs along Brook turnpike for three miles, passing by

height over a wide and deep valley which is thickly populated and intersected with streets about 300 feet apart.

The design for this structure submitted by the Trussed Concrete Steel Company of New York was accepted and the contract for the construction was awarded to John T. Wilson of Richmond, Va. The viaduct was designed to carry trains of cars each weighing 150,000 pounds, distributed on 4-wheel trucks having a 7-foot wheel base, the trucks being placed 33 feet center to center. The design provides for a system of track girders running lengthwise of the viaduct,

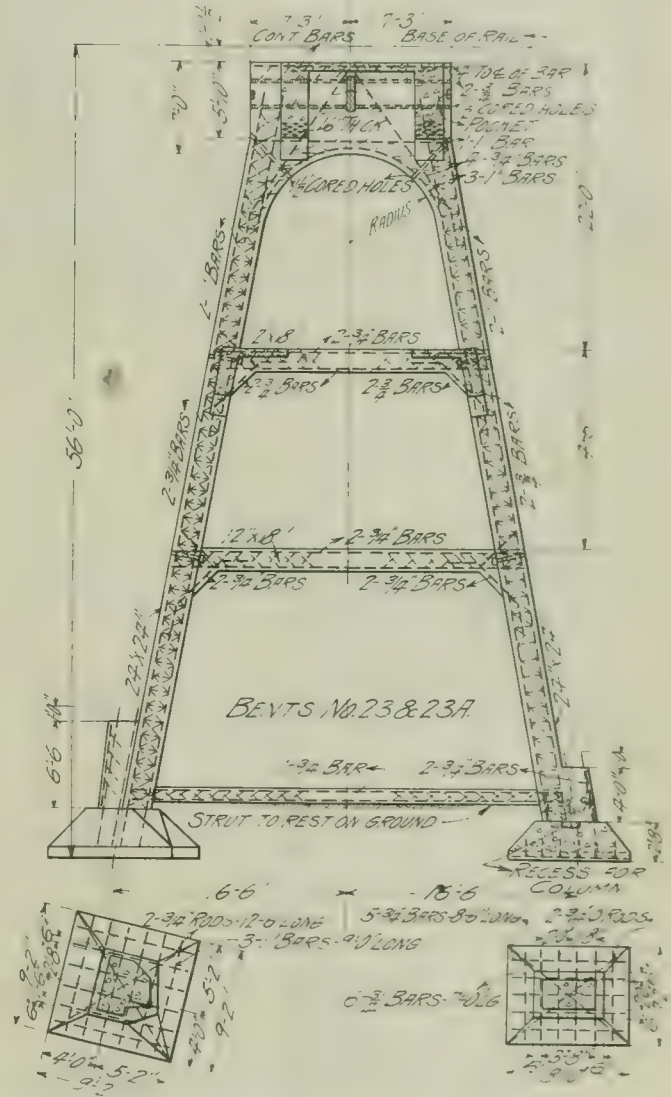


Richmond & Chesapeake Bay Railway—Completed Viaduct Structure with Electric Train.

spaced 6 feet 9 inches center to center, and supported on bents, many of which are connected by longitudinal struts. The spans vary in length from 23 feet 6 inches to 67 feet 5 inches and the girders used vary in cross section from 12 by 30 inches to 22 by 70 inches.

For lateral bracing transverse struts $3\frac{1}{2}$ inches thick are placed between the girders just below the track timbers, and over street crossings a $3\frac{1}{2}$ -inch solid floor is provided. The Kahn system of reinforcing is used throughout.

The columns are reinforced, as shown in an accompanying engraving. Longitudinal struts between columns are reinforced with continuous bars $\frac{3}{4}$ by 2 inches, the sections



Richmond & Chesapeake Bay Railway—Details of High Bent and Column Footings.

of the struts varying from 10 by 18 inches to 20 by 60 inches. In building the columns it was found impossible to pour them from the top and at the same time to ram the concrete properly. The forms were therefore built up on three sides and the concrete placed from the fourth side, which was built up as the column filled. The column forms were allowed to remain in position one month.

Girders and Floor.

The girders, which vary in section according to the length of span, are reinforced with bars varying from $\frac{3}{4}$ to $1\frac{1}{4}$ inches in diameter. The girders and floor were poured immediately after the column forms were filled, and the forms were allowed to remain in place at least a week. Expansion

joints are placed at intervals of 200 feet. A planed steel plate on the bottom of the girder slides on a steel plate on the top of the bent, a sliding toggle near the top of the girder being provided to counteract any tendency to overturn.

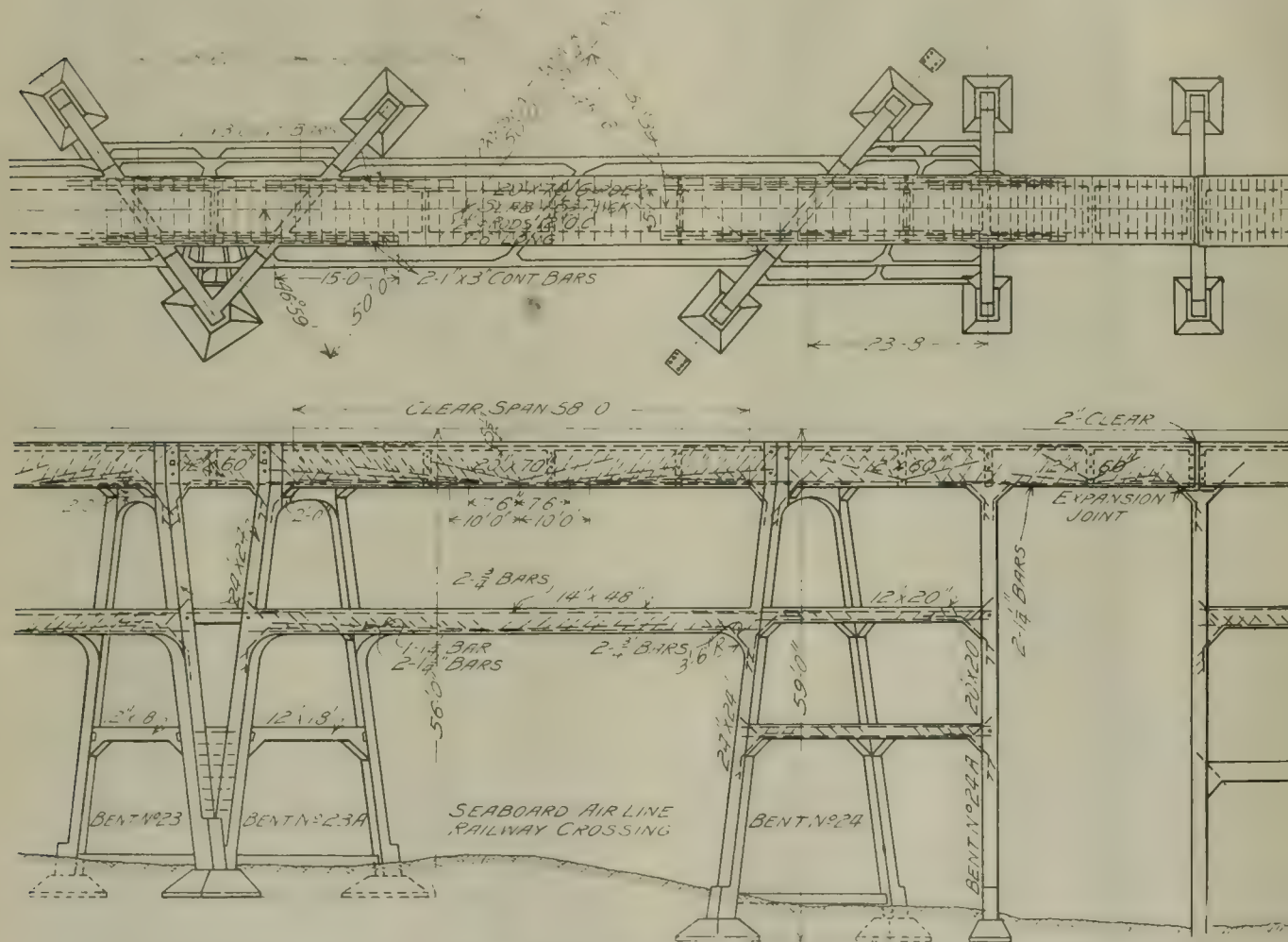
Track.

The ties, which are of oak, 8 by 8 inches by 9 feet, are supported by 6 by 12 inch all-heart pine stringers, placed over the girders. The ties are placed 12 inches center to center and every fifth tie is fastened by a $\frac{3}{4}$ -inch bolt embedded 9 inches in the concrete and passing through the wooden stringer and the tie. A wooden guard rail, 8 by 10 inches, is dapped over the ties in the usual manner. The trolley poles are supported on 16-foot oak ties, 8 by 14 inches, and are

concrete. The percentage of reinforcement used was less than 1½.

Work of construction was commenced in May, 1906, at two points along the viaduct. Concrete was mixed by a No. 2½ Smith concrete mixer and hoisted into place by machinery. Dumping buckets holding a little less than a barrel and made for this work were used in filling the columns. The forms for the struts were filled from the top of the structure by means of a galvanized hinged pipe 10 inches in diameter. Concrete for the girders and floor was handled in wheelbarrows. The cement used in the entire structure was Atlas Portland. The aggregate was crushed granite required to pass a 1-inch ring and thoroughly screened.

The crossing of the Seaboard Air Line Railway and the



Richmond & Chesapeake Bay Railway—Details of Reinforcing at the Seaboard Air Line Crossing.

spaced 30 feet on curves and 60 feet on tangents. On one side of the viaduct a walk is provided by having every fifth tie 12½ feet long, to serve as a cantilever support for the footway.

Design and Construction.

The concrete used for the structure was of 1-2-4 composition, with the exception of that for the footings, which were 1-3-6. The unit values allowed in the design for concrete were: Shear, 50 pounds; compression, 500 pounds. For steel reinforcement the unit values were: Shear, 10,000 pounds; tension, 16,000 pounds; compression, 60,000 pounds. The ratio of the modulus of elasticity of steel to that of concrete was taken as 12. The girders and struts were given a camber varying from 1¼ inches on the 23½-foot spans to 3½ inches on the 67-foot spans. The steel reinforcement was required to be embedded at least 1½ inches beneath the surface of the

crossing of a double street car track at Clay street, presented the most difficult features of form and falsework building. The heaviest girders at these points weighed nearly 50 tons, while the heaviest in the entire structure weighed 54 tons.

Test of Structure.

Upon the removal of the girder forms, the deflection of the 54-ton girders was only ⅛ inch. After allowing the work to stand for five months to permit the concrete to harden, the structure was tested on June 25, 1907. A steam locomotive with two gondola cars loaded with iron, coupled in front, was backed on to the structure so that the weight of the tender was the first load applied. The engine weighed 49½ tons and each loaded gondola about 40 tons. The loading was calculated to produce stresses double those for which the structure was designed. The deflection of girders where expansion joints were provided was greater than the others,

these girders being non-continuous. Observation of the amount of expansion indicated about $\frac{1}{2}$ inch in 200 feet.

In addition to the tests of deflection the viaduct has been

to Baltimore, but the opening of the extension to the present line of the Richmond & Chesapeake Bay Railway will result in bringing most of this to Richmond, which is much nearer.

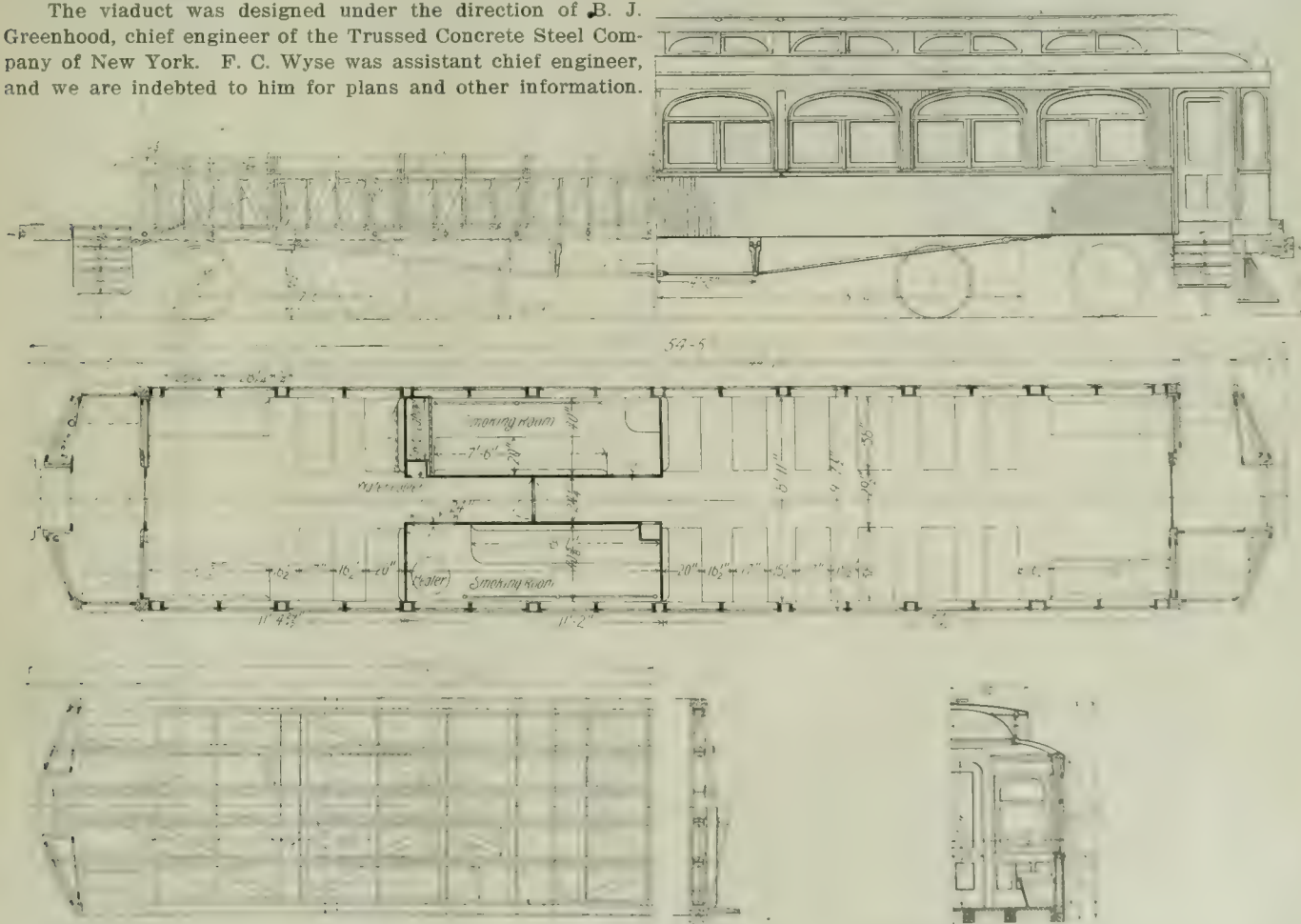


Richmond & Chesapeake Bay Railway—Exterior of High-Speed Car.

tested with rapidly moving trains and trains brought to a sudden stop by an application of the brakes. No undue vibration has been noted.

The viaduct was designed under the direction of B. J. Greenhood, chief engineer of the Trussed Concrete Steel Company of New York. F. C. Wyse was assistant chief engineer, and we are indebted to him for plans and other information.

While the use of alternating current seems hardly necessary for a road operating a distance of only 15 miles it must



Richmond & Chesapeake Bay Railway—Details of High-Speed Cars.

The territory through which the extension will be built is a rich truck farming section without any means of shipping products except by water and teaming over 20 to 30 miles of very bad road. At present most of this produce goes

be remembered that it is the intention to extend the line about forty-five miles to Chesapeake Bay. When the line is thus extended the advantages of alternating current at high voltage will be fully realized. The rolling stock was accord-

ingly designed with a view to train operation over about sixty miles of high-speed line.

Cars.

The initial equipment for the Richmond & Chesapeake Bay Railway consists of three cars built by the St. Louis Car Company. These cars have several special features, among which may be mentioned the interior arrangement, which consists of two main and two smoking compartments, the unusual length of wheel base and the great weight of the fully equipped car.

The length of the car body is 44 feet 10 inches and over the vestibule the length is 54 feet 5 inches; width over side panels is 9 feet 7½ inches. The height of the car body is 10 feet 2 inches, while the height of the car roof above the rail is 13 feet 9¾ inches. The framing of these cars is very heavy; the floor framing consists of six sills, the two outside sills being made up of a 6-inch channel iron placed between two



Richmond & Chesapeake Bay Railway—Interior of High-Speed Car.

wooden beams and the whole bolted together. The other four sills are made up of standard 6-inch I-beams with a heavy wooden filler on each side. Numerous short diagonal braces used throughout the floor framing add to its rigidity.

The M. C. B. type, American Locomotive Company trucks, are placed 31 feet 6 inches on centers, have a wheel base of 7 feet 6 inches and steel wheels 38 inches in diameter. The single-phase current of 6,600 volts pressure is taken from the trolley wire by a pantograph bow current collector. There are four GEA-603 single-phase motors of 125 horsepower each, geared to 80 miles per hour. The multiple-unit system of control is used, as these cars are usually run in trains. Pneumatic air sanders, locomotive type pilots and M. C. B. couplers with centers 35 inches above the rail are used. The weight of the fully equipped car is 60 tons.

The interior of the car is divided into four compartments, two main passenger compartments and two smoking compartments, the larger passenger compartment seating 32 people, the smaller one 16, while the smoking compartments will accommodate 12, making a total seating capacity of 60 people. The two smoking compartments are 11 feet long and are located near the middle of the car and on opposite sides of the center aisle. A swinging door in the 24¼-inch aisle, between the two smoking compartments, divides the car into the two main compartments. The hot water heater is located in a corner in one of the smoking compartments, while the ice water coolers are located in recesses in the compartments. A switch cabinet is located back of one of the ice water tanks. A door which ordinarily closes in the control apparatus swings

through a right angle and cuts off the right-hand side of the vestibule, forming a closed cab for the motorman. The end of the vestibule has a swinging door, making it possible to go from car to car of the train, and a gate is also provided for this opening. In the end of the car body is a sliding door. The vestibules are provided with single doors and traps over the three steps, the lower step being 16¾ inches above the rail. The reversible rattan seats are 38 inches wide, 17 inches deep and have a space between them of 15½ inches.

REGULATION VERSUS MUNICIPAL OWNERSHIP.*

BY H. J. GONDEN, EDITOR OF PUBLIC SERVICE, CHICAGO.

I cannot let this opportunity pass without referring to the proportion of unreason in most of the agitations to secure lower prices from public service companies. During the last decade and more the prices of almost everything necessary to the life and comfort of man have steadily increased in America until the general advance has reached a point not much less than 40 per cent. Almost the only necessities having prices decreased during the same time are gas, electricity and transportation—each a kind of public utility. With gas and electricity the cuts in price have been evident and are so general and decisive that no detailed proof in figures is necessary. On street railways the same 5-cent piece that now goes only as far toward buying necessities as three cents did 10 years ago purchases not only as much transportation as it did then, but much more, owing to extensions and new lines.

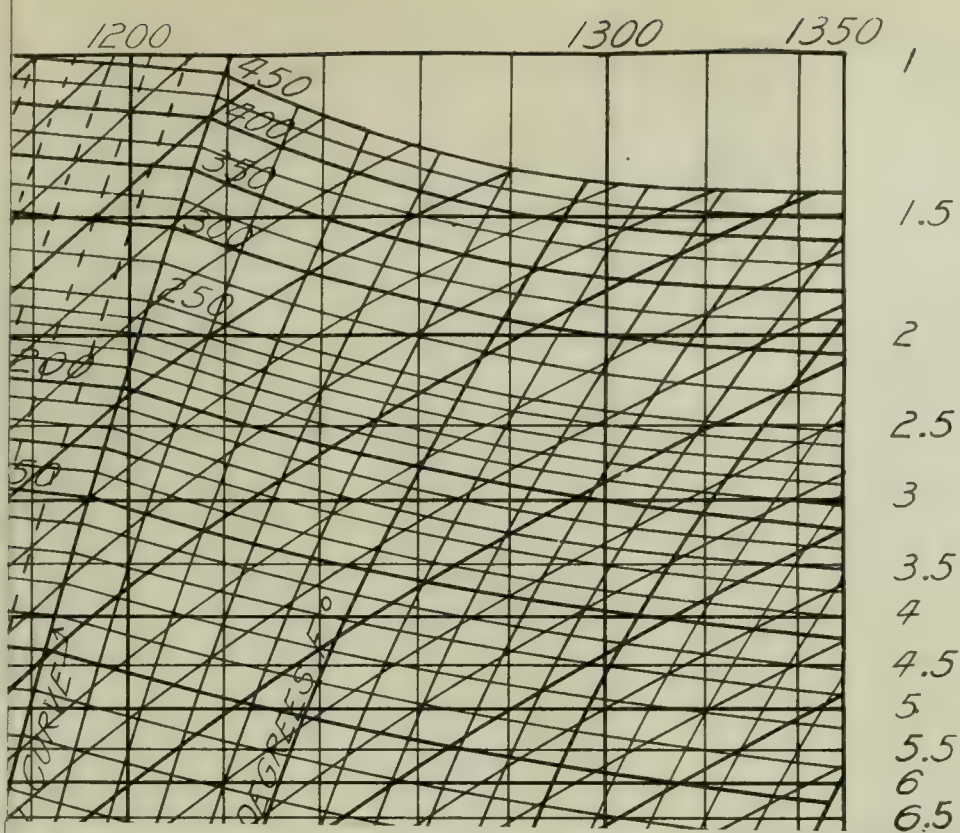
The price of wheat, iron or clothing may be down one day and up the next, but the price of the service company's wares once cut must stay cut, since it is impossible to increase it in the face of public opinion; not cold, academical opinion, but moving ire issuing from the pocketbook. To return reasonable dividends to the stockholders the public service manager has but one course; namely, the strictest economy of operation and the origination of devices to cheapen production and distribution. If this condition of affairs, coupled with legal regulation and control, is not bound to work to the advantage of the people my facts and my logic are seriously at fault.

There can be no valid objection to intelligent and honest inquiries to find out if service charges are too high, but this is not the manner in which most agitations for lower rates operate. The customary procedure is by arbitrary legislation based on mere guesses by men not remotely familiar with the industries with which they propose to interfere. Justice has no place in movements of this kind, and acrimonious and bitter litigation, bribery, demagogism and material damage to communities are but natural sequences.

The connection of public debt with municipal ownership ventures does not appear to be clearly understood. It is often referred to by opponents of municipal ownership, but seldom in a way that carries full import. Justice Brewer recently directed attention to the injustice of that kind of public debt contracted for things that wear out and disappear, but which under the arrangement succeeding generations are left to pay for. Some improvements such as sewers, paving, parks, etc., are so urgent as to warrant discounting the future by issuing long-time bonds to obtain them, particularly in view of the fact that these improvements are not only of a substantial and enduring nature, but contribute heavily toward the increased value of land and the general wealth.

It is hard, however, to list electric light plants or street railways or the other services in this category. All wear out and require replacement in from 15 to 50 years, the latter being probably an extreme calculation. Whatever benefits are derived are received usually before the bonds are paid off. Very few cities have sinking funds established for the redemption of bonds issued to build municipal plants. The prices of municipal service are not based on expenditures involving a sinking fund to pay off the bonds, and usually even the interest and depreciation are ignored. We all know that our municipal ownership engineers do not attempt to pay off the bonds of municipal plants during the life of the plants. Of course this could be accomplished by increasing prices, but that would not add to the attractiveness of the theory. They prefer to pass the bills, representing what they have not paid for monthly, on to their children, a legacy that is unjust, cruel and unavoidable by the citizens who are to follow, who, in all likelihood, will have burdens of their own sufficient unto the day.

*A paper presented at the eleventh annual convention of the League of American Municipalities, Norfolk, Va., September 18-21, 1907.



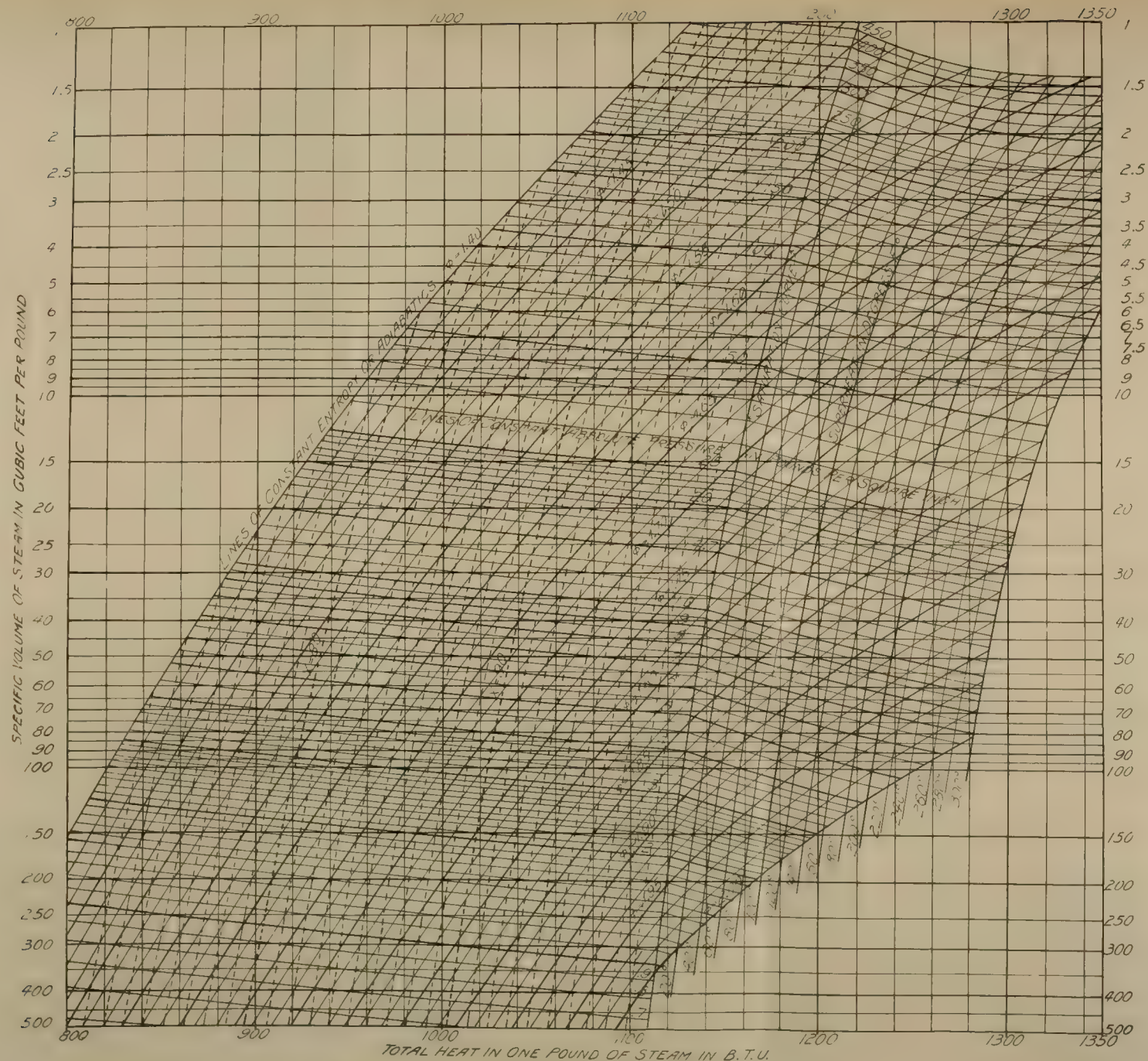
progression.

The reasons for the choice of these systems are that the volumes are always read direct and therefore in order to avoid having an extremely large diagram and enable the same degree of accuracy to be obtainable, whether reading large or small volumes, the logarithmic scale was used, as it has the property of having the same degree of error over its entire scale. As the heat readings are generally taken by differences it is held

$$T_s' = \frac{c_p}{c_v} \cdot T$$

which substituted in the formula for

$$V = \frac{5928}{P} \left(\frac{H - H_s}{c_v \cdot T_s} \right) + 12$$



A NEW ENERGY DIAGRAM FOR STEAM.

(With Inset.)

BY HENRY F. SCHMIDT.

Some of the questions which any steam engineer may ask himself from time to time are: What is the efficiency of my engine? How much work will be done by one pound of steam if expanded adiabatically from one pressure to another, or how much work will be done by one pound of steam if it expands between given pressures, assuming certain losses? If steam at a pressure of 150 pounds passes through a throttling calorimeter and the thermometer indicates 10 degrees of superheat, how much moisture was there in the steam before it passed through the calorimeter? A few more questions which the engineer frequently wants answered are: How much heat is there in a pound of superheated steam at any given pressure and degree of superheat? At what pressure will steam at 150 pounds pressure and superheated 150 degrees become saturated if expanded adiabatically? What will be the theoretical steam consumption of an engine using steam at 150 pounds gauge pressure, 100 degrees superheat and expanding to one pound absolute, and how much steam at a given pressure will pass through an opening having an area of one square inch, and what will be the velocity of the resulting jet? These and many more practical questions must frequently be answered by the progressive engineer, and many of them no doubt would present problems of considerable difficulty if worked out by the ordinary mathematical formulæ. By the use of the diagram which is presented herewith, all of these and many more questions can be answered in a few seconds without the use of any mathematics other than the simple subtraction of one number from another, and the results which can be obtained by the use of the diagram will in general be correct to within a small fraction of 1 per cent, which is more than sufficiently accurate for all practical purposes.

While it is possible to work out a great variety of problems by the use of the diagram herewith presented, without a knowledge of the method of constructing it, the engineer will appreciate its value and be able to work out a greater variety of problems if he understands the methods of its construction than would be possible without this knowledge.

Before explaining the method used in the construction of the diagram, a few of the advantages of the diagram constructed as here presented may be of interest. In the scope of its usefulness it is identical with the "ghostly" entropy diagram, but for practical use it will be found far superior to either the common temperature entropy diagram or the entropy diagram of Professor Mollier.

As will be seen from an examination of the diagram the co-ordinates used in plotting the curves are the specific volume of the steam in cubic feet and the total heat contained in one pound of steam expressed in British thermal units. The reasons for the choice of these co-ordinates are that in practically all problems relating to steam which confront the engineer, the important quantities which he wishes to know about are the volume of the steam in cubic feet per pound, the absolute pressure in pounds per square inch and the work done in foot-pounds or in British thermal units per pound of steam. Therefore the choice of these quantities as the co-ordinate axes of the diagram will be readily appreciated. Further, to obviate one of the difficulties of the common temperature entropy diagram, the volumes have been plotted in accordance with the logarithmic scale of the common slide rule, while the total heat of steam is laid off in arithmetic progression.

The reasons for the choice of these systems are that the volumes are always read direct and therefore in order to avoid having an extremely large diagram and enable the same degree of accuracy to be obtainable, whether reading large or small volumes, the logarithmic scale was used, as it has the property of having the same degree of error over its entire scale. As the heat readings are generally taken by differences it is held

that the arithmetic progression is the most suitable. When it is necessary to read the volumes more accurately than is possible by estimation, the volume can be very accurately obtained by means of a pair of dividers and the upper scale on an ordinary slide rule.

Method of Constructing the Diagram.

After having laid off the volume lines in accordance with the slide rule scale and the heat lines, using a scale of $2\frac{1}{2}$ inches = 100 British thermal units, or 1 inch = 40 British thermal units, the lines of constant pressure were next constructed in the saturated portion of the diagram. This lies to the left of the line marked "saturation curve." The saturation curve is plotted by finding the intersection of the volume line corresponding to the volume of one pound of saturated steam at any given pressure and the total heat at the same pressure, as found from the steam tables presented in all engineers' pocketbooks.

Lines of Constant Pressure.

Since the weight of steam is directly proportional to the heat added during the process of evaporation, it will be evident that the volume of the steam, neglecting the volume of the water, will be directly proportional to the amount of heat added; or, in other words, writing this in the form of a formula, we have:

$$V = \left(1 - \frac{(H-h)}{r_s}\right) V_w + V_s \frac{(H-h)}{r_s}$$

But since the volume of one pound of water is extremely small in comparison to one pound of steam at even very high pressures, the volume of the water may be neglected and we may write simply:

$$V = V_s \frac{(H-h)}{r_s}$$

or, transposing this equation, we have

$$H = h + \frac{V}{V_s} \times r_s$$

which is the form used in plotting the constant pressure curves. To plot the curve corresponding to one pound absolute, for instance, it is only necessary to assume any volume, such as, for instance, 325 cubic feet for V and from the steam tables V_s is found to be 334 cubic feet and $h = 70$ British thermal units, which, substituted in the above equation, gives the corresponding H , which thus determines one point on the curve. By assuming a series of consecutively smaller values of V , and finding H , a series of points is obtained through which the curve can be drawn. The other curves of constant pressure were obtained in the same manner. The curves of constant pressure in the superheated portion of the diagram lying to the left of the saturation curve were obtained in a similar manner by the use of Schmidt's formula for the volume

$$.5928T - 12$$

of superheated steam. This is of the form $V = \frac{P}{P}$

in which V is the volume of one pound of superheated steam in cubic feet; T is the absolute temperature of the steam and P is the absolute pressure in pounds per square inch. As we do not know the absolute temperature of the steam, however, this equation must be transformed so that the volume may be obtained in terms of the total heat. This may be easily done, as the heat added in superheating is equal to the rise in temperature multiplied by the specific heat of superheated steam at constant pressure. Consequently

$$H - H_s = c_p (T_s - T_s')$$

from which

$$T_s' = \frac{H - H_s}{c_p} + T_s$$

which substituted in the formula for

$$.5928 \left(\frac{H - H_s}{c_p} + T_s \right) - 12$$

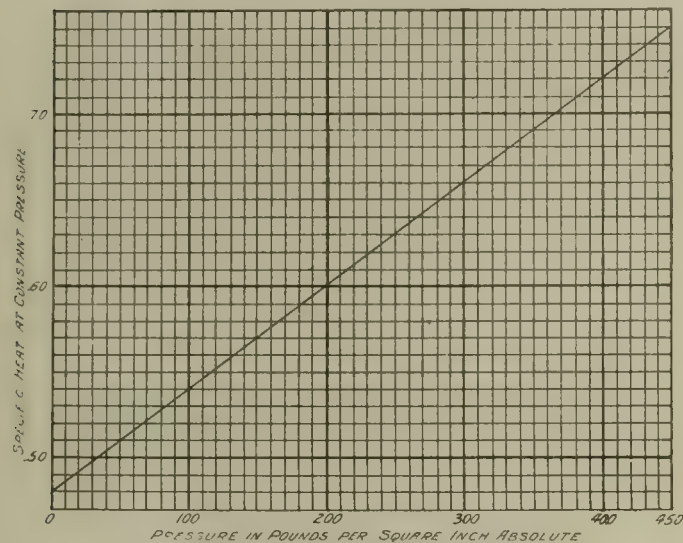
$$V = \frac{P}{P}$$

from which, by assuming values of H , the corresponding volume can be obtained which gives points on the curve.

Lines of Constant Superheat.

These lines were plotted by solving for H in the formula $H - H_s = c_p (T_s' - T_s)$, from which is obtained $H = (T_s' - T_s) c_p + H_s$, which, by assuming any value of $(T_s' - T_s)$ and the proper value of c_p and H_s intersections of the lines of constant pressure with the lines of constant total heat are obtained, through which the curves can be drawn.

The specific heat of superheated steam used in calculating the curves in the superheated portion of the diagram are



Energy Diagram for Steam—Heat and Pressure.

the average values of Professor Carpenter's results for 80 degrees superheat. The specific heat was assumed to vary with the pressure from five pounds absolute according to the curve of specific heats presented in the small diagram. Below five pounds absolute, the specific heat was assumed constant and equal to .48. Though the specific heat of superheated steam decreases with increase in superheat at any given pressure, the law of variation is not sufficiently well established to warrant assumptions in this respect. It will be evident, therefore, that the readings of total heat in the superheated portion are only correct at 80 degrees superheat, but the error resulting from the assumption of constant specific heat will not be great, and by taking the average value for 80 degrees the errors are probably much smaller than the variation in the results of different experimenters. The diagram is also more accurate than were a constant specific heat assumed for varying pressures as well as for varying degrees of superheat, as is usually done.

Lines of Constant Steam Weight.

The lines of constant steam weight, which are approximately parallel to the saturation curve, are put in dotted so that they may not be confused with the vertical lines of constant total heat. Since the total heat in one pound of steam and water mixed is equal to the heat in one pound of the liquid plus the heat of vaporization of one pound multiplied by the portion of one pound which has been vaporized, the lines of constant steam weight are readily plotted from the steam table by aid of the equation $H = r_s x + h$. Assuming any constant value of x and finding r_s and h from the steam tables, the value of H at any given pressure can be found. This gives an intersection of a line of constant total heat and a line of constant pressure, and by determining a number of points in this manner for a constant value of x , points are obtained through which a curve can be drawn.

Adiabatics.

In dealing with steam engineering problems a ratio is often used which has much the same property in heat problems as the force of gravity has in dynamical problems. If a body weighing w pounds is allowed to fall from a height H_1 to H_2 , the work done will be $w (H_1 - H_2)$ foot-pounds, or $W = w$

$(H_1 - H_2)$, from which we find $w = \frac{W}{H_1 - H_2}$, or simply $\frac{W}{H}$, if

$H_2 = 0$. In the same manner the work done by a pound of any substance when the temperature is decreased from T_1 to T_2 will be equal to this ratio multiplied by the change of temperature, or calling this ratio ϕ we may write $W = \phi (T_1 - T_2)$,

from which $\phi = \frac{W}{T_1 - T_2}$, or simply $\frac{W}{T}$, if $T_2 = 0$. This ratio

ϕ is called the entropy of the substance and is equal to the heat added while the temperature remains constant, divided by the absolute temperature at which the heat is added. Since the temperature of water remains constant during the process of vaporization, while heat is being added, the change in the

value of ϕ will be $\phi = \frac{xr}{T}$ or, in other words, ϕ is directly

proportional to the amount of water which is vaporized. During the heating process of the feedwater to the temperature of the water in the boiler, heat is being added and at the same time the temperature is also increasing, therefore the expression representing ϕ is not so simple as during the evaporating process. The expression for ϕ during the process

of heating the feedwater is $\phi = c \log \frac{T_1}{T_2}$ and the complete

expression for the ϕ of saturated steam will therefore be $\phi = \frac{xr_1}{T_1} + c \log \frac{T_1}{T_2}$. The value of ϕ_w for water and the

value of ϕ_s for steam can be conveniently taken from steam tables. Since the total heat in water is generally taken above 32 degrees F., the ϕ for steam is calculated with 32 degrees F. as zero. Since for adiabatic expansion the quantity ϕ remains constant, the equation representing adiabatic expansion in the saturated portion of the diagram may conveniently be written

$\phi - \phi_w - \phi_s = r_s + h_s = H$, which is the equation used in plotting the

adiabatics in the saturated portion of the diagram. The method employed was to assume a value at ϕ and then by finding the values of h , ϕ_w and ϕ_s from the steam tables, H was thus obtained corresponding to various pressures, and a curve drawn through the points thus found. The adiabatics for superheated steam were constructed in a slightly different manner from those for the saturated portion, as the change of ϕ with the addition of heat follows the same general law as

for water, that is, the change in $\phi = c_p \log \frac{T_s'}{T_s}$, consequently

the total ϕ for steam superheated to a temperature of T_s' will be $\phi = \phi_s + c_p \log \frac{T_s'}{T_s}$, from which $\log T_s' = \frac{\phi - \phi_s}{2.3c_p} + \log T_s$.

from which by assuming any value of ϕ , T_s' was calculated, giving an intersection between a line of constant superheat and a line of constant pressure.

Examples.

To find the work done by one pound of steam expanding adiabatically from 165 pounds absolute and 100 degrees superheat to one pound absolute: Looking on the left-hand side of the diagram of the superheated portion we find the constant pressure line marked 160 pounds and locate the intersection of a line about half way between the 160-pound line and 170-pound line on the 100-degree superheat line. This will represent the initial condition of the steam and an examination of the diagram will show that the volume of the steam is 3.38

cubic feet per pound, and the total heat in one pound of steam is 1,252 British thermal units. Follow the adiabatic curve through this point down to where it intersects the one-pound absolute pressure line and it will be found that the volume at that point is 270 cubic feet, and the total heat in the steam will be 911 British thermal units. Since during adiabatic expansion no heat is added or taken away from the steam the work done in British thermal units must be the difference between the initial and final total heat, or $1,252 - 911 = 341$ British thermal units, or since one British thermal unit is equal to 778 foot-pounds, the work done will be $341 \times 778 = 265,200$ foot-pounds. Let it now be desired to know the theoretical steam consumption of an engine working with steam under the foregoing conditions. As one horsepower is equal to 1,980,000 foot-pounds work per hour the theoretical steam consumption will be 1,980,000, divided by the work done in foot-pounds per pound of steam, which in this case is equal to 1,980,000, divided by $265,200 = 7.46$ pounds of steam per horsepower per hour.

Supposing it is desired to find the efficiency of a steam engine operating under the assumed conditions and showing a steam consumption of 12.42 pounds per brake horsepower per hour. The efficiency will be the theoretical steam consumption, divided by the actual steam consumption, or 7.46 , divided by $12.42 = .6$, or 60 per cent.

To Find the Moisture in Steam by the Use of a Throttling Calorimeter.

Supposing that steam is in the boiler at 150 pounds gauge pressure and passes through a throttling calorimeter, the thermometer of which shows 20 degrees superheat when the steam is expanded to atmospheric pressure, how much moisture does the steam contain? Since no heat is added or taken away from the steam and no external work is done, the heat in the steam after expansion to atmospheric pressure must be the same as it was when in the boiler. Therefore, if we follow the constant heat line passing through the intersection of the atmospheric pressure line and the 20-degree superheat line up to 165 pounds, it will be found that where this line of constant total heat intersects the 165-pound absolute pressure line, the quality of the steam was .9575; in other words, the steam contains $1 - .9575 = .0425$ parts moisture, or 4.25 per cent.

To find the temperature at which superheated steam becomes saturated when expanded adiabatically, assume steam at 100 pounds absolute to be superheated to 300 degrees F., and that it is desired to find the pressure at which it becomes saturated. Following the line of constant pressure 100 pounds across to where it intersects the 300-degree superheat line, gives the initial condition of the steam. Following the adiabatic through this point down to where it intersects the saturation curve, it will be found that it intersects it between the 11 and 12 pound absolute pressure line, or practically at 11.6 pounds absolute, at which pressure the steam would have become saturated.

To Find the Velocity of a Steam Jet and the Weight of Steam Passing Through an Opening.

Let it be desired to find the final velocity of the jet when steam is expanded from 165 pounds absolute and 100 degrees superheat to one pound absolute, and find the weight of steam discharged through an orifice having an area of one square inch. The velocity of a steam jet, neglecting losses, will be $V = 223 \sqrt{B. t. u. m}$, in which B. t. u. m is the heat units which are converted into work by adiabatic expansion to the pressure at the mouth of the nozzle. Therefore, by substituting the value of the work done—found in previous examples for these conditions—in the formula we get $V = 223 \sqrt{341} = 4,125$ feet per second, which will be the velocity of the jet neglecting losses in the nozzle. The weight of steam flowing through an orifice has been found to be a maximum when the final pressure at the throat of the nozzle is approximately .58 of the

initial absolute pressure. This critical pressure occurs at the smallest part of an orifice and is generally called the throat pressure and denoted by the subscript "t." Since the weight of steam passing through an opening is equal to the area in square feet multiplied by the velocity of the steam in feet per second divided by the volume of one pound of steam in cubic feet, we may write the formula for the weight of steam flowing through an area of A square inches, as

$$w = 1.553 A \frac{V}{\sqrt{B. t. u. m}}$$

Fifty-eight per cent of the initial pressure will be 95.5 pounds absolute, which is the pressure at the throat, hence the B. t. u. m will be the work done in expanding adiabatically from 150 pounds gauge pressure and 100 degrees superheat to 95.5 pounds absolute. From the diagram this will be found to be 50 British thermal units and the volume of one pound of steam at the throat condition will be 4.75 cubic feet per pound. Hence, substituting in the formula we have $1.553 \times \frac{\sqrt{50}}{4.75} = 2.31$ pounds per second.

To Find the Work During Expansion, Allowing for Frictional Losses and Leakage Losses.

When steam is expanded without loss or gain of heat to or from any external source, the losses occasioned by friction, eddying or leakage of steam will reappear as heat re-evaporating a portion of the moisture formed during adiabatic expansion, or if the steam is in a superheated condition it will tend to superheat the steam to a still further degree. As an example of how such a problem can be worked out by means of the accompanying diagram, assume that steam expands from 200 pounds absolute pressure and 200 degrees superheat to a pressure of 5 pounds absolute, assuming a constant instantaneous loss of 40 per cent; what will be the work done and what will be the increase in final volume over that in the case of true adiabatic expansion? This problem can be worked out very easily by taking the expansion in steps of, say, 20 British thermal units each. Starting from the initial condition, 200 pounds absolute and 200 degrees superheat, following the adiabatic through that point down 20 British thermal units, and then back along the line of constant pressure through 8 British thermal units, to a new point. This process is continued until a pressure of 5 pounds absolute is reached; and it will be found upon carrying out this process that the final total heat in the steam is 1,131 British thermal units, and the volume of the steam is 73 cubic feet per pound, whereas, had the expansion been adiabatic the final total heat in the steam would have been 1,022 British thermal units, and its volume 64.8 cubic feet per pound. The effect of re-evaporation and the effect of the work done by the heat loss, which is available through later expansion, is evident, as a loss of 40 per cent would only make available 178.2 British thermal units, whereas through the re-evaporation effect and that of expansion the heat actually available with a 40 per cent loss is 188 British thermal units.

These are but very few of the many other problems that can be just as easily solved by means of this diagram, which is presented with the hope that it may be of great value and assistance to practicing engineers, who have little or no time to work out such problems by the lengthy formulæ found in books.

The Portland Railway Light & Power Company, Portland, Ore., will soon receive from the General Electric Company two 40-ton 400-horsepower electric locomotives which will be used for freight train service on the Oregon Water Power Company division. Two 300-horsepower locomotives are being built in the company's shops.

The Nashville (Tenn.) Railway & Light Company carried 1,043,596 passengers during the week of the Tennessee State Fair.

LOS ANGELES INTERURBAN AND PACIFIC ELECTRIC RAILWAYS—BRIDGES AND CULVERTS.

In the construction of the later types of bridges on the Los Angeles Interurban and the Pacific Electric railways

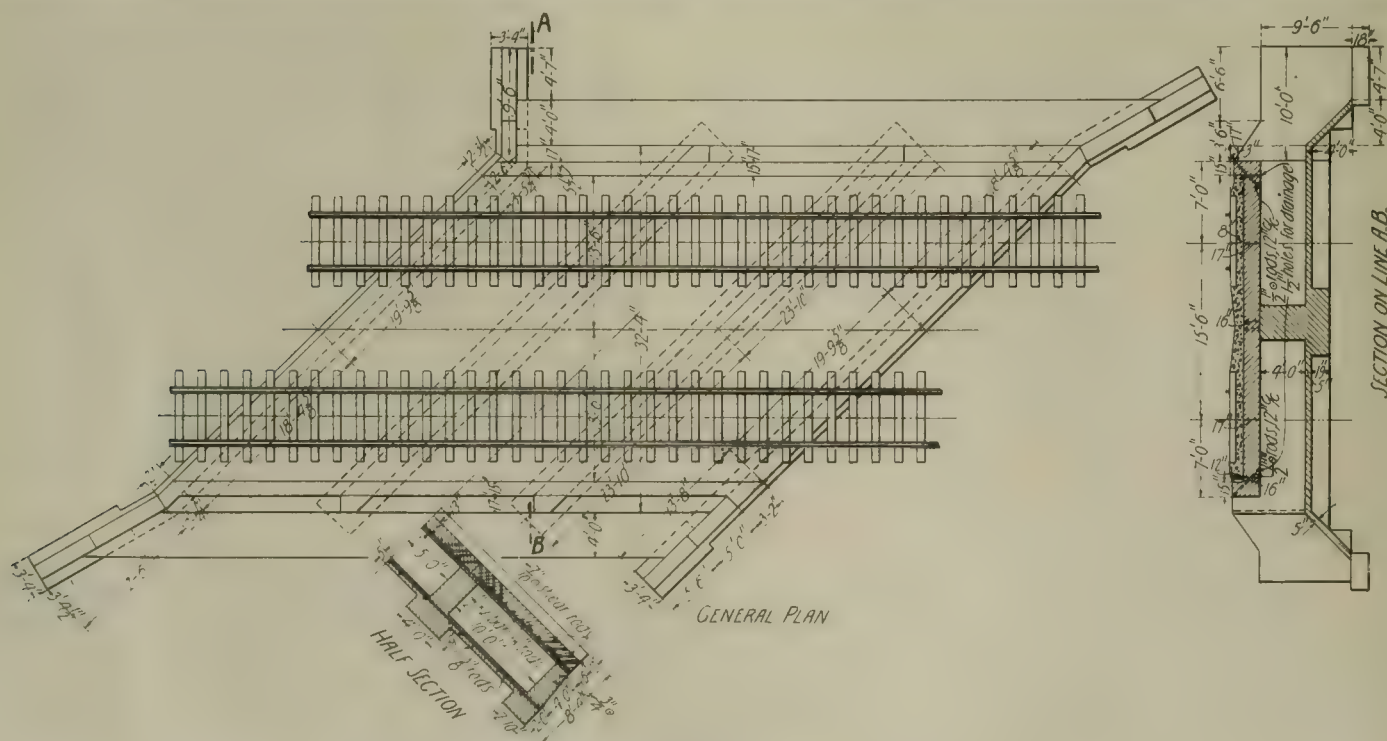
mountain stream, subject to sudden unexpected rises, is the largest of the bridges constructed. It is on the Monrovia-Glendora extension and consists of eighteen 57-foot reinforced arch spans, with spandrel walls extending 18 inches above the arches at the crown. The concrete for the foundations was



Pacific Electric Bridges—Overhead Crossing at Alhambra Avenue, Los Angeles.

reinforced concrete has been employed almost exclusively as a constructive material. The engineering problems involved in the design and construction of many of these structures are of interest more especially because of the elemental and

of 1:4:8 composition, the aggregate being taken from the excavated gravel as found, and varying in size from small gravel to good-sized boulders. The foundations rest on a substratum of gravel, which at the deepest point was 18 feet



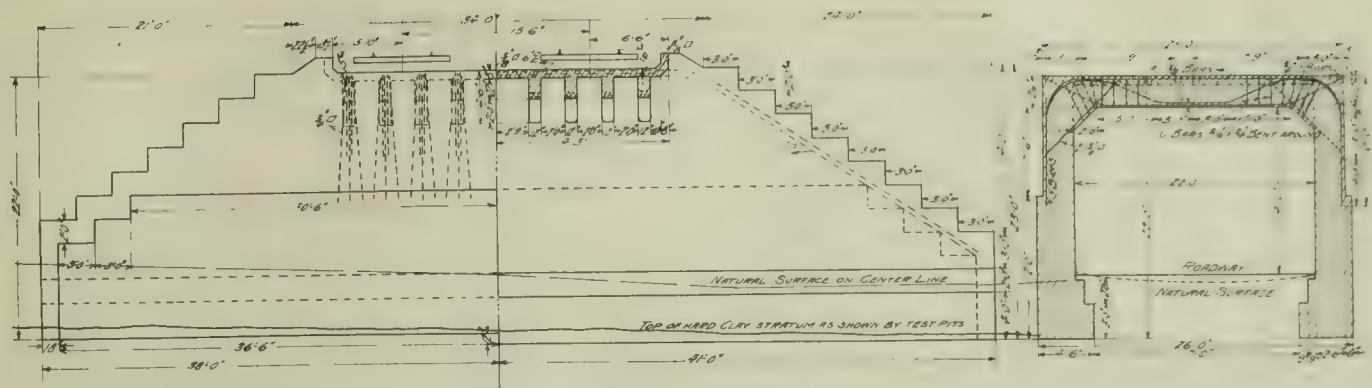
Pacific Electric Bridges—Typical Reinforced Concrete Culvert.

natural drawbacks for which the constructing engineers had to provide. The unusually heavy rainfall during the rainy season and the varying character of foundation beds were principal among these difficulties.

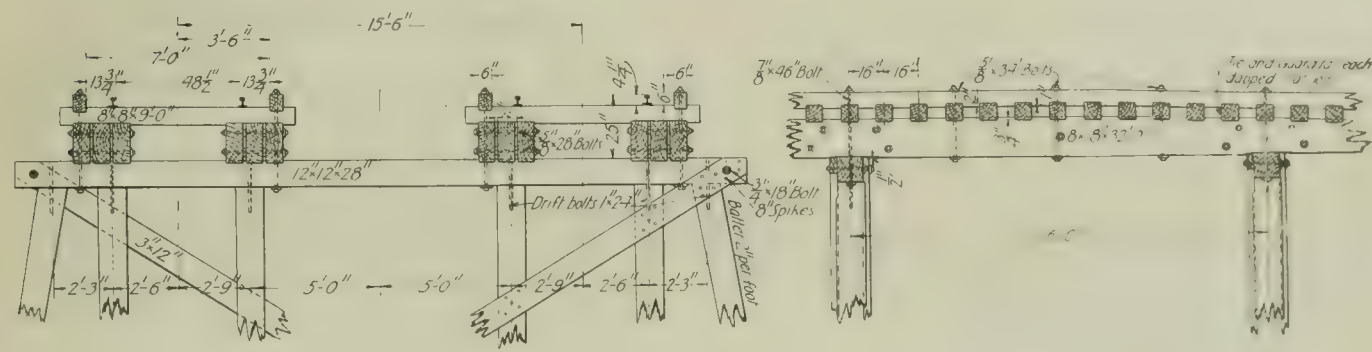
The crossing of the San Gabriel river, a treacherous

below the bed of the stream. It was impossible to handle the concrete with very extensive plants, and the mixing was done with a No. 2 Ransome concrete mixer for the foundation work and a No. 1 size for the arches and spandrels.

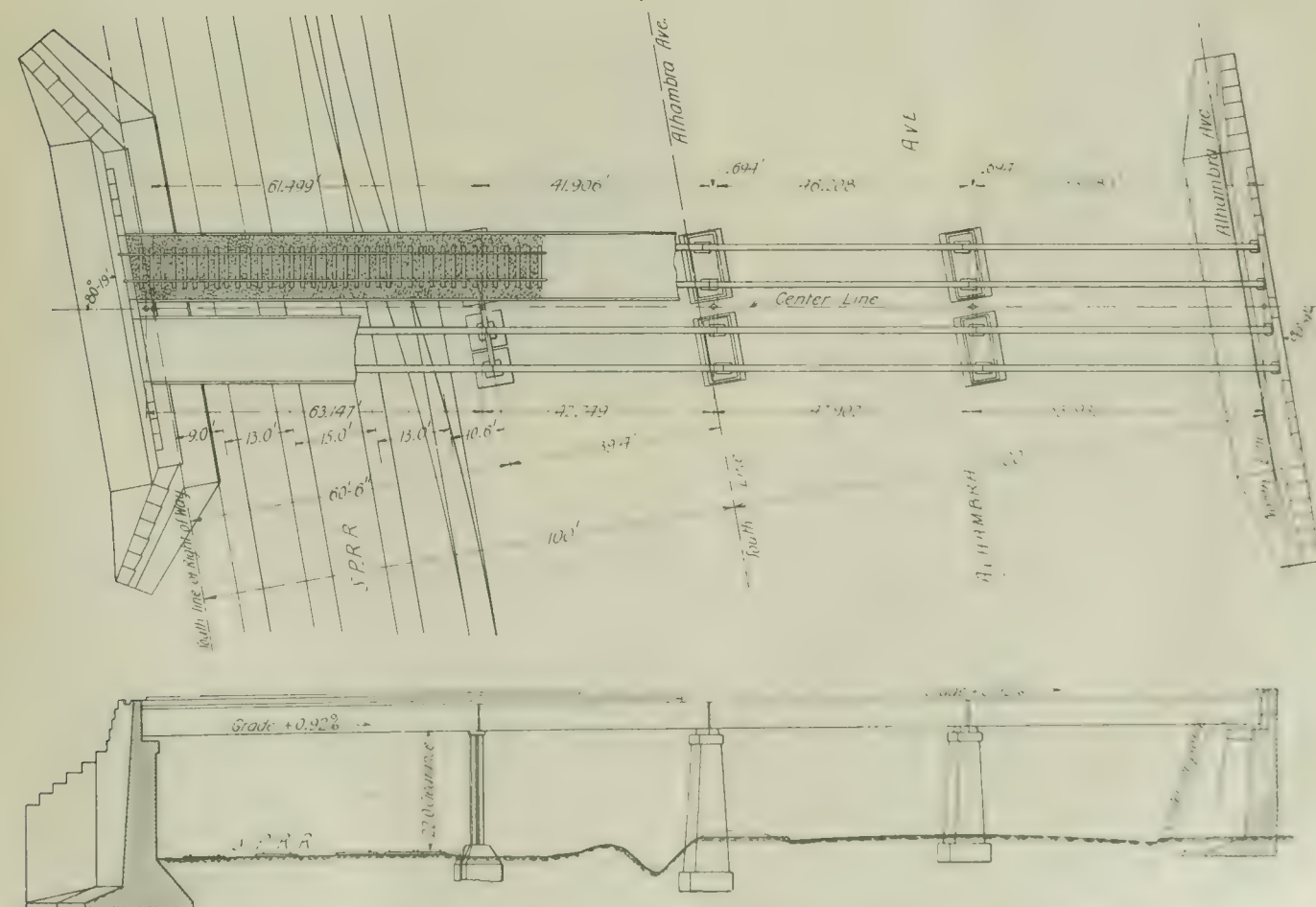
The composition used in the arches and spandrels above



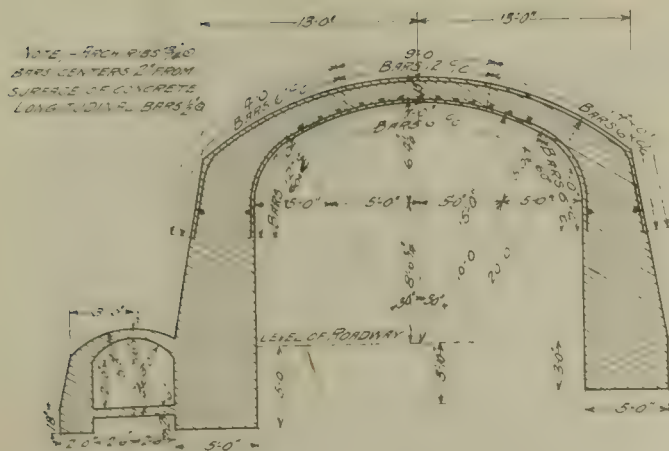
Pacific Electric Bridges—Sections of Typical Reinforced Concrete Crossing.



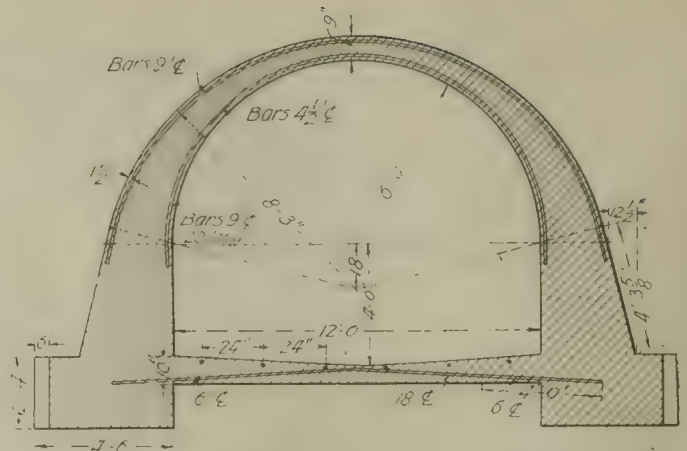
Pacific Electric Bridges—Standard Trestle Bent, San Pedro Trestle.



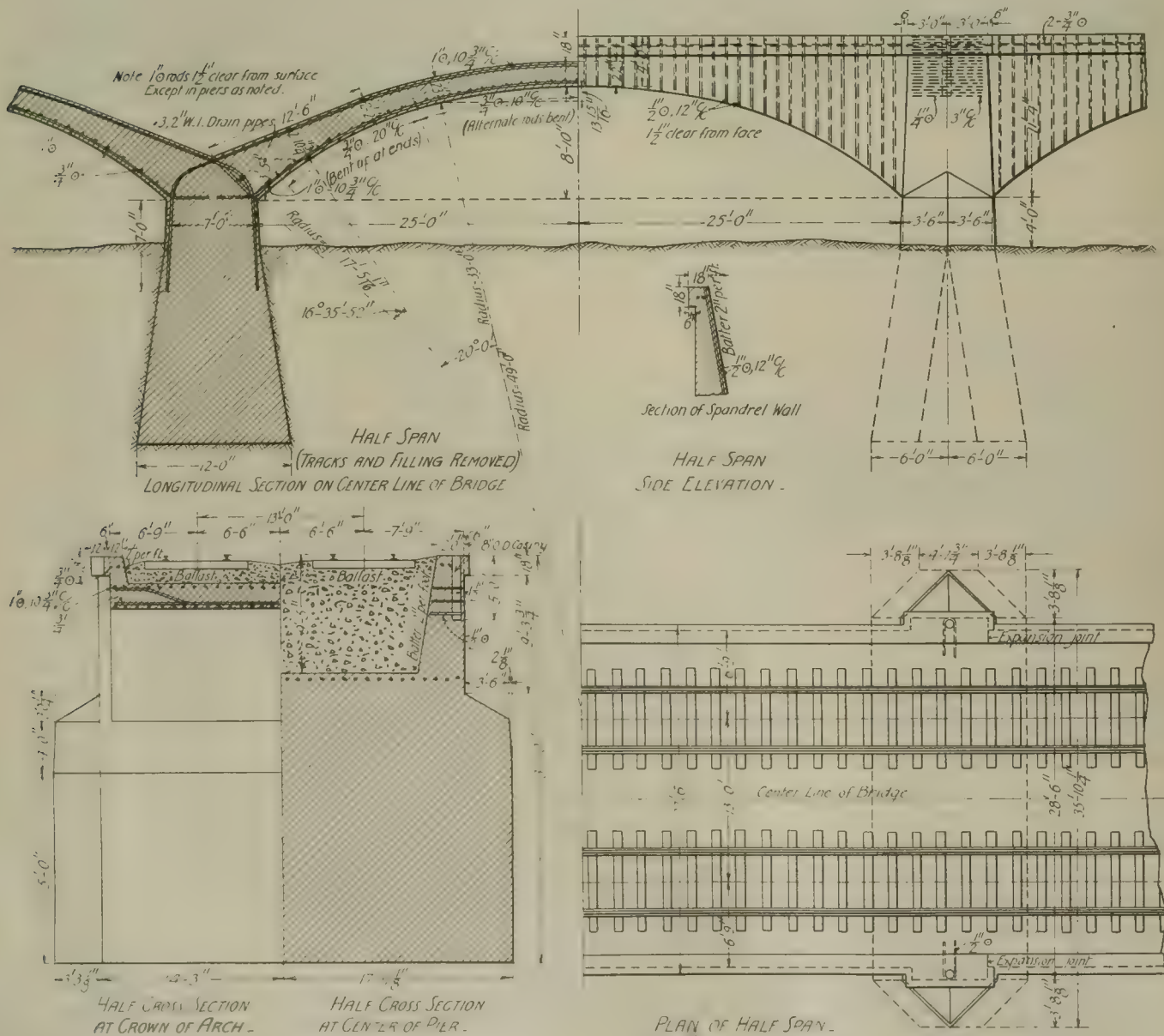
Pacific Electric Bridges—Plan and Elevation of Overhead Crossing at Alhambra Avenue.



Pacific Electric Bridges—Reinforced Concrete Overhead Crossing on the Covina Line.



Pacific Electric Bridges—Standard Culvert for Waterway.

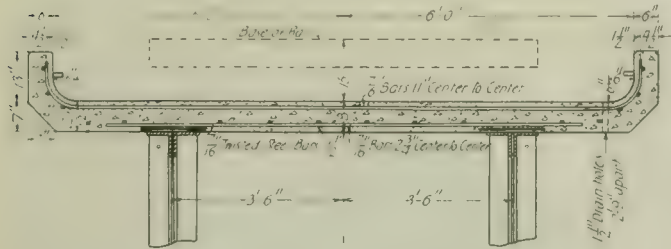


Pacific Electric Bridges—San Gabriel River Concrete Arch Bridge.

the springing line was 1:2½:5, the aggregate being more carefully selected and screened. Plain round reinforcing rods were employed throughout.

Each arch was built in two longitudinal halves, the work of completing these above the foundations requiring less than a day's time for an arch. About 145 cubic yards were required for each arch and about 40 cubic yards for the spandrels, the total amount of concrete in the bridge being about 7,500 cubic yards.

The spans and foundations were designed for a live



Pacific Electric Bridges—Cross Section of Concrete Floor of the Alhambra Avenue Overhead Crossing.

loading equivalent to Cooper's E-50, the usual impact allowance being made in addition. This loading, while appearing heavy for the purposes of an electric road, is simply an indication of what is looked for in future developments, and an example of the care employed in construction by western roads.

The design of all other concrete structures on the road employed the same loading. One of the accompanying en-



Pacific Electric Bridges—Typical Reinforced Concrete Overhead Crossing.

gravings shows a plan and sections of the spans and indicates the methods of reinforcing employed in this structure.

Alhambra Avenue Overhead Crossing.

At Alhambra avenue, on the new shore line cut-off, between Los Angeles and Pasadena, a 4-span plate girder viaduct was built to afford an overhead crossing of Alhambra avenue and the Southern Pacific Railroad tracks. The girders support a reinforced concrete floor with side walls and ballast strips for keeping the ballast in place. The concrete floor rests directly upon the track girders and is dapped about two inches over the girders to prevent lateral motion.

Culverts and Under Crossings for Highways.

Several slightly different types of simple under crossings for highways were used. All were built of reinforced concrete of proportions corresponding to those used in the San

Gabriel river bridge. Plans of three distinct types are shown in the engravings, which also show the type and method of reinforcing. Attention is called to the method of providing for the highway drainage through the structure, as shown in one of the cuts. This drainage duct is built of plain concrete throughout, with supporting foundation wall resting upon the same stratum as the main foundations.

The plan and sections of a reinforced concrete culvert show the method of reinforcing slabs for spans of 10 to 16 feet. The slabs have an actual depth of 16 inches and a theoretical or effective depth of 13 inches. Ballast walls are provided on sides and ends and eight inches of gravel ballast is placed beneath the ties.

San Pedro Trestle.

Among the roadbed structures is a double-track wooden pile trestle across a slough at San Pedro, which is 9,360 feet long. A standard bent is shown herewith, in which it will be noted that the track stringers used are 8 by 18 inches, a size which it is now almost impossible to secure in the eastern or southern states. Allowing for a 15-foot clear span, the six stringers used are light for Cooper's E-50 loading, but the structure, being temporary, is amply strong to carry the rolling stock now used.

PAINTING STEEL PASSENGER CARS.

One of the principal difficulties connected with the maintenance of steel passenger cars will be the prevention of corrosion, and this must be considered in the priming and color treatment. The finishing coats must also be such as will not be discolored rapidly by smoke and dirt and which will admit of easy cleaning. The methods used in painting wooden passenger cars must be abandoned eventually and the attempts to paint metal in imitation of wood are to be deplored.

The priming mixture should carry more pigment, a more volatile liquid and smaller proportions of linseed oil and varnish than the primer for wood. Steel does not absorb any of the protecting coatings and the drying must all be from the outside. The priming coat should not dry with a skin or high gloss, but should have a hard surface before other coats are applied. Most varnishes when applied to wood perish and absorb moisture within 18 months and their life on steel is likely to be much shorter, not only on account of the more favorable conditions for drying on wood, but from the effects of heat and cold which with steel are more severe. The fine glossy piano finish which has perhaps been one of the extravagances of wooden passenger car finish, should not be expected with steel and the tendency will be toward flat colors. With a metal surface there is a demand for some substitute for linseed oil in the priming coats and for varnish in the finishing coats. In order to preserve the metal when the surface film may be thin, high-grade enamels or a durable lacquer could be used in place of the flat colors. It is also possible that a process of electroplating the outside side sheets of steel passenger cars will be developed into a practical method of protection.

Steel plates have been rolled in combination with copper, producing a thin, uniform coating, and an effort has been made to adapt this process to the exterior sheets of steel cars. It is evident that old methods as used for wooden cars must be abandoned and something new developed for the protection and finish of steel passenger equipment. The subject opens up a wide field for investigation and invention.—The Railway Age.

During a recent trip over the new line between Plainfield and Greencastle of the Indianapolis & Western Traction Company, lightning struck the trolley wire, running down into the substation and putting the line out of commission, holding the officials of the road, including Hugh J. McGowan, C. E. Morgan, E. B. Peck and others, on the line for about four hours.

GRAIN TRAFFIC ON THE INLAND EMPIRE SYSTEM.

The accompanying engraving is from a photograph taken recently at one of the small stations on the new Spokane & Inland division of the Inland Empire System. This division runs south from Spokane into the prosperous Palouse farming country a distance of 76 miles. The photograph shows that the harvest is already well advanced and that the stream of golden grain is already en route for seacoast points. There are being operated on the Spokane & Inland division this season a chain of 30 grain warehouses and in

the same sort of general freight business as its competitors. Its freight equipment is interchangeable with the other lines under the usual rules, as the company is a member of both the American Railway Association and the Master Car Builders' Association.

NEW SANDING APPARATUS IN LIVERPOOL.

C. W. Mallins, traffic manager of the Liverpool Corporation Tramways, has designed a new device for sanding rails. This device, which is illustrated herewith, is described in



Handling Grain on the Inland Empire System.

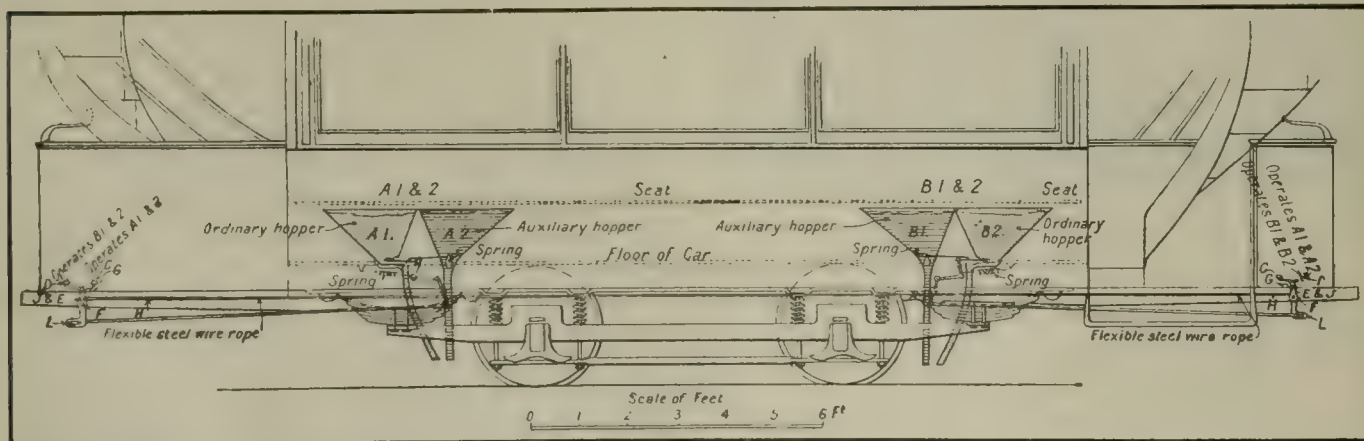
many instances the farmers are so anxious to deliver grain for shipment that the builders have been unable to finish the warehouses before delivery began.

Careful estimates of the grain crop this season in the territory lying tributary to the Spokane & Inland division show that fully 10,000,000 bushels of wheat will be produced. The Inland Empire System has entered into a traffic agree-

ment with the Great Northern Railway, and with the Spokane & International Railway, which has direct connections with the Soo Line and the Canadian Pacific, and, with the excellent electric service at its command, will undoubtedly handle a goodly portion of this grain.

The annual report of the operations of the Liverpool Tramways for the year 1906. The description is as follows:

The chief features of the apparatus consist in the use of an auxiliary hopper to contain sand, and of a system of levers and rods, by means of which a driver may, at will, cause a more copious supply of sand to fall on the rails than an ordinary sand box yields. The auxiliary hopper is fixed so that its delivery tube shall be within a few inches of



New Sanding Apparatus in Liverpool.

ment with the Great Northern Railway, and with the Spokane & International Railway, which has direct connections with the Soo Line and the Canadian Pacific, and, with the excellent electric service at its command, will undoubtedly handle a goodly portion of this grain.

Both of these traffic agreements provide for publication of through rates, which are divided on a basis regarded as mutually satisfactory to all companies. The Spokane & Inland is conducted on standard steam railroad principles, and does

the rim of the wheel, the tube of the ordinary sanding supply being fixed a little farther from the wheel. The two supplies of sand are controlled by one small foot lever. The auxiliary sand supply of the rear wheels of the car can also be brought into play without the driver having to leave his platform, in the event of a car from any cause beginning to move backwards when ascending a hill.

Under ordinary conditions the driver, on depressing the sand punch when in the position shown in the drawing and marked "C," causes the vertical lever, "E," to oscillate about its fulcrum, "F," through the intermediary levers (or ordinary

hopper rigging), bringing into operation the ordinary sanding device marked "A1." On an emergency arising, necessitating a sudden stop, the driver kicks out the clutch, "G," which limits the downward movement of the sand punch, "C," and by this means is enabled to still further depress the sand punch, and by the increased thrust bring into operation the secondary, or auxiliary, hopper, "A2," allowing a copious supply of sand to fall on the rails and making it practically impossible to skid the wheels.

In the event of a car on a greasy rail commencing to run backwards down hill, the driver, by the simple operation of kicking the sand punch around to the position shown by the dotted outline, "D," and then depressing it, puts tension on the flexible steel wire rope, "H," which is connected with the vertical lever, "J," under the rear platform. This motion is then transmitted through the hopper rigging to the rear hoppers, "B1" and "B2," throwing a flood of sand on the track in front of the wheels in the direction in which the car is then traveling. It will be noted that, owing to the reversal of the movement of the vertical lever, "E," the pin connecting the lower end of the lever with the rigging merely runs idle in the slot, "L," and consequently the hopper rigging and hoppers, "A1" and "A2," remain at rest. In a test made on a greasy rail, a car, when traveling at 12 miles per hour, was stopped in three yards by using sand from the auxiliary supply, whereas by the ordinary supply the car could only be stopped in 15 to 20 yards.

Fifty cars will be fitted with the new sanding arrangement as an experiment.

PRACTICAL VIEWS ON TRUCKS FOR ELECTRIC MOTOR SERVICE.

BY FRANKLYN M. NICHOLL.

It would seem a most opportune time, when all efforts are being centralized on the standardization of the various wearing parts of electric motor trucks, to discuss, from the standpoint of an observer, the practicability of the principles of the Master Car Builders' truck in their adaptation to electric service requirements.

Compared with the steam railway the electric railway is still in its infancy and in a grand endeavor to benefit by the long experience of its contemporary the electric railways have, among other things, almost unanimously "adopted as standard" the so-called M. C. B. design of passenger coach truck.

The passenger coach truck as designed and adopted by the Master Car Builders' Association was found, after a great many years of experience, to possess the best riding and wearing qualities for that class of steam railway service. It was adopted as standard by that association before the advent of electricity as a motive power for railways. Its design and principles were not intended to meet the requirements of a truck containing a motor, whether steam or electric.

Analyzing the M. C. B. truck it will be found to consist principally of two separate and distinct frames, the truck frame proper, carrying the bolster, swing-motion device, pedestals, brake rigging, etc., and the wheels and axles carrying the equalizing bars which are supported rigidly upon them through the journal boxes and bearings. The main truck frame is not connected to the equalizing bar frame, but is flexibly supported thereon by means of the vertical coil springs and is held in place by the pedestal jaws guided by contact with the journal boxes. The combination of the two frames constitutes an admirable means for the carrying of steam railway passenger coaches, which are virtually trail cars.

With the so-called M. C. B. electric truck the motors are suspended from the transom bars attached to the main frame and to the axles forming the equalizing bar frame, or, in other words, the motors are suspended between the frames. Thus, by reason of the action or propelling force of the motors and the independent movements of the frames, due to the actions of equalizing bar and swing motion principles, the two frames are made antagonistic to each other with the evident result of excessive wear between the parts in contact. With these conditions it is apparent that the two frames will not remain absolutely square with each other. The frames

being out of square the axles will neither remain parallel with each other nor square with the track. Excessive wear is thus caused to the wheel flanges and track and so the motors consume more power.

In an endeavor to solve the problem it is suggested that the truck should consist of a single frame, the same as a locomotive frame with properly trussed sides between its bearing points. The frame should also be laterally trussed across its center to receive the weight of the car body, motors and the excessive strains of the brakes which should be suspended, without a doubt, between the wheels. The bearing points should be provided with suitable means for relieving the frame from wheel shocks and the journal bearings should have ample lateral play to allow the wheels to safely take track inequalities, special work, etc. The bolster should be mounted in the truck without lateral or longitudinal play of any description, the approach to track curvature properly constructed relieving undue lateral motion to the car. The bolster should be as wide as possible with its full width of bearing surface upon springs. The springs should have an equally wide amount of bearing surface as the bolster and should consist of as many springs to the bundle as the distance between the transoms will permit, with leaves as long and few in number as is practical in reducing the damping effect.

With the elimination of the equalizing bar principle in the single frame truck the position of the brakeshoes in relation to the wheels will remain normal at all times, thus effecting a more efficient braking apparatus and preventing to a large extent the chattering of the brake hangers.

Again, with the single-frame truck each motor will receive its equal share of the load, which is not the case where weight is distributed alternately from one motor to the other by the principles of the Master Car Builders' type of truck.

COST OF CONCRETE POSTS.

Dellwood park, a pleasure resort near Chicago, owned by the Chicago & Joliet Electric Railway, Joliet, Ill. (described in the Electric Railway Review of February 16, 1907, page 224), contains 62 acres of land and is fenced with concrete posts. A thousand of these posts are 9 feet long and the remainder 7 feet. They are 4 by 4 inches in cross section at the top and 4 by 6 inches at the base. They are made of one part Portland cement and two parts stone screenings, ranging from dust to ¼-inch pieces. Each post is reinforced with four ¼-inch Johnson corrugated bars, one on each corner.

Two men were engaged in making the posts and could produce about forty a day. The working platform was large enough to hold 80 forms, or two days' product. In casting a post a layer of concrete would be placed in a form, then two reinforcement rods were placed, followed by a second layer of concrete, the other two rods, and then the balance of the concrete. The latter was made wet and was tamped well in place. The forms were stripped 24 hours after the posts were cast, the latter being kept wet in the meanwhile. The posts were left on the planks on the platform an additional 24 hours, and were then removed from the platform while still on the planks. They were stored at least a week on this platform and were then laid out in piles in single layers until used. For three weeks after they were made they were kept wet and for the first week of that time were covered. The two men in making an average of 40 posts a day also mixed the concrete and moved and watered the posts. Forty forms were provided and after being used in making 1,500 posts, were still in good condition. Altogether not over 3 per cent of the posts were broken after they had been made before they were set in place in the fence.

The average cost of the 9-foot posts was 65 cents each, including all expenses and based on the following prices: Cement cost \$2.00 a barrel; screenings, 75 cents a cubic yard; reinforcing steel, 3½ cents a pound; the two laborers were paid \$2.00 a day each.

The posts were allowed to season at least a month after they were manufactured before they were set.—Cement Age.

PIPING AND POWER STATION SYSTEMS—LVIII.

BY W. L. MORRIS, M. E.

Class Q 5—Steam Drips from Pump Branches.

In long pump branches the considerable condensation makes some device for removing the steam from the water absolutely necessary. For this purpose a receiver-separator is often located at the pump close to the throttle valve. By connecting this receiver to the drip system, or by using a hand-operated bleeder it is possible to get dry steam for the pump, even if the distance from the steam main is great.

The use of a receiver-separator is advisable for all classes of steam machines that are located at the end of long steam lines, the principal advantages being better lubrication and a drier steam. Where the steam machines are comparatively small and placed close together it will be much better to run a steam line from machine to machine than to put in an auxiliary main with branches. By taking steam from the top of the pipe and slightly sloping the pipe and placing a drip receiver at the lower end dry steam for the auxiliary will be insured.

Class Q 6—Drips from Pump Steam Cylinders.

The drips from pump steam cylinders are present, even though the steam branch to the pump be well drained or free from condensation. Such cylinder drains are often the only means of discharging the condensation from the branch line. The best arrangement that can be provided for pump cylinder drains is shown in Figure 330 (Q 6-1). The operation of but one valve is required to open the four drains of the duplex pump. An arrangement of check valves prevents water being blown back into the cylinder which is exhausting to the atmosphere. If the steam to the pump is fairly free from moisture these drains are closed while the pump is in operation, and for the short time they are open in starting no difficulty will be encountered in discharging to an open drain.



Figure 330 (Q 6-1).

moisture these drains are closed while the pump is in operation, and for the short time they are open in starting no difficulty will be encountered in discharging to an open drain.

Class Q 7—Steam Drips from Engine Cylinders and Checks.

All engines require cylinder drains, either as a part of the engine or pipe separator. With Corliss engines, having a release device at the eccentric rods, drips can be discharged first from steam branch to cylinder, then from cylinder to exhaust by moving the valves by hand. Engines that are not equipped with the releasing gear require drips to free them from condensation when starting up. Pipe drips should have valves worked by hand, and to provide against water while the engine is running it is customary to connect at each end of a cylinder an automatic relief valve set at a pressure slightly higher than the steam pressure. On a Corliss type of engine it is customary to place the relief valve horizontally and above the cap of the exhaust valve, as shown in Figure 157.

Class Q 8—Steam Drips from Engine Receiver and Reheater.

In an installation having compound engines, reheating receiver, steam separator, condenser, etc., as shown in Figure 331 (Q 7-1), there would be a large amount of drips. This figure also shows the cylinder drip connections which would be used in case a release device on the valve gear were not provided. The by-pass from steam separator and drip line would be used only in an emergency when the reheating coil was out of service or when the drain would not pass the water fast enough. In case of high water or bad water the use of this waste would be necessary to prevent injury to the engine.

The object in passing all drips through the reheater coil is, as previously noted, to insure quick removal and to eliminate handling drips of different pressures. The warming pipe is used before starting up and should be installed regardless of whether the valves can be hand operated or not, as it allows steam to be put on both sides of the piston. By the use of these warming pipes the different parts of the engine may

be heated and expand to their normal size and form before moving over the wearing surfaces. It is well known that a perfect, dense and glossy surface is secured in the cylinder, on the piston and valves only after considerable time and care have been expended to secure it. These surfaces can easily be destroyed by moving one part over another when they are not at their normal running temperature, in which case, instead of the pressure being low, it is sufficiently high

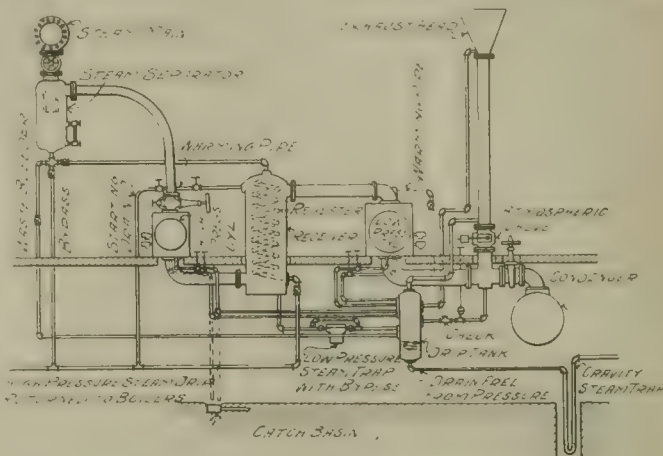


Figure 331 (Q 7-1).

to preclude the possibility of oil reaching the sliding surfaces. When an engine groans in starting up it is unmistakable evidence that the smooth surface gained by normal operation is being injured.

The starting drain at the top of the throttle is not a universal detail, as it is possible to pass this condensation through the engine by opening the throttle. By the use of the starting drain the oil is not so completely washed out of the cylinder. The cylinder drains should be piped to one side so that an extension valve stem and hand wheel placed above the floor can be used. Special care must be observed in running cylinder drips to avoid the possibility of water being drawn back into the cylinders when under a partial vacuum, as will be the case when the engine is being started and the little steam admitted expands below atmospheric pressure. Ordinarily each drain is run separately to the exhaust. The safety of this arrangement is contingent upon the certainty of the exhaust being free from water. The arrangement recommended by the engine builders is to run each drain separately to a catch basin in the basement floor, with the end of the drip pipe above the floor level, so that it is impossible to draw water back into it. In no case should the drain from one end of the cylinder be connected with the drain from the other end; each drain should be separately piped to the point of discharge, so that when one pipe is discharging water and the other one sucking air there will be no danger of water being drawn back into the cylinder. Where escaping steam is objectionable a drip tank can be used, but it should always be open to the atmosphere and to the sewer.

Class Q 9—Drips from Steam Loop.

In Figure 332 (Q 9-1) condensation is being taken by the gravity return loop from an elevation lower than the boiler into which it is discharged. To maintain this system in operation it is necessary that the weight of the column, a, shall be less than the weight of column b. The riser leg, a, will contain, when working, water at a temperature of the steam—say, 140 pounds pressure—which will make the weight of the water 55.16 pounds per cubic foot. The drop leg must be sufficiently exposed to lower the temperature of the water 100 degrees, say, to 250 degrees. At this temperature the water would weigh 58.81 pounds per cubic foot. With these temperatures, if riser, a, were 50 feet and distance, c, one foot, b plus c would have to be 47 feet, and distance, d, three feet to make the

system operative when full of water. This, however, is not the usual method of operation. The distance, *d*, is generally 15 or 20 feet. In order to maintain water in the leg, *b*, continuously heavier than leg, *a*, it will be necessary that the contents of leg, *a*, be steam and water, the steam flowing at sufficient velocity to carry the condensation upward and into the condensation pipe. The riser, *a*, must be sufficiently small to produce this velocity and the condenser pipe sufficiently large to condense the steam that passes through riser, *a*. The difference in water temperatures of the two legs is quite a negligible quantity, the system being operative with water and

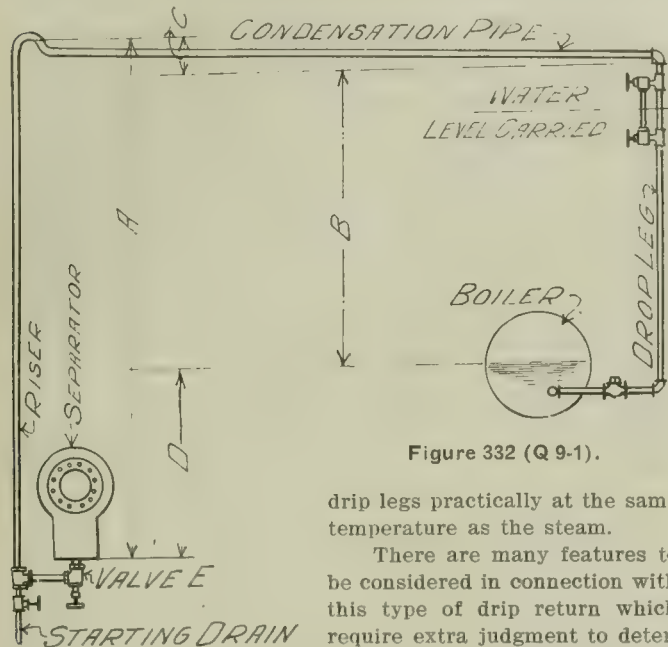


Figure 332 (Q 9-1).

drip legs practically at the same temperature as the steam.

There are many features to be considered in connection with this type of drip return which require extra judgment to determine. With a small size of riser pipe a greater pressure drop is necessary, and to permit this greater pressure drop the drop leg, *b*, must be increased accordingly. If riser, *a*, is made very large, then the riser, *b*, can be short; but the condenser pipe must be increased to condense the increased amount of steam. If the system is laid out in a comprehensive manner to do certain work, it is possible to operate this loop very satisfactorily. The valve, *e*, controls the flow through the loop and is set by observing the water level in the gauge glass at the top of the drop leg. The closing of the valve, *e*, decreases the pressure accordingly for the entire loop and the water in the gauge glass rises until its head equals all the losses.

In comparing this drip system with that shown in Figure 329 it will be noted that the two systems are very similar in that they both carry condensation to an elevation so that it will flow to the boiler—one condensing steam to effect this result, the other wasting the steam. The system shown in Figure 332 could go out of service without any ready means of showing it; but the system in Figure 329 would show quite plainly by the water passing through the feed pump.

(To be continued.)

According to an official report the number of passengers carried by the Indianapolis Street Railway and the various interurban lines entering Indianapolis during the recent Indiana State Fair shows a considerable increase over last year. The city cars carried 1,922,193 passengers during the week, as compared with 1,830,815 in 1906. The interurbans carried 163,127, as compared with 146,945 last year. On one day the city cars carried 372,213 passengers, while the interurban roads handled 37,186.

It is announced that the line of the Chicago Lake Shore & South Bend Railway from South Bend, Ind., to Kensington, Ill., will be in operation by April 1, 1908. The road will connect with the Illinois Central Railroad at Kensington.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Offices and Franchises Exempt from Taxation.

North Jersey Street Railway Company v. Mayor, etc., of Jersey City, 67 Atlantic Reporter, 33.—The court of errors and appeals of New Jersey holds that, under the general tax law of 1903, which exempts from taxation under this act among other things, "all offices and franchises, and all property used for railroad and canal purposes, the taxation of which is provided for by any other law of this state," all offices and franchises are excluded from taxation under this act, whether taxed under other laws or not. The qualifying clause relates only to the last antecedent, to wit, property used for railroad and canal purposes.

Passengers After Alighting Going on Other Tracks.

Eagen v. Jersey City Hoboken & Paterson Street Railway Company, 67 Atlantic Reporter, 24.—The court of errors and appeals of New Jersey had here a case where a passenger who had alighted from a trolley car passed behind the car and proceeded to cross the track on which cars ran in the other direction. He apparently made no observation for his own safety except to "look up" when the car from which he had alighted prevented his view of the other track, and, without waiting until that car had passed sufficiently far to permit observation, entered on that track and was struck by a car thereon before he had seen it. That car was not shown to have been running at excessive speed. The court holds that his negligence contributing to the injury he received was so disclosed as to leave no question to be submitted to the jury. Whether the duty which the trolley company owed to him as a passenger just discharged from one of its cars exceeded that which it owed to any foot passenger attempting to cross its tracks was not involved. The fact that he had been a passenger did not relieve him from the duty on his part to take reasonable care for his own safety.

Vestibule Law is Constitutional.

Beaumont Traction Company v. State, 103 Southwestern Reporter, 238.—The court of civil appeals of Texas says that this suit was brought by the state to recover the penalty denounced by Section 2 of the act of April 3, 1903, for operating an electric car, other than a train car attached to motor cars, during the period beginning November 15 and ending March 15, without having the forward end of such car provided with a screen or vestibule such as to fully protect the motorman or other person directing the motive power by which such car was propelled from wind and storm. It was alleged that such car was operated by the defendant on January 22, 1906, at a time when there were no excursionists visiting the city. The case was tried without a jury and judgment was rendered in favor of the state for \$100, which is here affirmed. The act under which the suit was brought was clearly within the legislative power of the state. It is a police regulation not by or in violation of any provision of the United States.

Liability for Injury from Derailment Caused by Boy Putting Brick on Track.

O'Gara v. St. Louis Transit Company, 103 Southwestern Reporter, 54.—The supreme court of Missouri, division No. 2, says that the plaintiff was a passenger in one of the transit company's cars, and, while sitting in her seat, was injured by the sudden derailment of the car and its collision with a telegraph post on the side of the street. The company insisted that the plaintiff ought not to recover damages because her injuries were the result of the wrongful act of a stranger over whom it had no control, namely, a school boy who had placed a brick on the track. If it could establish that the plaintiff's injury was caused solely by the act of the boy or

some third person placing the brick on the track, then it must have shown the good legal excuse for the exemption from liability. The law makes each man liable for the consequences of his own negligent and wrongful act, but it does not attempt to hold him for the misconduct of another over whose acts he has no control, unless his negligence concurs with that other in causing damage.

Again, the court says that unquestionably it is the law as declared by the court that it was the duty of the defendant to maintain its track in safe condition, and, while it was not to blame in the first instance for the tortious act of the little boy in placing the brick on the track, it was its duty if by the exercise of ordinary care its servants could have seen the brick upon the track in time to have avoided running over it and thereby derailing its car, to have done so. If it was impossible with the means and appliances then at his command for the motorman to have stopped the car in time to avoid the derailment, then the defendant was not liable. But the rule which would exonerate the defendant on account of the little boy placing the brick upon the track only clothes the defendant with immunity when its own negligent act does not concur with that of the tortious act of the stranger in producing the damage. Keeping in mind always the obligation which the law places upon a common carrier of passengers to exercise that high degree of care in maintaining its tracks that a very prudent man would in like circumstances, it is obvious that it was the duty of the defendant not only to have a well-constructed track in the first instance, but to use a high degree of care in keeping it free of obstacles which might cause a derailment of its cars.

Intoxicated Person Kicking at Conductor and Hitting Passenger—When Duty to Refuse Admission to Cars.

Brehony v. Pottsville Union Traction Company, 66 Atlantic Reporter, 1006.—The supreme court of Pennsylvania says that a passenger, more or less under the influence of drink, who had refused to pay his fare when demanded, and thereupon became disorderly in resisting the conductor who was attempting to eject him, gave a violent kick directed at the conductor, but which struck the plaintiff occupying a seat opposite in the car, and seriously injured her. This action was brought against the traction company to recover damages for the injuries sustained, on the ground that the company unlawfully and negligently permitted the person who inflicted the injury to get on the car and ride therein while visibly intoxicated. The case went to the jury to determine the question of the conductor's negligence from the testimony of witnesses, none of whom saw anything in the appearance or conduct of the man as he entered the car to attract or excite suspicion, though they agreed in saying that he subsequently gave unmistakable evidence of being intoxicated. The only question presented was whether it was negligence to admit this passenger. The court thinks that it was error to refuse the defendant's point that under all the evidence in the case the verdict of the jury must be for the defendant.

It is the duty of a conductor, the court says, to exercise a watchful care for the safety of his passengers; and this duty may require him under certain conditions to refuse to admit into his car a person applying. If one applying for admission bears upon his person signs convincing to the ordinary mind that he is afflicted with a dangerous and contagious malady, it is manifestly the duty of the conductor to exclude him. If one evidently a maniac applies, the duty to reject is quite manifest. If it be said these are extreme cases, the answer is that only in extreme and exceptional cases does the duty arise. In the cases mentioned common prudence should inform the conductor that the admission of either would be attended with danger to the other passengers, and it would be negligence on his part to allow it.

But such danger cannot be affirmed of admitting a person who is simply intoxicated. Intoxication is not infectious; nor

does it so ordinarily express itself in violence that disturbance of the peace of the car is to be reasonably apprehended when an intoxicated person is admitted. There may be, and doubtless are, exceptional cases where the intoxication is so gross, the conditions resulting therefrom so offensive, the conduct of the individual so unbecoming and violent, as to justify, and indeed require, his exclusion. If this was the condition of the offending passenger here, so obvious that the conductor should have observed it, such facts should have been made to appear as part of the plaintiff's case. It was essential to a recovery.

When "Practicable" to Change Grade Crossing.

Pittsburg Cincinnati Chicago & St. Louis Railway Company v. Indianapolis Columbus & Southern Traction Company, 81 Northeastern Reporter, 487.—The supreme court of Indiana says that this action was prosecuted under Section 5 of an act approved March 3, 1903, to change a grade crossing to one below or above grade. Under this statute the first and controlling question for the trial court to determine was whether it was or was not practicable to change the grade crossing to one below or above grade. If determined in the negative, there was nothing else to decide; if in the affirmative, then followed the dependent duties pointed out by the statute.

The words of the statute are: "If the court shall find that it is practicable," etc. It was argued that the term "practicable," as employed in the statute, should be taken in the sense of physically practicable; or in the sense of an engineering problem. But the court thinks that construction too narrow. Conceding, without deciding, that it is the legislative purpose to discourage, and ultimately to eliminate, ordinary grade crossings, still the court thinks that it was intended that the object shall be effected in such a reasonable and conservative manner as will not prove unduly oppressive to the railroad companies, nor be in disregard of the rights and interests of the public.

The word "practicable," as used in the statute, the court thinks should be given its usual and ordinary meaning as indicated by its context. Plainly it is not synonymous with "possible." A thing practicable must necessarily be possible, but a thing may be possible that is not practicable. It cannot refer to apparent difficulties and cost alone, or the words "finds practicable" become an idle phrase; for, under modern engineering skill, there is hardly anything but may be accomplished at some cost. It should not be held to relate solely to the removal of perils from persons carried by the cars, for the work might be so difficult and expensive as to amount to confiscation.

The question, therefore, depends upon the circumstances of each particular case. These circumstances may be many and varied. Among them, the difficulties to be overcome in changing from a grade to a crossing above or below grade; the cost, whether reasonable or extraordinary; the extent of public travel; the frequency of trains and cars; the character of the country, whether level or hilly; whether the employees of one company may see the cars of the other company far enough away to put their own under control before reaching the crossing; to what extent, if at all, dangers to persons being conveyed by the cars will be eliminated; whether the dangers from ascending and descending the long gradients made necessary by the elevation or depression of the track of the crossing company will be greater or less than the dangers from collision encountered at the grade crossing; the availability and efficiency of well-known devices for the avoidance of collisions at grade; and such other surrounding conditions as naturally and reasonably address themselves to the judgment of prudent and cautious persons.

The first regular cars were operated over the new extension of the Evansville & Eastern Traction Company from Hatfield to Richland, Ind., three miles, on October 4.

News of the Week

The Chicago Traction Litigation.

Further litigation to delay settlement of the traction problem in Chicago was begun on October 15, when petitions were filed in the United States circuit court charging Receiver Marshall E. Sampsell of the Chicago Union Traction Company with exceeding his lawful authority as a receiver in withholding interest due on bonds, and attempting to coerce bondholders into accepting the plan of reorganization whereby the Chicago Railways Company would obtain operating control of the north and west side street railways. The petitioners are the Guaranty Trust Company of New York, original judgment creditors in the proceedings that caused the appointment of receivers for the property April 22, 1903.

The petitions filed were against Mr. Sampsell, as receiver for the Union Traction Company and for the North Chicago Street Railroad Company. A third petition, on behalf of West Chicago Street Railroad interests, is expected.

It is charged that it was the duty of Mr. Sampsell as receiver for the North and West Side companies to collect rentals from the Union Traction Company, and that he has not done so. "But with the effect of creating an apparent lack of funds with which to conduct the business of said receivership and an apparent excuse for turning over most of said property to the said Chicago Railways Company, and for making default in the payment of the obligations of the North Chicago Street Railway Company for interest and rentals as aforesaid, he has acquiesced in and encouraged the disbursement by the receiver or receivers of the Chicago Union Traction Company of the funds in his or their hands for purposes not warranted by any order of the court," the petition says.

The court is asked:

"To direct an investigation by a master in chancery of all the doings of Marshall E. Sampsell and the late James H. Eckels, as receivers, including all allowances for 'compensation, solicitors' fees and other expenses,' and to make an order on the report as may be equitable.

"To direct Receiver Sampsell to proceed against the Chicago Railways Company for recovery of all moneys improperly disbursed by the receiver or receivers of the Chicago Union Traction Company to or for account of the Chicago Railways Company, and to enforce if necessary for the collection of such moneys the personal liability of stockholders of the Chicago Railways Company.

"To increase the bonds of Marshall E. Sampsell and Henry A. Blair, within the next 30 days, to \$250,000 each, the present bonds being \$25,000 each.

"To direct Receiver Sampsell to pay, as receiver for the Union Traction Company, interest due or that may become due on bonds, and the rentals specified in the modified lease.

"To enter a final decree of sale of the property 'as soon as may be in the regular course of procedure.'"

State of the Copper Market.

The Amalgamated Copper Company on Thursday reduced its quarterly dividend from 2 to 1 per cent. The directors issued a statement saying that in arriving at their decision they were "governed by the fact that the copper market has been for the last few months in a most unsettled condition. The business of the manufacturing consumer has been so depressed that only a small portion of the copper produced has been sold, and that at such a decreased price that necessarily the earnings realized by the producing companies have been affected."

The statement says also that at present the output of the Amalgamated mines is about 40 per cent of the regular output, that the physical condition of the mines is the best in their history and that they have on hand large stores of refined copper.

Joint Rates and Routing Required Under New Michigan Railroad Law.

By the provisions of the new Michigan railroad law interurban electric lines must have joint rates and routings with steam lines and in certain cases, where a shipper desires to unload or load a freight car, the Michigan railway commission may compel a steam railroad to turn over its empty or loaded freight cars to an electric interurban line, to be switched by the latter to any point not reached directly by the steam road. This is practically the same measure as that enacted by the last Indiana state legislature and tested by the railway commission in that state in the case of the Cleveland Cincinnati Chicago & St. Louis Railroad and the Indiana Union Traction Company. In this case the electric line touched a point

six miles from the tracks of the steam road. The traction company was willing to switch the cars of the steam road to a point where the shipper could unload, but the steam road refused to allow its cars to leave its tracks. The Indiana railway commission ruled that the steam road must comply with this section of the law and turn its cars over to the traction line for delivery to the shipper. As most of the larger interurban roads in Michigan are equipped with facilities for handling heavy freight and express business, compliance with the provisions of the measure undoubtedly will facilitate the delivery of material to shippers at points remote from steam railroads.

Recent Accidents.

Twenty persons were injured in an accident on the Chicago Union Loop Monday afternoon, October 14, when a train on the Douglas Park branch of the Metropolitan West Side Elevated ran into the rear coach of a South Side Elevated train at State and Van Buren streets. The passengers on the South Side train were just alighting at the station when the accident occurred and in the panic following the attempt to escape many of the passengers were trampled, four of whom were seriously injured. The motorman in charge of the Metropolitan train states that he applied the air brakes when at a point 75 feet from the rear coach of the South Side train, but that the wheels slid along the tracks after the brakes were applied. Traffic was delayed for about half an hour. Officials of both railroads attribute the accident to defective brakes.

As the result of a collision on the Buffalo & Lake Erie Traction line at Moorheadville, Pa., on October 14, 25 persons were injured. The accident was caused by a misplaced switch, which allowed a passenger car running at the rate of 30 miles an hour to leave the main track for a siding, where it collided with a work car.

In a rear-end collision between two cars of the Oakland (Cal.) Traction Company on October 7, two passengers were seriously hurt and four severely bruised. It is stated that the accident was caused by some one on the first car tampering with the trolley rope, which cut off the current and brought the car to a sudden standstill. This allowed no time for the motorman of the car following to apply the brakes in time to prevent the collision which followed.

One passenger was killed and 30 injured in a street car wreck in Cincinnati, O., on Wednesday, October 16, when an Elberon avenue car went over a 25-foot embankment at Mt. Hope, in the western part of the city. The car jumped the track while going down a steep grade, landing upside down at the foot of the declivity. Most of the injured were pinned beneath the heavy trucks, which crashed through the floor of the car.

Cleveland 3-Cent Fare Franchises Illegal.

At Cleveland, on October 15, Judge Lawrence of the common pleas court rendered a decision holding illegal franchises for so-called "3-cent fare" lines on the east side, except a small section constructed on East Fourteenth street, which covers about two blocks. The court held that the franchises for 3-cent lines on the west side were valid, because they were granted prior to the date upon which Mayor Johnson was alleged to have become financially interested in the roads. The substance of the decision is that all of the grants applying to the territory west of the center of the public square are valid and legal grants, but that, excepting as to East Fourteenth street, which is reserved for future consideration, all of the grants applying to the territory east of the public square are invalid.

It is announced that the street railway committee of the city council of Cleveland has agreed to accept from the Cleveland Electric Railway Company \$84,488.37, the amount fixed by A. B. du Pont and Henry J. Davies as arbitrators as the amount which the company owed the city as its profits from the operation of the Central-Quincy lines from March 23, 1905, when the franchises expired, to January 12, 1907. The Ohio supreme court on October 3 gave a decision in the case of a property holder against the Forest City Railway, asking that the company be enjoined from laying tracks on Brownell avenue. The court holds that the city has a right to give frontage consents for property it owns and dissolves an injunction granted by a lower court over a year ago.

A series of newspaper discussions of the traction problem, city expenditures and local politics is being held in the daily newspapers of Cleveland between Mayor Tom L. Johnson and Theodore E. Burton, according to the following programme:

In the morning papers 1,000 words is allowed for the candidate who is to open the debate, 1,000 words for the reply, and each side is to have 500 words for rejoinder. In the afternoon papers each side is to be presented in 100 words.

Morning newspapers—Friday, October 18, "The Traction Problem," affirmative, Mr. Burton; Sunday, October 20, "The Traction Problem," Mayor Johnson, affirmative; Tuesday, Oc-

tober 22, "City Expenditures," Mr. Burton, affirmative; Friday, October 25, "Cleveland's Bonded Debt," Mayor Johnson, affirmative; Sunday, October 27, "The Machine," Mr. Burton, affirmative.

Evening newspapers—Friday, October 18, "The Traction Problem," Mr. Burton, affirmative; Saturday, October 19, "The Traction Problem," Mayor Johnson, affirmative; Tuesday, October 22, "City Expenditures," Mr. Burton, affirmative; Thursday, October 24, "Cleveland's Bonded Debt," Mayor Johnson, affirmative; Saturday, October 26, "The Machine," Mr. Burton, affirmative.

The candidate having the affirmative in each discussion sends his manuscript to his opponent, that the latter may prepare his reply. The reply is sent to the nominee having the opening for his rejoinder, which is sent in turn to his opponent, so that each debate will be complete when published.

Express Company Will Handle Interurban Business.—Representatives of Wells, Fargo & Co. are completing arrangements for handling the interurban express business of the Ft. Wayne & Springfield Railway. The service will be inaugurated on November 1.

New York City Railway to Increase Service.—The New York City Railway Company has agreed to comply with the proposed order of the public service commission for an increase of service on the Broadway surface line below Houston street. The increased service will be effective from 7 a. m. to 7 p. m.

Easton, Pa., Cannot Regulate Street Railway Fares.—Judge Scott of the Northampton court has filed a decision in a suit brought by the city of Easton, Pa., against the Easton Transit Company to compel the company to sell 25 tickets for a dollar, that a city of the third class has no legal right to fix the rate of fare.

New Through Service on Indiana Line.—The Terre Haute Indianapolis & Eastern Traction Company has inaugurated a fast service between Indianapolis and Crawfordsville on the northwestern division of the system. In addition to the local cars there will be three through cars run daily in each direction, covering the 53 miles in 1 hour and 30 minutes.

Extra Meeting of the Western Society of Engineers.—At an extra meeting of the society held in Chicago on Wednesday evening, October 16, Prof. F. E. Turneaure presented a paper on "Experimental Determination of Stresses in Web Plates and Stiffeners of Plate Girders." The next regular meeting of the society will be held on November 6, 1907.

Electric Railway Employees' Convention Ends.—The annual convention of the Amalgamated Association of Street and Electric Railway Employees, which was held in New Orleans, La., concluded its sessions on October 14. All of the old officers and directors were re-elected. The next annual meeting of the association will be held in Toronto, Can.

Work of the Public Service Commission.—An examination of the property account and other accounts of the Metropolitan Securities Company on behalf of the public service commission, first district, New York, shows that there was paid to lawyers between February 19, 1902, and September 20, 1907, \$916,438. During the same period the New York City Railway and the Metropolitan Street Railway paid to counsel \$238,227.

Through Tickets from Springfield to Worcester.—The Springfield Street Railway and the Worcester Consolidated Street Railway companies have put into effect a system of through tickets to points between Springfield and Worcester, Mass. Heretofore passengers making the entire trip have had to pay sixteen 5-cent fares. The new tickets will contain a list of stations with the rate of fare to each and will be punched at the point of destination.

Ft. Wayne & Wabash Valley Freight Service.—Two additional freight cars have been added to the equipment of the Ft. Wayne & Wabash Valley Traction lines to care for the rapidly growing freight business of this road. The growth has been particularly noticeable since the opening of the Lafayette & Logansport extension and the service now in operation on the passenger cars and one freight car is no longer adequate for the increased business of the company. The new service will be inaugurated next week.

Rehabilitated Line Opened in Chicago.—The first of the rehabilitated traction lines in Chicago to be completed is the Chicago City Railway Company's Indiana avenue line, which, on October 11, was opened from Fifty-first street to Thirty-ninth street. The work on this portion of the line was begun last August and has cost about \$150,000. Reconstruction work on States street and Cottage Grove avenue has progressed from the southern termini to Sixty-third street, and it is believed that it may be completed as far as Forty-seventh street

or possibly Thirty-ninth street this year. In all 45 miles of new track has been laid in Chicago under the direction of the board of supervising engineers and the work is progressing in all parts of the city.

Electrification of Southern Pacific Suburban Lines Near Oakland.—The suburban lines of the Southern Pacific across the bay from San Francisco, which it is intended to equip for operation by electricity, comprise the following: From Alameda pier to Melrose, 8.42 miles, of which 6.08 miles are double track; Alameda pier to High street, 6.91 miles of double track; Oak Junction to Twentieth and San Pablo streets, 1.84 miles, of which 0.98 mile is double track. The total is 17.7 miles of line, comprising 3.20 miles of single track and 13.97 miles of double track, or a total equivalent of 31.4 miles of single track.

Commission Orders More Cars on New York Subway and Elevated Lines.—The public service commission has ordered the Interborough Rapid Transit Company to place 392 additional cars in operation on its subway and elevated lines during the periods just before and just after the rush-hour traffic. A part of the order was effective on October 14, but owing to lack of available equipment for immediate compliance on all of the lines the company was given until October 25 and November 20 in which to provide for the additional service on the remainder of its system. The order as a whole is effective until April 1, 1908.

United Railroads Suffer from Lack of Power.—Charles N. Black, general manager of the United Railroads of San Francisco, is quoted as saying that the road is losing \$5,000 a day on account of the present crippled condition of its system, caused by the insufficient supply of power furnished by the California Gas & Electric Company's plant at Electra. The company cannot operate all of its cars and the cars are so crowded that the conductors are missing a large number of fares. The lack of power is due to an accident at the Electra plant, but the damage is expected to be repaired and new machinery installed within three weeks.

Wells, Fargo & Co. Get Express Contract in Pittsburg.—A contract has been closed between Wells, Fargo & Co. and the Pittsburg & Butler Street Railway Company by which the express business of the Erie Railroad in Pittsburg will be handled by the Wells Fargo company over the lines of the Pittsburg & Butler Street Railway. Connection with the interurban line will be had by the Lake Erie & Bessemer Railroad at Butler. Special baggage and express cars will be furnished by the street railway company and as soon as the minor details have been arranged and an office opened in Pittsburg, the new service will be inaugurated.

Work is Begun on the Evanston Extension of the Northwestern Elevated.—The work of converting for electrical operation the Chicago Milwaukee & St. Paul Railway between Wilson avenue and Evanston, over which the Northwestern Elevated will operate its trains, was begun on October 11 by the planting of the first trolley pole. General Manager E. C. Noe, accompanied by a party of officials and north shore residents, went by special train and automobiles to Ainslie street and the Chicago Milwaukee & St. Paul tracks, where the ceremony of breaking ground for the planting of the pole was conducted. It is planned to have the line completed and in operation by the end of the year.

East River Tunnel is Completed.—The completion on October 15 of the south tube of the new Belmont tunnel under the East river between Manhattan and Long Island City, and its formal transfer to the trustees of the New York & Long Island Railroad Company, marks the end of the actual construction work on this undertaking and the beginning within a short time of the operation of electric cars through it. The north tube has been ready for traffic for several weeks and as soon as the working tracks in the south section have been removed new tracks will be laid and the overhead equipment installed for actual operation. Ground was broken for the building of the tunnel on July 14, 1905.

Peoria Citizens Cripple Street Railway Service.—The controversy between the village of Peoria Heights and the Peoria Street Railway Company regarding the terms of the new franchise applied for by the company resulted on October 8 in the tearing up of a section of the tracks by the citizens of that village and the consequent stoppage of street car service to Peoria. The trouble arose out of certain clauses in the franchise regarding a change in the running time between Peoria and Peoria Heights from 12 minutes to 15 minutes; the statement that only three-fourths of a mile of track would be operated in the village; that cars would be run only to Sieberling avenue, a point considered to be not convenient to the majority of the people, and other inconveniences which the company is said to have declined to remedy. The citizens

have now organized a "bus" line of their own, consisting of all the available vehicles in the village, which they declare will be used until the matter has been settled to their satisfaction. The company has filed an injunction against the village of Peoria Heights restraining the citizens from further molestation of its tracks and property in the village, particularly its cars, several of which have been tied up at the end of the line because of the action of the citizens in tearing up the tracks and cutting the trolley wire. Final settlement of the question will be made on October 21, when a new franchise will be presented by the company to the village board.

Recommends Reduction in Brooklyn Rapid Transit Assessment.—Ex-Judge Abraham R. Lawrence, who was appointed referee some months ago to take testimony in the actions brought by the Brooklyn Rapid Transit Company and its subsidiary corporations for a reduction of the assessments of the properties owned, recently reported to the supreme court that in his judgment the assessments should be reduced. The original assessments amounted to \$14,013,000. The referee claims that this should be reduced to \$7,524,143. It is claimed that many of the items put in by the tax commissioners should have been omitted entirely and that there is an established rule that only 72 per cent of the actual value should be assessed.

Meeting of the American Society of Mechanical Engineers.—The society will hold its next regular monthly meeting on Tuesday evening, November 12, at 8:15 o'clock, in the building of the Engineering Societies, 29 West Thirty-ninth street, New York. The principal address will be made by Charles R. Pratt and will treat of features of construction and operation of the gearless traction electric elevator, which is being installed in the Singer and Metropolitan Life, New York's two highest buildings. The paper will be discussed by engineers and architects from New York, Philadelphia and Chicago. It is expected that the subject will be exhaustively treated from the view of the architect and the engineer. The members of all professions are cordially invited to attend.

New Bridge to Relieve Car Congestion in Chicago.—By the opening of the new bridge which has just been completed over the Chicago river at Dearborn street, an additional outlet for the cars of the Chicago Union Traction Company to the north side has been secured and the partial relief of the street car congestion in Clark street made possible. By the new system of car routing which it is now planned to put into effect for the rush-hour traffic, half of the cars of all the lines which heretofore have crossed the river at Clark street will be diverted to Dearborn street, thus dividing the traffic between two bridges. The Chicago Union Traction Company has its tracks laid and the overhead work completed in readiness for the operation of its cars over the new structure as soon as the necessary formalities pertaining to the transfer of the bridge to the city have been observed.

Proposed Statute for Electrification of Steam Lines Entering Chicago.—The council committee on state legislation of the Chicago city council completed on October 16 the draft of a statute to compel the electrification of all railroads entering the city using steam as the motive power. The statute is recommended for enactment as a state law and provides that in all cities having a population of more than 200,000 steam operated lines must be converted for operation by electricity, compressed air or other power which does not require steam or combustion on the locomotives. The change must be made within three years after the law goes into effect, the railroads being liable to a fine of \$500 per day for each locomotive operated by steam after that date. Plans for the change must be submitted to the city authorities by the railroad companies within six months after the passage of the law.

New Method of Recording Interurban Fares.—The Alton Granite & St. Louis Traction Company, Alton, Ill., is experimenting with a "hat check" system on its interurban lines which it is believed will greatly simplify the work of the conductors in keeping track of the fares and destination points of passengers, especially during the heavy week-end travel. The system was designed by G. C. Pierce, general superintendent, and probably will be placed in general use on all of the company's lines. The check is formed in duplicate, one-half being given to the passenger on receipt of his fare and the other retained by the conductor after he has punched both for the following information: Point at which the passenger boarded the car; destination; fare (whether cash, transfer, ticket or half fare); amount paid; car on which trip was made; date. This information is so arranged that generally only two and never more than three punches are required. The check, therefore, not only serves as a fare receipt, but is also a complete record of the transaction, which can be produced by either party should a question arise regarding any of these points between the passenger and the conductor.

Construction News

FRANCHISES.

Aberdeen, S. D.—The Wagner Lake Shore & Armour Traction Company has applied for a franchise in this city to operate an electric light and power plant to furnish power for its proposed interurban line, which will connect Aberdeen with the southern part of South Dakota by way of Mitchell. The company will soon make application for a franchise to operate this proposed line through the city.

Bainbridge, Ga.—Application for a street railway franchise, covering the use of the principal streets in Bainbridge has been made by Col. W. H. Krause, T. E. Greer and others.

Humboldt, Tenn.—Col. I. H. Dungan of Humboldt, president of the company which proposes to build an interurban electric line from Humboldt to Dyersburg, Tenn., will apply for a franchise at the next regular meeting of the city council for the right to enter from the northwest and use the streets of this city. The franchise will cover two routes—one for a passenger and the other for a freight line. A freight station will be located on Woodfin street, near the junction of the Louisville & Nashville and the Mobile & Ohio railroads.

Indianapolis, Ind.—The Grand Central Traction Company, which proposes to build an interurban railway from Indianapolis to Evansville, with a branch from Bloomington to Terre Haute, has applied to the board of public works for two franchises—one covering a private right of way, with the privilege of exchanging freight with the Belt railroad, and the other asking for the use of the Garfield park tracks, with a turnout in Madison avenue or Iowa street to the proposed office building of the company, not yet located.

Kananga & Gallipolis Traction Company, Gallipolis, O.—Rails are now being distributed in the streets of Gallipolis for the construction of this line through the city and on to a point opposite Point Pleasant, W. Va.

Louisville, Ky.—Advertisement for the sale of a franchise to allow the connection of the tracks of the Louisville Railway and those of the Kentucky & Indiana Bridge at Thirty-first and High streets by way of Twenty-ninth street, has been made. The franchise will be for 20 years and will be sold at a minimum price of \$1,500. It also provides a right of way for the Louisville & Northern Railway to its station on Third street along the Bank and Green street route of the Louisville Railway.

Mansfield, Ill.—The Corn Belt Traction Company has secured a franchise for the operation of its interurban line on Griggs, State and Depot streets in this city.

New Albany, Ind.—As the result of its disregard of an order from the city council to suspend excavating in East Elm street, the franchise of the Louisville & Southern Indian Traction Company has been rescinded, except as to the streets now in use by its tracks. It was claimed that as the date specified in the franchise on which the company was to begin work on Elm and other streets had expired it had no right to use the street for its proposed extension to the Hammersmith warehouse without a permit from the city. It is stated that the company has instituted proceedings in court to restrain the city from interfering in any way with its operations on any of the streets named in its franchise.

Olympia, Wash.—C. D. Hillman has applied to the county commissioners for a franchise to build and operate a double-track steam and electric road from Boston harbor to Centralia, by way of Olympia.

Owosso, Mich.—J. A. Thick, representing the Saginaw Owosso & Lansing Electric Railway, has applied for a franchise to operate an electric railway in Owosso. This is a renewal application of a franchise formerly granted to this company which recently became inoperative on account of the expiration of the time limit. The new franchise provides that construction on the line shall be started within 18 months.

Pasadena, Cal.—The Pacific Electric Railway has deposited with the city of Pasadena a certified check for \$5,000, being payment for the privilege of double-tracking its lines in that city. The work must be completed within 60 days from the date of starting to double track the lines. The company has until next April in which to commence the work, although it may be started this fall.

Portland, Ore.—The city council is considering the application for a franchise made by the Mt. Hood Railway & Power

Company for a right of way across a tract of land near the confluence of the Bull Run and Sandy rivers. It is stated that the franchise will be granted provided the railway company will waive any water rights it may have on the Bull Run river. It is stated, however, should the company refuse to do this and there is a possibility of encroachment on the city water rights, the board will refuse to grant the franchise and fight any condemnation proceedings which may be instituted by the company.

Racine, Wis.—The Milwaukee Light Heat & Traction Company has applied for a franchise to extend its line on Second street, from its intersection with Main street, east to Lake Michigan, the life of the new franchise to be coexistent with that under which the company is now operating in other streets of Racine.

Sand Point, Idaho.—Charles R. Foss, John C. Cleary and Peter Johnson have applied to the city council for a 25-year franchise to construct and operate a street railway in Sand Point.

Seattle (Wash.) Electric Company.—This company has applied for a franchise to construct a line on Twenty-third and Twenty-fourth avenues north from East Jefferson street to the university grounds. Permission also is asked to lay tracks on east Olive street, from Twenty-third to Twenty-fourth avenues and to East Madison street.

RECENT INCORPORATIONS.

Falls Construction Company, Muskogee, I. T.—Incorporated in Indian Territory to build an electric railway from Muskogee down the Arkansas river to Ft. Smith by way of Webbers Falls and Tamaha. It is understood that the company also contemplates securing control of the site for the large dam in the Grand river for the erection of a water-power plant to furnish power for its electric lines. Capital stock, \$2,500,000. Incorporators: S. M. Rutherford, E. A. Hill, J. M. Brogan and Ira L. Reeves, all of Muskogee, I. T.

Missouri Valley Traction Company.—Incorporated in Missouri to construct and operate an interurban line in Buchanan, Clinton, Ray, Clay and Caldwell counties for freight and passenger traffic. Capital stock, \$6,000. Incorporators: John I. McDonald, H. G. Krake, T. B. Campbell, St. Joseph; J. R. Sprague, L. L. Frost, George H. Morris, Mirabile; W. A. J. Bell, A. M. Bates, George Kidd, Excelsior Springs, Mo.

Napa & Lakeport Railway.—Incorporated in California to build an electric line from Napa to Lakeport, about 90 miles. Capital stock, \$2,000,000, of which \$110,000 has been subscribed. Incorporators: E. C. Amedee, San Francisco; A. J. Brown and W. F. Ansell.

Seattle-Tacoma Short Line, Seattle, Wash.—Incorporated in Washington to build an interurban railway from Seattle to Tacoma, 30 miles. This is the line for which Merle J. Wightman and C. E. Muckler have been securing franchises in Seattle and Tacoma. Preliminary surveys have been made and most of the private right of way secured. Construction work has been begun in Pierce county near Tacoma by the building of about 200 feet of trestle and other active construction work will be started as soon as the remaining right of way has been secured. The line is to be double-tracked the entire distance. The company has options on 1,000 acres of land near Tacoma, which it proposes to develop in connection with its interurban line. Offices have been opened in the American Bank building, Seattle, and in the Perkins building in Tacoma. Capital stock, \$6,000,000. Incorporators: Merle J. Wightman, C. E. Muckler and F. J. Eitel.

TRACK AND ROADWAY.

Abilene (Tex.) Electric Railway.—General Manager Bradshaw of this company is quoted as saying that rails for immediate delivery for six miles of track have been purchased and that electric railway service in Abilene is assured by the first of January.

Augusta (Ga.) Railway & Electric Company.—Work has been started on the extension of this company's line, which will form a loop from the curve on the Lake View line entering the park, to the entrance of the fair grounds. The extension is made to facilitate the handling of the crowds during the state fair.

Bayou Teche Electric Light & Railway Company, Bayou Teche, La.—Contracts have been let by this company for the construction of an electric railway within the city limits and to Jeannette, La. Work on the line is to be started at once.

Belton & Temple Traction Company, Temple, Tex.—It is stated that extensive improvements are contemplated by this

company during the coming year, among which will be the extension of its lines in Temple. W. G. Haag, general manager, Temple, Tex.

Butler, Pa.—An electric railway, to be known as the Butler & Chicora Street Railway, is one of the recent interurban propositions in Pennsylvania. The line will connect Butler, Carns City, East Brady and Kaylor, Pa. John Daly, W. J. Horgan, W. Criswell, W. G. Stern and E. W. Dewey are interested.

Bloomington Pontiac & Joliet Electric Railway, Pontiac, Ill.—We are officially advised that the Fisher syndicate of Joliet, Ill., together with J. M. Raymond and J. K. Newhall of Aurora, Ill., has secured control of this road and will take immediate steps to extend the line south to Bloomington and north from Dwight to Joliet. It is stated as doubtful that any actual construction work will be done this fall, but all details of securing right of way, franchises, etc., are to be arranged during the fall and winter in readiness for an early beginning of work in the spring. It has not yet been decided whether the single-phase system now in operation between Dwight and Pontiac will be adopted under the new management or whether it will be replaced with the direct-current system. This matter is now under advisement and a decision will be made public later. At a recent meeting of the stockholders, held for the purpose of ratifying the transfer of the road to the Fisher syndicate, the resignations of President J. A. Carothers and Secretary A. C. Folsom were accepted. H. A. Fisher was elected president, John K. Newhall secretary and L. D. Fisher general manager. The capital stock is to be increased to \$2,500,000.

Boise & Interurban Railway, Boise, Idaho.—Announcement is made that this company is planning to make important extensions to the Boise-Caldwell line, the first one of which will be from Pierce Park or Star to Nampa. Another is the building of a line up the Payette valley from Caldwell to the Snake river. The company is now building a loop in Boise and expects to have it completed by the first of the year.

Brookings & Sioux Falls Electric Railway, Brookings, S. D.—Surveyors are at work locating the permanent route for this South Dakota line and as soon as contracts for the grading have been let work will be started from both Egan and Brookings. It is expected that if the weather is favorable this stretch of track will be completed by the first of the year. In the spring work will be begun toward Sioux Falls and it is stated that later a proposition to extend the line farther north will be considered. Contracts for the equipment already have been awarded and the delivery of four passenger cars is expected by January 1. Gasoline-electric motor cars will be used.

Canyon City & Royal Gorge Interurban Railway, Canyon City, Colo.—Ex-Governor Peabody of Colorado, who is interested in this proposed line, is reported as saying that all papers had been signed for the financing of the road and that contracts for its construction and equipment would be let very shortly. The line will traverse the summit of Royal Gorge, crossing it at a height of over 2,000 feet, and when completed will be one of the finest scenic interurban lines in the west. It is expected to have the line in operation within a year.

Chambersburg Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—Practically all of the right of way for this company's proposed extension from Greencastle to Chambersburg has been secured. The line will pass through Kauffman's, Rhodes' Grove, Marion and Guilford Springs. It is stated that work will be started from the Greencastle terminus toward Chambersburg, where a connection with the Chambersburg & Gettysburg Electric Railway may be had. J. M. Wolff, general manager, Waynesboro, Pa.

Charleston-Paris Interurban Railway.—Ground was broken on October 7 for this interurban line which will connect the points named in the title and the intermediate towns of Ashmore, Kansas, Dudley and Cologne, Ill. The line will be about 28 miles long and it is stated will be in operation by the summer of 1908. W. R. Patton of Charleston, Ill., is president.

Chicago Lake Shore & South Bend Railway, South Bend, Ind.—This company has brought suit in the courts of Hammond, Ind., to secure right of way for its interurban line. This action is said to have been necessary on account of the exorbitant prices asked by farmers along the proposed route.

Conestoga Traction Company, Lancaster, Pa.—This company has completed surveys for a new route which will connect Lancaster and Philadelphia. The new line will branch off from the main line at a point near Gap, pass northward to Christiana and enter Parkesburg at the eastern limits, cutting down the distance nearly three miles from that of a pre-

vious survey. Construction work is to be started in the spring and completed in the summer of 1908.

Decatur Sullivan & Mattoon Electric Railway.—It has been announced that construction on this interurban line will commence at Sullivan, Ill., within a month and that the line between Mattoon and Sullivan will be completed first. President Starbuck of the company has stated that it was the intention of the company to build between Mattoon and Sullivan in connection with the Mattoon-Charleston line, when the wreck of August 30 threw the latter company into the hands of a receiver, thus ending all negotiations. It will now be built independently of any connecting line.

Denver & Interurban Railway, Denver, Colo.—T. S. McMurray of the Colorado & Southern Railroad, which controls this proposed interurban line, has announced the intention of the company to complete the road to Boulder by next summer, provided the necessary material is not delayed. Arrangements for the use of the tracks of the Denver City Tramway lines from Globeville to Fifteenth street in Denver have been made and an hourly service between Boulder and Denver alternately by way of Louisville and Marshall, is to be maintained. Fifty-five-foot interurban cars, capable of running 60 miles an hour, have been ordered, power for the operation of which will be obtained from the plant of the Northern Colorado Power Company at Lafayette. A bridge will be built over the Poudre river, near Greeley. Mr. McMurray stated that a somewhat lower passenger rate would be made. Local baggage will be carried on the interurban line; all through baggage, however, is to be carried by the Colorado & Southern steam road.

Eastern Pennsylvania Railway, Pottsville, Pa.—It is announced that this company has secured permission from the Philadelphia & Reading Coal Company for right of way over the latter company's land between Tamaqua and Middleport, Pa. The Eastern Pennsylvania company will now commence the construction work on its extension to Mauch Chunk, much of the material for which has been on hand for some time, and it is believed that cars will be in operation by next July.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—As soon as the Patoka extension of this road is completed work will be started on the line to the White river and on to Hazelton, to which point it is expected to have the track laid by, next fall. At a recent meeting of the executive board plans were discussed for a new local extension in the eastern portion of Evansville. Work on this, however, will not be started until next spring.

Forest City Railway, Cleveland, O.—With the dissolving of the injunction, which since last fall has tied up the construction work on the Bridge avenue line of the Forest City Railway, immediate steps were taken to cross the tracks of the Cleveland Electric Railway for the extension of the Forest City company's west side lines. The crossing is to be made at Fulton road and Bridge avenue, northwest, at which point a large force of men has been placed to make the track ready for the crossover. As the west side franchises were declared valid by Judge Lawrence in rendering his decision in the controversy between this company and the Cleveland Electric Railway, at whose behest the injunction was served, the Forest City company declares its intention of pushing the extensions in that part of the city to an early completion. The east side grants were declared invalid on certain technicalities and new franchises, therefore, must be obtained by the company before any extensions can be built in Central avenue and Quincy avenue, southeast, as earlier planned. It is stated that these franchises will be applied for within a short time.

Ft. Dodge Emmetsburg & Spirit Lake Railway, Emmetsburg, Ia.—It is reported that financial backing has been secured for this proposed interurban line and as soon as right of way and franchises have been obtained from the towns and villages along the route actual work will be started. Surveys are now being made. As proposed the line will connect with the principal trunk lines west of Chicago and will be 116 miles long, extending from Ft. Dodge to Spirit Lake by way of Clare, Pocahontas, Havelock, Mallard, Emmetsburg, Graettinger, Terrill and Milford. Power for its operation and for commercial purposes will be developed by a dam across the Des Moines river about seven miles above Ft. Dodge. M. H. Miller, vice-president, Ft. Dodge, Ia.

Ft. Worth-Mineral Wells Interurban Railway, Mineral Wells, Tex.—Rapid progress is reported on the construction of this interurban line from North Ft. Worth to Mineral Wells. Work is being pushed from Mineral Wells and it is believed that the road will be in operation within a year. Eight miles have been graded and there are now five grading forces at work toward Ft. Worth. The permanent survey has been

located to Springtown, Tex., and engineers are locating the remainder of the permanent route. J. W. Beardsley, Mineral Wells, is interested.

Grand Rapids Hastings & Battle Creek Interurban Railway.—Announcement is made that the remainder of the right of way for this interurban line between Battle Creek and Grand Rapids is practically assured. The line will be 52 miles long as surveyed and will touch several of the lakes in that section. A. C. Sekell is promoting the line.

Great Falls & Old Dominion Railroad, Washington, D. C.—It is announced that arrangements have been completed between this company and the Western Maryland steam line whereby the latter company will enter Washington over the tracks of the Old Dominion line, which now extends from the terminal of the Capital Traction Company in Georgetown to the Great Falls of the Potomac, 14 miles from Washington. The line is well built and it is said the tracks are able fully to meet the heavy requirements of steam operation.

Hamilton Radial Electric Railway, Hamilton, Ont.—The city of Hamilton has applied to the railway and municipal board for an order to restrain this company from laying tracks between Wentworth and Wilson streets and Sherman avenue. It is claimed by the city that the company's franchise does not cover the use of these streets.

Indianapolis Crawfordsville & Western Traction Company, Indianapolis, Ind.—Announcement is made that this company has a force of 150 men grading on an extension of its line from Crawfordsville, Ind., to Danville, Ill. The work has been completed to a point a few miles west of Hillsboro. The line will pass through Wesley, Waynetown, Hillsboro, Veedersburg and Covington to Danville, where it is expected to use the tracks of the Illinois Traction System for entrance to the city.

Interurban Construction Company, Denver, Colo.—E. N. Reaser, president of this company, which is constructing an interurban line from Denver to Greeley, Colo., writes that surveys have been completed for the entire distance of 54 miles. The line will use the county road to Adams City and will touch the following intermediate towns: Hazeltine, Henderson, Brighton, Ft. Lupton, Ione, Plattville, Gilchrist, Peckham and Evans. The headquarters of the company are in Denver and the following are the officers: E. N. Reaser, president, 415 Kittredge building; George S. Van Lew, vice-president; Joseph M. Bordy, secretary; G. H. Pierce, treasurer; all of Denver. G. H. Sethman is chief engineer.

Lewiston & Southeastern Electric Railway, Lewiston, Idaho.—Work on this proposed interurban line will be started at once and pushed as rapidly as the weather will permit. R. D. Thomas, vice-president, Lewiston, Idaho.

Los Angeles-Pacific Company, Los Angeles, Cal.—Work on the Hill street tunnel, which this company is building to serve as an outlet to Sunset boulevard for its Hollywood and Colegrove lines, has been started. Day and night forces also are at work on the reconstruction of the tracks in Hill and Sixteenth streets and 50 new cars will be placed in operation when this improvement has been completed.

Louisville & Southern Indiana Traction Company, New Albany, Ind.—This company intends to build an extension of its city line to the warehouse of the Hammersmith Transfer Company, which recently has contracted to do all the transfer express business of the Louisville & Southern Indiana company between Louisville, New Albany and Jeffersonville, Ind., using the express cars of the railway for transferring between the three cities.

Milwaukee & Fox River Valley Railway.—The contract for surveying this interurban line, which will be built from Fond du Lac to Peebles and Clifton, Wis., skirting the east shore of Lake Winnebago, has been let to the Western Engineering Construction Company, Milwaukee. Surveys already have been started. It is expected that grading on the stretch between Fond du Lac and Peebles will be begun this fall and be finished in time for tracklaying next spring. It is stated that traffic arrangements may be made with the Milwaukee Northern Railway for the use of its tracks in Fond du Lac. The road eventually will connect with the line which the company now is completing from Plymouth to Elkhart. A. J. Grover, chief engineer, Milwaukee Wis.

Minneapolis St. Paul Rochester & Dubuque Traction Company, Minneapolis, Minn.—Engineers are surveying the permanent route of this line through Clay county, Iowa. As surveyed the line will reach Dubuque by way of Postville, Garnerville and Elkport.

Muscatine, Ia.—James H. Collins of Chicago is said to be interested in an interurban railway project between Muscatine and Elkport.

stated that a line will be built from Cedar Rapids to Davenport, by way of Tipton, Ia., with a branch line from Tipton to Muscatine.

Nashville & Columbia Interurban Railway, Nashville, Tenn.—H. H. Mayberry, president of this electric railway, which will be built from Nashville to Columbia, Tenn., is reported as saying that the road would be completed and in operation by March 1, 1908. Work is progressing from Nashville to Franklin, and when this section is completed construction will be started from the Columbia end of the line. Henry Pointer, Franklin, Tenn., also is interested.

Northwestern Interurban Railway, Grand Forks, N. D.—A corps of surveyors is now engaged in locating the permanent route of this company which will build an interurban railway from Grand Forks to Crookston, N. D., as well as local street railways in both cities. The route as planned will include several summer resorts situated on the lakes in that section. It is reported that the line may be extended to Fergus and also to Wahpeton.

Owingsville, Ky.—It is announced that the Kauffman-Shaw Construction Company, Dayton, O., has offered to construct and operate an electric railway from Salt Lick to Carlisle, Ky., by way of Owingsville and Sharpsburg, provided the counties of Nicholas and Bath will furnish \$8,000 each to the enterprise when the road shall be in operation. The road as proposed will be 34 miles long and eventually will afford direct connection with Cincinnati, O. A committee from both counties is now soliciting the \$16,000 required.

Philadelphia Rapid Transit Company.—Rapid progress is reported on the construction of the Market street subway. About 60 per cent of the work has been completed and it is stated that by December 1, 1908, that portion of the subway and elevated road from Delaware avenue and South street to the terminal at Sixty-ninth and Market streets will be in operation.

Philadelphia & Westchester Traction Company.—At a meeting of the borough council of Westchester authority was granted to this company for a connection of its tracks with the West Chester Street Railway, thus completing a through electric line from Philadelphia to Coatesville and on to Parkersburg in the western portion of the county. A joint arrangement has been effected between the companies for the interchange of freight.

Sacramento Electric Gas & Railway Company, Sacramento, Cal.—Ground has been broken for this company's new south side street railway system, which will serve a portion of the city heretofore without street car service. The line will be double track and will extend as far as Oak Park.

St. Louis Montesano & Southern Railway.—Actual work on the construction of this new interurban line from St. Louis through Jefferson and St. Francois counties to Flat Rock, Mo., was begun on October 9, when seven carloads of ties were unloaded and distributed along the Lemay ferry road. A shipment of rails also is en route. The line will follow the Lemay ferry road from the southern limits of St. Louis to the Meramec river, which it will cross on a new bridge to be built by the company alongside the present county highway bridge. When completed the line will be 65 miles long. Franchises have been secured through both counties. Charles W. Gutke, 5727 Von Versen avenue, St. Louis, is president.

St. Louis & Toledo Interurban Railway.—Engineers have completed the survey for this proposed road as far as Ft. Wayne, a portion of which was laid out along the old bed of the Wabash & Erie canal. It is stated that the new road may use the local lines for entrance to Ft. Wayne.

San Antonio (Tex.) Traction Company.—This company has started work on the construction of about a mile of new track, which will serve the section of San Antonio lying between the Rock quarry road and Laurel Heights terrace. The new line will be an extension of the present Tobin Hill line and will make a loop around the terrace. Grading has been started and all of the material for the work has been received. It is stated that the line will be in operation within six weeks.

Sarnia (Ont.) Street Railway.—This company has received permission from the town council to construct a street railway $1\frac{1}{2}$ miles long in Sarnia. The company intends also to double-track its lines in Front street, from George to Wellington streets, and in Wellington to Vidal street, all work to be completed by December 1, 1908. The company will be in the market for rails, ties, bonds and all overhead equipment.

Sheffield Electric Company, Sheffield, Ala.—Announcement is made that this company will take over the passenger, mail, express and freight business formerly handled by the Florence branch of the Southern Railway, service on which has been discontinued.

Spokane & Inland Railway, Spokane, Wash.—On October 8 this company began operating electric cars from Spokane to Colfax, Wash. The line heretofore has been operated by steam from Spokane to Rosalia.

Steubenville & East Liverpool Railway & Light Company, Steubenville, O.—Excellent progress is reported on this company's $7\frac{1}{2}$ -mile extension forming the link which will connect the systems of East Liverpool and Steubenville, and it is hoped to have it completed by the first of the year. The company's extension of its East Liverpool lines to a connection with the Beaver Valley Traction Company's lines also is progressing satisfactorily and an effort is being made to have it in operation by next May. With the completion of these extensions a continuous electric line from Steubenville, O., into Rochester and Beaver, Pa., a distance of 24 miles, will be afforded.

Toledo Fostoria & Findlay Railway, Fostoria, O.—This company announces that all right of way has been secured for an entrance into Toledo and that its cars will be running into that city within 60 days. But a small amount of grading remains to be done near Walbridge, O., and most of the overhead work has been completed. The cars will operate in Toledo over the tracks of the Toledo Railways & Light Company.

United Railway, Portland, Ore.—A scenic railway along the range of hills northwest of the city will be built by this company, with its terminal at Mt. Calvary cemetery. The line in some places will reach a maximum grade of 6 per cent. On this account it is planned to use only passenger cars, the freight traffic being cared for by the construction of a line to Hillsboro, where the grade will be but about 2 per cent. The company's line within the city limits is practically completed, its Front street tracks being built to within 50 feet of the tracks of the Oregon Electric Railway. When this gap has been closed connection will be afforded between the two roads, allowing the cars of the Oregon Electric company to reach Front street and the union depot terminals over the tracks of the United company.

West Penn Railways, Pittsburg, Pa.—This company has secured right of way for a new line between Hunker and Scott Haven, Pa., connecting with West Newton. The line will connect with the McKeesport and Scott Haven line at Scott Haven and will cross the Youghiogheny river to Hunker over a new bridge to be built at that point. The object of the new line is to secure passenger traffic from West Newton and the surrounding territory to Greensburg, as well as to distribute freight from the Pennsylvania Railroad to points in that section.

Woodstock Marengo Genoa & Sycamore Electric Railway.—This is the name of the new electric road which will connect Woodstock and Sycamore, Ill., by way of Marengo and Genoa. The company has been organized with the following officers: Col. M. W. Powell, president; John A. Schmidt, Thomas Edward, Irwin D. Stevens, Charles A. Spinny, T. H. Rhodes, E. C. Spinny and E. B. Harang, directors. Right of way is being secured with a view to active construction work in the spring.

Worcester & Mansfield Electric Railway.—It is stated that the construction of this interurban line, which will connect Worcester and Mansfield, O., is practically assured. Most of the right of way has been obtained along the projected route, which takes in the towns of Jefferson, Reedsburg, New Pittsburg, Hayesville and West Mansfield. David Collier, Plimpton, O., is interested.

Yakima Valley Transportation Company, North Yakima, Wash.—Rails, ties and electrical equipment for this company's proposed system of interurban roads have been ordered and it is announced that construction work will be started immediately. G. Rankin, North Yakima, is interested.

POWER HOUSES AND SUBSTATIONS.

Americus Railway & Light Company, Americus, Ga.—This company, recently incorporated with a capital of \$250,000, will shortly begin the construction of a new power plant which will operate the street railway, supply light to the city and pump the city's water under contract. Although the company has purchased the old gas and electric lighting plant in Americus, the building will not be utilized for the new power house, which is to be in another part of the city.

Huntsville Railway Light & Power Company, Huntsville, Ala.—It is reported that this company has appropriated an amount sufficient to cover temporary improvements to its power house with a view to the erection of a new modern plant at a later date. It is stated that plans are now under consideration for the new power house.

Personal Mention

Mr. P. J. Cunningham has been appointed claim agent of the Saginaw (Mich.) Valley Traction Company, effective on October 15.

Mr. E. B. Lincoln has been appointed general manager of the Muncie & Portland Traction Company, Portland, Ind., succeeding Mr. John L. Matson, resigned.

Mr. W. J. Harvie, electrical engineer of the Utica & Mohawk Valley Railway, has had the Syracuse Rapid Transit system added to the lines under his jurisdiction.

Mr. L. H. Davis has tendered his resignation as comptroller of the Delaware & Hudson Company, owing to ill health. Mr. W. H. Davis, assistant comptroller, has been appointed acting comptroller.

Mr. Fred M. Weld of Providence, R. I., has been appointed master mechanic of the Evansville & Southern Indiana Traction Company at Evansville, Ind., succeeding Mr. A. H. Mann, resigned, as noted in a previous issue.

Mr. Robert W. Cunningham, park manager of the Mahoning & Shenango Railway & Light Company at Youngstown, O., has resigned, effective on November 1. He has held his present position since last spring, at which time he was transferred from the claim department of the company.

Mr. Bion J. Arnold has been appointed consulting engineer on transportation problems for the public service commission of New York. Besides reporting to the commission on the equipment, service and power houses of the Metropolitan system, Mr. Arnold will advise regarding the subway problems of New York City.

Obituary.

Robert L. Carson, a prominent financier and street railway magnate of Philadelphia, Pa., died suddenly on the night of October 15, while attending a theatrical performance, aged 61 years. He was a brother-in-law of President John B. Parsons of the Philadelphia Rapid Transit Company, and had large holdings in several street railway companies.

Comparative Cost of Wood and Concrete Piles.

In the new buildings of the United States Naval Academy at Annapolis, Md., a saving of over \$27,000, or about 50 per cent of the cost, was effected by the substitution of concrete piles for wood piles in foundation work. The factors which influenced the saving were the reduction in the number of piles needed, owing to the greater bearing value of the concrete piles, a reduction in the quantity of excavation, the elimination of shoring and pumping and the reduction in the quantity of material required for the footings. Eight hundred and eighty-five concrete piles replaced 2,193 wood piles; 4,543 yards of excavation were reduced to 1,038; and 3,250 yards of concrete footings were reduced to 986 yards. Shoring and pumping estimated to cost \$4,000 were not found necessary. Raymond concrete piles were used.

In the annual report of the Wabash Railroad for the year ended June 30, 1907, F. A. Delano, the president, says: "Following the lead of Ohio, the legislatures of Iowa, Indiana, Illinois and Missouri have enacted laws limiting the passenger rate to two cents per mile. It is clear that these laws must, if remaining in force, seriously affect our passenger revenues. The effect of the interurban electric lines upon our passenger business is plainly indicated in the decreased number of passengers carried, while the increase in the length of the average journey and the revenue per passenger show clearly that the electric lines are being used more extensively for the shorter trips, leaving to the steam railroads only the long-haul business."

It is reported that Frank Hedley, general manager of the Interborough Rapid Transit Company, New York, has patented a device to prevent the telescoping of cars in train wrecks. It consists of an attachment secured to the end of the car platform with three prongs or projections on its outer surface. When the cars come together in case of an accident these prongs on the platforms interlock and the car is prevented from rising above the platform of the one it strikes. By preventing the platform from overriding the one ahead the dangers of telescoping are materially lessened. It is reported that many of the Interborough cars are being equipped with this device.

Financial News

Aurora Elgin & Chicago Railroad Company.—At the annual meeting of the company, held in Chicago on October 15, the board of directors was increased from seven to nine members and the retiring members were re-elected. Charles Jones, chief engineer, and C. E. Flenner, auditor of the company, are the new directors. The statement of earnings for the year ended June 30, 1907, showed that after paying dividends at the rate of 5 per cent on the preferred stock there was a surplus of \$135,719, applicable to dividends on \$3,100,000 of common stock.

Citizens' Electric Company, Eureka Springs, Ark.—Control of this company has been purchased by new interests. The following officers have been elected: President and treasurer, George Sengel; vice-president, George Tilles; secretary, L. P. Miles, all of Ft. Smith, Ark.

Detroit United Railway.—Notice was sent to stockholders on October 14 that the quarterly dividend due on the stock in November will not be paid. The notice, signed by President J. C. Hutchins, says: "The territory which the Detroit United Railway serves has been developing at a very rapid rate, necessitating large expenditures for equipment, improvements and additions to property. The present condition of the money market is such that the company is unable to reimburse itself through the sale of its bonds, at what it deems a reasonable price, for sums properly chargeable to capital account. Notwithstanding the fact that the surplus earnings of the company are approximately equal to those of the previous fiscal year, it is deemed by the board of directors to be for the best interest of the stockholders to use such present surplus earnings in providing for the improvements to which reference has been made above. The directors have, therefore, decided to omit payment of the regular quarterly dividend at this time."

Indianapolis & Louisville Traction Company, Louisville, Ky.—A trust deed has been filed to secure an issue of \$400,000 mortgage and collateral trust 6 per cent 5-year notes, dated July 1, 1907, and due on July 1, 1912, but subject to call at 102½ and interest. Of the authorized issue \$300,000 bonds have been sold. The bonds are convertible into preferred stock.

Metropolitan Street Railway, New York.—Judge Lacombe last week granted an application of the Morton Trust Company, asking that the federal receivership for the Metropolitan Street Railway Company be extended to the property covered by the refunding mortgage, and that the rents and profits of the mortgaged property be sequestered in order that the interests of the bondholders may be protected. The action is believed to have blocked Attorney-General Jackson's efforts to get state receivers appointed with the argument that the complaints in the federal action were not judgment creditors. On October 15 suit was brought in the United States circuit court at New York by Daniel W. Burrows of Chicago demanding restitution to the Metropolitan Securities Company of \$965,607.19 alleged to have been paid to Anthony N. Brady for railway franchises and \$250,000 declared to have been paid to John B. McDonald to keep him from building subways that would compete with the present system. August Belmont, E. J. Berwind, John D. Crimmins, Cornelius Vanderbilt, Andrew Freedman and others, codefendants, filed their answer to the suit previously commenced by Burrows, as owner of 1,400 shares of Metropolitan Securities Company stock, to have the Interborough-Metropolitan merger dissolved on the ground that it violated the Sherman anti-trust law. In the answer the defendants deny that the merged roads were in any sense competing lines. Routes of the Interborough and the Metropolitan ran parallel, they admitted, but denied that the new company constituted a monopoly or was created with any view toward creating a monopoly or with any other unlawful purpose. Mr. Belmont admitted the details of the merger, but declared that so far as he knew all the stockholders of the old company came into the new one, and denied for himself and his codefendants any unlawful purpose or action.—In appearing before Justice Seabury in the supreme court Samuel Untermyer made the statement that the New York City Railway was solvent up to the time of the receivership, although it was being operated at a loss. Mr. Untermyer said that affidavits would be submitted showing that in September, 1906, the assets exceeded the liabilities by between \$5,000,000 and \$6,000,000. The receipts for passenger traffic last year decreased \$600,000, Mr. Untermyer said, while the operating expenses increased that much. The company had also incurred a liability of \$4,000,000 for electrification of lines.—Judge Lacombe reserved decision on the motion of Roger

Foster, counsel for four judgment creditors of the New York City Railway, demurring to the appointment of permanent receivers for that company.

Toledo (O.) Railways & Light Company.—The dividend due on November 1 on the capital stock will not be paid. President Henry A. Everett has issued the following letter to stockholders: "The question of the distribution of the surplus earnings of this company has received the careful consideration of its officers and directors. The past six months have been more than usually prosperous, and the surplus earnings will show considerably more than the usual semi-annual dividend, but on the other hand the growth in the electric light business of this company has compelled it to increase its power facilities largely, and the street railway traffic has demanded new cars, which have been added during the past year and a large amount of double tracking and increased weight of rail have been found necessary. The surplus earnings as they have come in from time to time have been used in the payment of these permanent improvements, so that the only source from which this company could properly pay a dividend at the present time would be the selling of the bonds issued and to be issued to this company under the terms of its mortgage, for 75 per cent of the cost of the permanent improvements made. As you know, the condition of the money market at this time is such that bonds can only be sold at a discount greatly in excess of anything that we would feel justified in paying, and it is the consensus of opinion of the board of directors that the payment of a dividend should be delayed until the bond market becomes more favorable."

Winona Interurban Railway, Winona Lake, Ind.—Announcement is made of negotiations now pending between this company and the Murdock interests which, if consummated, will result in the Winona line becoming a part of the Chicago South Bend & Northern Indiana system, successor to the Northern Indiana Railway Company and controlled by the Murdock syndicate.

ELECTRIC RAILWAY EARNINGS.

Chicago & Milwaukee Electric Railroad Company.

September—	1907.	1906.	Increase.
Gross earnings	\$111,117	\$ 97,155	\$ 13,961
Operating expenses	42,790	39,864	2,926
Net earnings	68,326	57,291	11,035
January 1 to September 30—			
Gross earnings	785,400	633,542	151,858
Operating expenses	325,436	252,758	72,677
Net earnings	459,964	380,783	79,180

Lexington & Interurban Railways Company, Lexington, Ky.

August—	1907.	1906.
Gross earnings	\$ 59,085.37	\$ 51,546.71
Operating expenses	32,916.68	31,223.03
Net earnings	26,168.69	20,323.68
January 1 to August 31—		
Gross earnings	361,587.68	333,134.57
Operating expenses	235,187.77	225,366.74
Net earnings	126,399.91	107,767.83

Norfolk & Portsmouth Traction Company, Norfolk, Va.

August—	1907.	1906.
Gross earnings	\$307,487.90	\$162,622.70
Operating expenses	171,543.67	105,230.80
Net earnings	135,944.23	57,391.90
January 1 to August 31—		
Gross earnings	1,681,686.06	1,120,195.87
Operating expenses	1,038,747.40	738,923.24
Net earnings	642,938.66	381,272.63

United Railways Company of St. Louis.

September—	1907.	1906.
Gross earnings and other income	\$930,606	\$884,121
Expenses, taxes and depreciation	588,883	530,915
Net earnings	341,723	353,206
Charges	232,404	231,802
Net income	109,319	121,404
January 1 to September 30—		
Gross earnings and other income	\$8,116,337	\$7,632,958
Expenses, taxes and depreciation	5,299,016	4,785,673
Net earnings	2,817,321	2,847,285
Charges	2,083,731	2,086,147
Net income	733,590	761,138

Dividends Declared.

Twin City Rapid Transit Company, common, quarterly, 1½ per cent.

Manufactures and Supplies

ROLLING STOCK.

Ogden Rapid Transit Company, Ogden, Utah, is reported to be figuring on the purchase of a number of cars.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va., has placed an order for one express car with The J. G. Brill Company. It is said that this company may also be in the market for another car of the same type.

Kansas City Railway & Light Company, Kansas City, Mo., is reported to have placed an order, presumably with the St. Louis Car Company, for 25 cars. In the Electric Railway Review of August 31 it was noted that this company would probably be in the market later for this number of cars.

Utah Light & Railway Company, Salt Lake City, Utah, is building an electric locomotive in its own shops at Salt Lake City. Another locomotive may be built as soon as the one above mentioned is completed. The company is remodeling 72 street cars and equipping them with air brakes and new seats.

SHOPS AND BUILDINGS.

Birmingham (Ala.) Railway Light & Power Company.—A freight depot will be built and two buildings remodeled so as to serve as a passenger station and car shed at Bessemer, Ala.

Macon (Ga.) Railway & Light Company.—The directors of this company held a meeting in Macon last week to discuss the erection of a transfer station.

Ogden (Utah) Rapid Transit Company.—This company is building a new car house on Nineteenth street.

Toledo Urban & Interurban Railway, Toledo, O.—This company will build a passenger and freight station at Cynnet, O.

Waterloo Cedar Falls & Northern Railway, Waterloo, Ia.—The Waterloo car house, six cars used for city service and two interurban cars were destroyed by fire on the morning of September 25, as reported in the Electric Railway Review. The origin of the fire is not known, except that it started in one of the cars inside the building. The loss has been adjusted for \$10,000 and the company is now completing plans for a fireproof car house of twice the capacity of the old one, to cost in the neighborhood of \$10,000.

Yakima Valley Transportation Company, North Yakima, Wash.—Ten acres of property on South First street have been purchased by this company on which to build car houses and terminal facilities. It is said that the purchase price was \$10,500.

TRADE NOTES.

Ft. Pitt Bridge Works, Pittsburg, Pa., has opened offices in the Fisher building, Chicago, with A. R. Young, C. E., in charge.

Harris Pneumatic Tool Company, New York City, has been organized with a capital stock of \$100,000 to manufacture pneumatic tools, appliances and machinery.

Bethlehem Steel Company, South Bethlehem, Pa., has opened an office and warehouse in Cleveland, O., at 1264-68 Ontario street. R. A. Hamaker is in charge.

A. E. McBee, formerly president of the A. E. McBee Company, has been elected vice-president of the Streets Railway Advertising Company, Flatiron building, New York City.

Bryant Zinc Company, New York, has established a downtown office at 1320 West Street building, 90 West street, New York, where all mail, messages, etc., should be addressed.

Saiga & Co., electrical suppliers and engineers, announce that they have moved to Fushimi-Machi 3 Osaka, Japan, where commodious quarters have been secured for their increasing business.

Lord & Burnham Company, 1133 Broadway, New York City, manufacturer of sash operating machinery, has appointed William R. Westcott manager of its ventilating department.

Northern Engineering Works, Detroit, Mich., is adding a new power station to its plant. The boiler and coal storage station, which will be built at once, will be about 30 by 60 feet, one story high, of entirely fireproof construction, with

iron doors, reinforced cement roof, etc. The plans were made by Smith, Hinchman & Grylls, engineers and architects, Detroit.

The J. G. Brill Company, Philadelphia, Pa., has filed notice of an increase of \$336,000 in capital stock. This makes the amount issued \$9,580,000 of the authorized capital of \$10,000,000.

American Automatic Switch Company, Salisbury, N. C., has been incorporated with a capital of \$100,000, half of which has been subscribed. Incorporators: P. H. Thompson, F. M. Thompson and D. L. Avery.

Castings, Caxton building, Cleveland, O., is the name of a new technical journal devoted to the art of founding, which has been established by H. M. Lane, M. E., and R. I. Clegg. The first issue was dated October 15.

Pittsburg Automatic Vise & Tool Company, Pittsburg, Pa., has received an order for a large number of vises of the double and single swivel type, to be installed in the new shops of the Washington Terminal Company, Washington, D. C.

Samson Steel Underframe Company, Chicago, Ill., has been incorporated with a capital stock of \$10,000 to manufacture railway rolling stock and supplies. Incorporators: William T. Underwood, George W. Manierre and Alvin T. McElroy.

Fred J. Meyers Manufacturing Company, Hamilton, O., manufacturer of car fenders, conductor's punches and other railway supplies, reports that its September sales exceeded those of any other one month since the company was organized.

American Bridge Company's iron works near Philadelphia, Pa., on October 14 were damaged by fire to the extent of \$300,000, according to press reports. Twelve freight cars standing on a sidetrack of the Philadelphia & Reading were destroyed.

American Locomotive Company, 111 Broadway, New York City, held its annual meeting on October 15, at which time the following directors were re-elected for a period of three years: Joseph Bryan, C. A. Coffin, S. L. Schoonmaker and G. R. Sheldon.

Lodge & Shipley Machine Tool Company, Cincinnati, O., has awarded the contracts for an addition to its machine shop. The extension, which will be built west of the present building, will be 90 by 198 feet, one story high, and of brick and iron construction.

George L. L. Davis, who has been connected as general sales manager with the General Castings Company at 42 Broadway, New York City, has been appointed manager of sales in the railroad department of the U. S. Metal & Manufacturing Company, 25 Broad street, New York City.

Cobbs Car Company, Lake Charles, La., has been incorporated with a capital stock of \$100,000 for the purpose of taking over and using the patents of B. J. Cobbs. The company will manufacture and build cars of all kinds, locomotives, steamboat engines and machinery. Board of directors: B. J. Cobb, A. Thompson, D. Z. Thompson, B. J. Banker and F. E. Thrall.

Technical Literature, published by the Technical Literature Company, 220 Broadway, New York, with the September number has been changed to the standard magazine size, 7 by 10 inches, and presents in more attractive form than ever its monthly digest of engineering and technical journals. The usual index to technical articles in current periodical publications is continued.

Tool Steel Motor Gear & Pinion Company, Cincinnati, O., the incorporation of which was noted in the Electric Railway Review of August 31, will soon have its new plant in full operation at Linden street and Cook avenue, Carthage, which is a suburb of Cincinnati. The original intention was to manufacture gears and pinions for electric railways exclusively, but the company has since decided to produce a general line.

Central Inspection Bureau, 17 State street, New York City, has just completed the inspection of a large number of flat bottom gondola cars for the Newburg & South Shore Railroad at the works of the Pressed Steel Car Company. The Central Inspection Bureau has a contract also with the Emlenton Refining Company for the inspection of a large number of tank cars which will also be built by the Pressed Steel Car Company.

Bliss Electric Car Lighting Company, Milwaukee, Wis., reports the receipt of the usual large amount of orders for Bliss standard equipment. Among recent orders is one from the New York Central Lines to electrically light the Wolverine trains on that system. A number of orders for export shipment also have been received. The orders now in hand and

pending indicate a successful future and the prospects are most favorable for the payment of a dividend at an early date.

C. H. Whall & Co., Boston, Mass., manufacturers of fibers for railroad insulation, have completed a paper mill to work in connection with their fiber plant for the manufacture of special papers for use in the making of railroad insulation fibers. At the meeting of the Railway Signal Association the company exhibited a panel showing samples of track circuit insulations for insulating rail joints. F. R. Whall represented the company as usual.

National Machine Tool Builders' Association held its annual meeting and election of officers October 15 and 16 at the Imperial hotel, New York, a large number of the members being in attendance. The special subjects brought up for discussion were the "Apprenticeship System" and the "Method of Ascertaining Cost of Machine Tools." Six new members were added to the association and Atlantic City was selected as the next meeting place.

Charles Hansel & Co., 43 Wall street, New York City, have been engaged by the North Platte & Encampment Canal Company to prepare the surveys, plans and estimates and to take charge of the construction of a canal for the irrigation of 93,000 acres of land extending from Saratoga, Wyo., south to the Colorado state line. This work will involve the building of a canal with a capacity of 1,000 second feet and it will carry with it the development of a hydro-electric plant of considerable magnitude.

Detroit Hoist & Machine Company is a new corporation with a capital stock of \$50,000 which will take over the business of the Pilling Air Engine Company, Detroit, Mich., manufacturer of pneumatic hoists, locomotive turntable motors and compressed air hoisting machinery. The new company has just installed and is now operating its own plant. Other improvements will be added in the near future, provision having been made for growth by the purchase of three acres of ground on the Grand Trunk Railway at Milwaukee Junction, near Detroit.

Mathias-Hart Company, 23 Edinboro street, Boston, Mass., has recently been organized to do a general railway supply business. The company is composed of Robert Mathias, who for the past few years has been associated with the sales department of the Stuart-Howland Company of Boston, and G. H. Hart, who was formerly superintendent of supplies for the Old Colony Street Railway. Both Mr. Mathias and Mr. Hart have a large acquaintance in the electric railway fraternity of New England and having succeeded in obtaining for sale a general and a substantial line of standard supplies they are looking forward to a successful business.

Western Electric Company, Chicago, Ill., has completed plans for a first mortgage 5 per cent gold bond issue of \$15,000,000. The call for the meeting and the announcement on the proposed bond issue follows, in part: "A special meeting of the stockholders of the Western Electric Company will be held, to consider and vote upon ratifying the action of the directors in authorizing the execution and delivery of a mortgage for \$15,000,000 to secure an issue of the company's first mortgage 5 per cent gold bonds. The directors do not expect that, if their action is ratified, it will be necessary to issue all or part of the bonds at present. The proposed action would give authority to issue bonds, if future business conditions demand it. At present the company has no bonded indebtedness. Its authorized capital is \$25,000,000, of which \$15,000,000 is outstanding."

The bureau of promotion and development of the Paint Manufacturers' Association of the United States, with headquarters at Chicago, reports that there has already developed marked beneficial results from the educational work which this bureau has undertaken in an endeavor to disseminate accurate, scientific knowledge concerning paint. The bureau has recently distributed reprints from the American Artisan and Hardware Record, discussing the subject of paint legislation which has become important because of the enactment by the state of North Dakota of a law specifying paint standards.

F. W. Mahin, United States consul at Nottingham, Eng., states that recent acts of parliament authorize the construction of some 200 additional miles of railway in the United Kingdom, involving an outlay exceeding \$50,000,000. The authorized construction includes railway extensions in the Midlands and other parts of the kingdom, and various dock improvements at railway termini. The chief item is a projected railway in Ireland over 100 miles long, terminating on the west coast, and forming a link in a future route between England and Canada by rail across Ireland and a direct steamship line from Blacksod Bay.

NEW CARS FOR THE TOLEDO RAILWAYS & LIGHT COMPANY.

The G. C. Kuhlman Car Company is delivering to the Toledo Railways & Light Company 40 grooveless type Brill semi-convertible cars. As will be noted in the accompanying illustrations, the front platform is divided by a partition which forms a motorman's cab and provides a front entrance of the semi-accelerator type. The rear platform is of the Detroit type, with an iron dividing rail. Rattan-covered seats, both cross and longitudinal, are used, the cross seats being of the walkover type, with grab handles at the corners. This seating plan is rapidly becoming standard for cars used in city



Toledo Cars—Interior of Semi-Convertible Car.

service. The accompanying illustrations afford an idea of the exterior and interior of these cars.

Following is a list of the principal dimensions and weights: Length over end panels, 30 feet 8 inches; length over crown pieces, 40 feet 8 inches; front platform, 4 feet; rear platform, 6 feet; width over sills, 7 feet 11½ inches;

roll amounted to \$6,000. About this time 400,000 bricks were laid in 11 working days, or an average of some 36,000 bricks per day.

It is interesting to note that 280 men were employed under the guidance of four brick foremen, four carpenter foremen and four labor foremen. Two timekeepers were continuously employed and one of the members of the contracting firm was always present.

Throughout the factory standard mill construction was used, the girders resting upon post caps of the usual type. Posts of 14 by 14, girders 16 by 16 and beams 10 by 16 were the prevailing unfinished sizes before planing. Sleepers for the 1¼-inch maple flooring were of 3 by 4 longleaf yellow pine, embedded in concrete and spaced 18 inches center to center. All mortar was made of lime and Portland cement and the windows and door sills were made of dressed blue-stone.

Salmond Brothers of Newark and Arlington, N. J., were the contractors, and Messrs. Wilson, Harris and Richards of Philadelphia were the architects for the General Electric Company.

ADVERTISING LITERATURE.

Goldschmidt Thermit Company, New York.—A newly issued leaflet is devoted to the applications of Thermit in foundry practice.

Niles-Bement-Pond Company, New York.—A handsome and complete catalogue descriptive of the Pond rigid turret lathe has just been issued. The various classes of work which can be handled by this lathe are illustrated.

Theodore F. Koch, 801 Globe Building, St. Louis, Mo., and 79 Dearborn Street, Chicago.—A booklet describes the advantages of Wunner's bitumen-emulsion, a new waterproofing compound, in making walls of cement, brick or stone permanently impervious to water. Mr. Koch is the importer and sole selling agent in the United States.

Association of American Portland Cement Manufacturers, Philadelphia, Pa.—Bulletin No. 16 of the association comprises an article by E. S. Larned, C. E., of Boston, Mass., on "Regulation and Control of Concrete Construction". Those who are interested in these publications of the association may secure



Toledo Cars—Exterior of Semi-Convertible Car.

width over posts at belt rail, 8 feet 2 inches; height from top of rail over trolley board, 12 feet 2 inches; weight of car body, 18,500 pounds; weight of trucks, 10,000 pounds.

GENERAL ELECTRIC COMPANY'S FACTORY.

A lamp factory recently completed at Newark, N. J., for the General Electric Company, was constructed with remarkable speed. On the twenty-fourth of the month ground was first broken by the contracting firm doing the work, and on the twenty-third of the following month the building was finished and the manufacturers' machinery was being installed, all in 29 calendar days, without night or Sunday work and with a half holiday on Saturday for the skilled labor.

The cost of the factory was approximately \$50,000 with a bonus and forfeit clause, and in one week of 5½ days the pay-

them upon application to the secretary, C. E. E. Bottomley, Land Title building, Philadelphia.

General Electric Company, Schenectady, N. Y.—The Wright demand indicator, which has been extensively adopted in determining load factor, the maximum output of generators, transformers, feeders, etc., and the demands of individual customers, is illustrated and described in Bulletin No. 4533. It consists of a small differential thermometer, having one of its bulbs surrounded by a heating band carrying all, or a definite shunted part, of the total current. The expansion of air in this bulb forces the liquid in the "U" tube of the differential thermometer into the opposite leg and causes it to overflow into a central or index tube connected to the upper end of the "U." The height of the liquid in the index tube is read on the indicator scale and marks the maximum demand of the circuit.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 17

CHICAGO, OCTOBER 26, 1907

WHOLE No. 235

TABLE OF CONTENTS.

Editorial:	Recent Electric Railway Legal Decisions By J. L. Rosenberger, LL. B.	713
Electric Roads of New Haven Company.....	693	
Pay-as-You-Enter Car in Large Cities.....	693	
Refinement of the Pay-as-You-Enter Car.....	693	
Expenditures for Improvements in Detroit.....	694	
New Interests in Macon (Ga.) Railway.....	694	
The Little Road	694	
The Storage Battery in Alternating-Current Work.....	695	
Classification of Operating Expenses.....	695	
Annual Reports:		
—New York New Haven & Hartford Railroad.....	696	
—Allis-Chalmers Company	696	
Power System of the Spokane & Inland Railway (Illustrated)...	697	
Street Railway Car Building.....	701	
Report of the Committee on Public Relations.....	701	
Turbines and Auxiliaries.....	704	
New Surface Cars for Brooklyn (Illustrated).....	705	
Rail Corrugation. By A. L. C. Fell.....	707	
Pay-as-You-Enter Cars for the New York City Railway (Illustrated)	709	
Improvements Authorized on New York City Railway.....	710	
Heavy Electric Traction	710	
Piping and Power Station Systems—LIX. By W. L. Morris, M. E. (Illustrated)	711	
News of the Week:		
Accidents in New York City	714	
—Chicago Traction Reorganization	714	
The Cleveland Situation	714	
Construction News:		
—Franchises	715	
—Recent Incorporations	716	
—Track and Roadway	716	
—Power Houses and Substations	718	
Personal Mention	718	
Financial News:		
—Chicago Union Traction Company.....	719	
—Interborough Rapid Transit Company.....	719	
—Electric Railway Earnings.....	719	
Manufactures and Supplies:		
—Rolling Stock	720	
—Shops and Buildings	720	
—Trade Notes	720	
—Advertising Literature	721	
Broom Machine Exhibited at Atlantic City (Illustrated).....	722	
General Electric Display at Atlantic City (Illustrated).....	722	
The Johns-Manville Catalogue (Illustrated).....	722	

In the final analysis of reasons why the directors of the Detroit United Railway decided not to pay a dividend on the stock in November it is not fair to overlook the attitude of the city authorities of Detroit. The constant efforts of the municipal officials to harass the company necessarily make it more difficult to raise capital for improvements.* J. C. Hutchins, president of the railway, has further emphasized this week the alternative which the company was under of either increasing its floating debt or of withholding dividends from stockholders and using the funds for improvements. To enable the system to handle its traffic further large expenditures are necessary. Mr. Hutchins has given out a summary of the cost of some of the important improvements of the year. It includes: For enlarging a power house and for new power house equipment, \$400,000; for new cars, \$350,000; on track work, \$250,000. The total expenditure on track will reach over \$300,000 for the year. By passing the quarterly dividend the company will retain in its treasury \$156,250. Since August 1, 1905, the dividends have been at the rate of 5 per cent annually. As the entire amount of authorized stock—\$12,500,000—is outstanding, the requirements for dividend purposes in the calendar year 1906 were \$625,000. For 1907, with three quarterly disbursements aggregating 3½ per cent on the stock, the annual report will show total dividend payments of \$468,750.

The significant feature about the statement of earnings of the street railway lines owned by the New York New Haven & Hartford Railroad is the proportion of the gross revenue which was used in operating expenses. The statement will be found in another part of this issue. Out of gross earnings of \$10,638,057.80 there was used in operating expenses \$7,022,158.11, or 66 per cent. There was charged to the three maintenance accounts, way and structure, equipment and power plants, a total of \$1,917,698.30, which is equivalent to 18 per cent of gross earnings, or to 27.3

per cent of the total operating expenses. It will be observed that the statement shows separately the cost of maintenance of power plant. The largest expenditure for maintenance was devoted to way and structures, on which 10.8 per cent of the total gross earnings was expended. Outside of the three maintenance accounts, the largest single item of expense was for the operation of cars, which required 24.7 per cent of gross earnings. The operation of power plants cost 9.7 per cent of gross earnings, making a total for these two items of 34.4 per cent of the gross revenue. As the unification of the companies in the system is carried further, it is probable that the general expenses will be reduced. While the principal interest in the statement will naturally lie in the maintenance and the operating expenses, other important facts may be presented to show the sources of earnings. Passenger traffic yielded 88.5 per cent of the total revenue, and freight, mail and express together contributed 2.5 per cent.

It will be interesting to note the comparative success of the pay-as-you-enter cars which are to be introduced in Chicago and are shortly to be introduced in New York on the Madison avenue line. Though cars of this type have met with the favor both of the operating company and of the public in Montreal, where they may be said to

have been given a thorough trial, it is undoubtedly considerable of an experiment to attempt their operation in cities such as New York and Chicago, where there are complications of density of traffic, operation under short headway with frequent stops, superior force of fickle public opinion and other elements not met elsewhere. In both New York and Chicago the management of the lines operating pay-as-you-enter cars saw fit to give more or less publicity to the scheme of operation and the purpose of the new cars. In New York in particular, where every innovation is looked upon as a scheme to increase the receipts of the transportation company, stress has been laid upon the features of speed, safety and comfort. Likewise in that city the greatest density of traffic is un-

doubtedly encountered, and it is proposed to limit the carload to 65 persons, the seating capacity of each car being 36, and by a slight change in the construction of the railing dividing the platforms into entrance and exit to use both doorways from the car to the front platform as exits. Thereby, it is believed, the handling of passengers will be materially facilitated. In this connection it is interesting to note that in Chicago smoking is allowed on the front platform, whereas in New York it is prohibited entirely, with the result that many women do not hesitate to use the front platform as a mode of exit. With the New York cars it is expected that practically all passengers will leave by the front platform and thus the interference occasioned by passengers boarding and leaving the cars at the same time will be reduced to even less than that of pay-as-you-enter cars having the regular railing arrangement. It is also interesting to note that it is proposed in New York to prohibit passengers standing on the rear platform after having paid their fares.

Following the change which has been made in the dividing railing on the pay-as-you-enter cars for New York, described elsewhere in this issue, it may be of interest to

Refinement of the Pay-as-You-Enter Car.

note that a further change in the same connection has been considered and is understood to have been adopted by the Montreal Street Railway Company for future cars for its lines. In the past it has been noted that while with the pay-as-you-enter car there has been a decided freedom from interference between passengers boarding and leaving the car, there has been an inclination of men to seize the handhold at the end of the car body and swing themselves aboard before the car came to a full stop. Necessarily from the arrangement of entrance and exit this interfered with passengers about to disembark and there was occasioned a slight delay until the person getting on the car could step aside or along the running board to the entrance. To prevent this it is proposed to have the dividing railing or post, which now extends only to the platform edge, continued to the edge of the lower step. This arrangement would present the dividing post as a handhold for persons boarding the car. The post would project as far as the handhold at the corner post of the car body and could clearly be seen by waiting passengers. From familiarity with the arrangement of the car passengers would quickly learn to seize the dividing post rather than the handhold.

The interests which have acquired control of the Macon (Ga.) Railway & Light Company have issued a statement of principles to the people of Macon. The statement is signed by the new president, W. J. Massee, who is outspoken and reassuring. Although Mr. Massee gives credit to the old management for furnishing the best

service possible under existing conditions, he states that with new improvements which will now be made the service will be better. When the properties which form the holdings of the present company were consolidated in 1902, the officials agreed with the municipality to devote \$150,000 to improvements. As a matter of fact, since that time \$500,000 has been expended for this purpose. Had the company been able to secure the right to construct double track, the service undoubtedly would have been better. The position of the stockholders was clearly presented. They are residents of the city, "young men with possibly every interest they have invested" in Macon, "and, while there is no immediate hope for returns on the investment which has been made by them, they hope, with good service and the assistance of the citizens of this community, that it will ultimately bring them a profit." The desirability of extensions, the fact that the company expends about \$12,000 monthly in salaries and wages and the

relations of the road with the public are also mentioned. While admitting it is proper that public utility corporations should be regulated, Mr. Massee says that good service cannot be attained except with the co-operation of the people in the community. He promises that if there are any weak places in the management they will be strengthened and that complaints affecting the service will have immediate attention. For the good of the city the people of Macon should give their earnest support to the efforts to provide adequate service.

THE LITTLE ROAD.

Bereft of its italics, quotation marks and epigrammatic phrases, a paper presented to the American Street and Inter-urban Railway Association at its recent meeting on "Problems of the Small Road" is suggestive of several features which may well be incorporated in the management of any road, large or small, but which for present purposes may be considered from the viewpoint of the small company. It is not necessary or profitable to attempt to define the precise stage of growth at which a road passes out of the primary class. At the meeting of the association a year ago it was suggested that while it was valuable for street railway officials generally to meet in convention, discuss problems and lay down recommendations as approved practice, the greater part of the problems considered were those of the larger roads and the recommendations made were applicable to them only.

It is obviously impossible that the same methods in operation and management should be equally applicable to the small road upon which the same man serves as general manager and superintendent, engineer and master mechanic, trackman and lineman, as to the extensive system upon which every item of work is definitely assignable to its own department and upon which the superintendent of track would as soon think of appearing officially in Wall street as of making a suggestion as to the maintenance of a transmission line. But it is equally obvious that the principles of the system which are absolutely essential to the conduct of a large property may be applied beneficially to the conduct of one of minor importance. The author of the paper has stated a truth when he says that the road must be a very small one when the principle of departmental organization becomes farcical. It may be that the various departments under the control of the general manager are but pigeonholes in his desk. The value of systematization remains.

It is readily conceivable and admissible that it may be impossible upon the small road to maintain the physical standards of the larger systems, though even here the difficulty is not so great as is sometimes insisted. It is presumable that a road is expected to increase in importance and extent, and upon this supposition it is questionable if it is not a simpler matter to begin the formation of an adequate basis of organization at an early stage of growth than later. If this is the correct theory, it is obvious that in every respect, in principle if not in detail, the practice which is good for the large system is equally good for the small road.

As a matter of fact, it would appear as if the criticism made that the national associations are of use only to the large systems were not so much a complaint as to the subjects chosen as an arraignment of the manner in which the associations handle the questions presented for their consideration. If this consideration is confined largely to detail, then obviously the little road can get but little benefit from a rehearsal of the details with which the larger system is deeply concerned. The logical conclusion as to the course which would subserve equally the interests of the little road and the large system is, that if the proceedings of the association moved to a greater extent along the lines of fundamental principles and less in the paths of detail, the interests of both classes of roads would be equally served.

Again, the representatives of the small roads have only

themselves to blame if their part in the work of these national associations appears insignificant. It is probable that even in the matter of engineering standards the man who is connected with a road operating 20 miles of track has opportunities for closer observation, if with less numerous examples, than the one who has supervision over a system comprising several hundred miles. The principles of operation, the relations with the public and with employes are the same, and the number of miles operated or of cars in service changes the problem only in degree, but not in kind.

One or two of the points here suggested seem to have been in the mind of the author of the paper to which reference has been made. He says in addition, "that his little road takes his every minute from his early rising to his late retiring," and he has difficulty in taking an active interest in the association proceedings. Such, however, is the common lot, and it is doubtful if the manager of the small road has more of difficulty in this respect than he who controls the larger system. It would be of advantage to the association if each of the representatives of the smaller roads would contribute his bit—even in proportion to the size of his road—to the common stock of knowledge. It is possible that the service would not be wholly altruistic.

THE STORAGE BATTERY IN ALTERNATING-CURRENT WORK.

With the advent of alternating current for the operation of interurban cars many arguments were advanced tending to show that the recognized saving in the construction of trolley and feeders would be outweighed by inflexibility of operation. One of these arguments was that with the use of alternating current only, storage batteries could not be relied upon to cut down the peaks of the power station load. How well this argument has been controverted is illustrated in the data included elsewhere in this issue in the description of the phase-changing and load-regulating station of the Spokane & Inland Empire Railroad.

The methods for utilizing the fly wheel characteristics of a storage battery for smoothing the demand curve on a railway power supply have been well perfected for electric roads operating with direct current. The employment of special means for taking advantage of the valuable characteristics of a storage battery for performing a similar duty on single-phase alternating-current railways has been carried out at Spokane, Wash., with much credit to the engineers who bore the responsibility of solving the problem.

One of the controlling features of the power supply for this road, which operates trains of three or more cars under regular steam railroad conditions, with varying headway, was that power must, at the start, be purchased with the cost charges based upon the maximum demand during each month. For this reason it became very desirable to employ some means for flattening the railway load curve and thereby secure current at a much lower cost per unit than would obtain if the fluctuations caused by handling heavy freight trains with electric locomotives were imposed on the water-power plant generating the current.

Another condition which required recognition was that the railway motors were designed to operate with 25-cycle current, while the power supply company's apparatus generated current at 60 cycles. There were, therefore, these two main conditions to be considered: First, a flattening of the load curve; second, a changing of the frequency from 60 to 25 cycles. In solving this problem of power supply the railway engineers, together with the engineers of the storage battery and electrical apparatus manufacturers, designed a phase-changing and battery station which, as described, performs its duty remarkably well and is thought to be unique in its application.

The essential feature of this station is the use of 3-ma-

chine motor-generator sets. One machine of each set is an induction motor operated by three-phase 60-cycle current at 4,000 volts and driving the second machine, a 1,000-kilowatt single-phase 25-cycle 2,200-volt generator; direct connected with these two machines is a direct-current generator (or motor) rated at 1,100 amperes at 550 volts. The latter machine floats across the terminals of a storage battery and has its input and output regulated by the usual type of booster sets and carbon regulator.

With this equipment adjusted so that on normal load the battery neither charges nor discharges, it is seen that there is available a train of apparatus which instantly and automatically can be called into play to smooth out the high load demands. If the railway motors under the freight locomotives and passenger cars demand from the single-phase generator of the 3-machine unit more than the average load which the railway generator places upon the induction motor driving it, the battery regulating devices are called into play and immediately the storage battery supplies current to the direct-current machine, which then, acting as a motor, assists the induction motor in driving the single-phase railway generator.

On the other hand, when the railway load is light and the single-phase railway generator does not require for its driving the full capacity of the induction motor the battery regulating devices act so that the direct-current machine acts as a generator and charges the cells, thus increasing the load on the induction motor up to about the normal point. The result is a remarkably flat load curve.

While at first thought this combination of machines may seem intricate, it is not so, and all of the apparatus employed, together with the methods of wiring, have been tried under equally severe duties. The equipment has its reason for apparently being novel in a unique combination of methods that long since have shown their ability to withstand the abnormal conditions of railway service.

CLASSIFICATIONS OF OPERATING EXPENSES.

To the Editors:

In your issue of October 5 you presented in parallel columns a comparison of the "Classifications of Operating Expenses" of the American Street and Interurban Railway Accountants' Association, the interstate commerce commission and the Ohio Electric Railway. In a very comprehensive statement of the differences between these classifications, you stated that the Ohio Electric Railway classification was prepared by me. The basis of the classification adopted by this company was a tentative classification prepared by W. H. Forse, Jr., A. B. Bierck and A. C. Henry, a subcommittee on "Interurban Accounts" of the American Street and Interurban Railway Accountants' Association, and while certain changes were made by me, I think the above explanation is due these gentlemen and I shall be glad to have you make the correction

M. W. GLOVER.

Cincinnati, O., October 21, 1907.

United States Consul F. W. Mahin, in writing from Nottingham that the manufacture of aluminum cables as electrical conductors in place of copper has actively begun in Great Britain, adds: "The high price of copper has led to this. Aluminum, it is explained, is an efficient substitute for copper where space is not an important consideration; is lower in cost, needs fewer poles for its support, and is less affected by the atmosphere than copper. Three serious former disadvantages are now said to have been overcome—the difficulty of procuring aluminum in a reasonably pure state, of drawing it into wire, and of making satisfactory joints. The cables and wires being made in this country are covered with vulcanized bitumen treated by Paterson's method, and they are, it is claimed, not brittle at low temperatures nor unduly soft at high temperatures, which they would meet with in ordinary use.

ANNUAL REPORTS.

New York New Haven & Hartford Railroad.

In the annual report of the New York New Haven & Hartford Railroad for the year ended June 30, 1907, the following statement is presented regarding the operations of the street railway lines in the system:

Earnings—	
Passenger	\$9,410,432.33
Freight	130,581.29
Mail	10,638.66
Express	122,786.52
Chartered cars	30,285.56
Sale of power	86,744.72
Park earnings	69,690.86
Advertising	34,268.37
Miscellaneous, including gas, light, power and water	742,629.49
Total earnings	\$10,638,057.80
Operating expenses—	
Maintenance of way and structures	\$1,143,967.52
Maintenance of equipment	698,315.65
Maintenance of power plants	75,415.13
Operation of power plants	1,027,375.64
Operation of cars	2,622,945.47
General expenses	1,079,542.13
Miscellaneous expenses	374,596.57
Total operating expenses	7,022,158.11
Net earnings	\$ 3,615,899.69

The New York New Haven & Hartford Railroad is now the direct owner of all the steam railways, electric urban and interurban roads, lighting, gas and water supply companies formerly owned and operated by two separate corporations, the New York New Haven & Hartford Railroad and the Consolidated Railway. For simplification of operation and in order that the accounts of operating results may be intelligently compared with those of other companies not operating similar properties, the street railways, electric lighting, gas and water supply companies in Connecticut owned and controlled by the New Haven company, have been, since June 1, 1907, operated under a contract by the Connecticut Company, all of the capital stock of which is owned by the New Haven company. The contract provides for the payment monthly of all the net earnings to the steam railroad company.

The report contains a description of the street railway lines and equipment of the subsidiary Connecticut Company and the Rhode Island Company. The Connecticut Company operates 640.17 miles of street railway lines, of which 411.01 miles are owned and 229.16 miles are leased, serving the following cities and towns:

Cities of New Haven, Hartford, Bridgeport, Waterbury, New Britain, Meriden, New London, Norwich, Middletown, Stamford, South Norwalk, Rockville, Derby, Ansonia, and the towns of East Haven, Branford, North Haven, Wallingford, Hamden, Orange, Southington, Plainville, Putnam, Thompson, Killingly, Plainfield, Waterford, Montville, Norwich, Lisbon, Sprague, Portland, Wethersfield, West Hartford, Farmington, Bloomfield, Windsor, East Hartford, South Windsor, Manchester, Enfield, Glastonbury, Suffield, Greenwich, Stratford, Milford, Huntington, Fairfield, Westport, Norwalk, Darien, Naugatuck, Torrington, Winchester, Beacon Falls, Seymour, Cheshire, Newington and Berlin, Conn., and the towns of Rye, Port Chester, Harrison, Mamaroneck and New Rochelle in New York state.

The Connecticut Company owns 1,231 passenger and other cars and leases 460, making a total of 1,691. In addition to the street railway lines various gas, electric lighting, water and power plants are operated.

The Rhode Island Company operates 310.90 miles of street railway lines, of which 43.89 miles are owned and 267.01 miles are leased, serving the following cities and towns:

Cities of Providence, Pawtucket and Central Falls, and the towns of Cranston, Warwick, North Providence, East Providence, Johnston, Cumberland, Lincoln, Barrington, Coventry, Scituate, Warren, Bristol and East Greenwich.

The total number of 946 cars owned by the Rhode Island Company is divided between 342 owned and 604 leased.

Allis-Chalmers Company.

Supplementing the annual report of the Allis-Chalmers Company for the last fiscal year, President W. H. Whiteside presents the figures of earnings for the quarters ended June 30 and September 30, 1907. Between the showing of these figures and the results of operations in the year which was completed on June 30, there is a decided contrast. Mr. Whiteside explains that the quarterly figures reflect a steady and substantial improvement since April, 1907, when the company first began to receive the benefits from the newly developed lines of machinery built in the plant at West Allis, which was enlarged to provide for their manufacture. The quarterly statements follows:

Quarter ended—	September 30, 1907.	June 30, 1907.	Increase.
Gross profit	\$852,836.49	\$780,277.18	\$72,559.31
General and selling ex- penses, interest on bonds, etc.	563,926.60	579,919.21	*15,992.61
Net profit	\$288,909.89	\$200,357.97	\$88,551.92

*Decrease.

In these six months the total net earnings in excess of all expenses and fixed charges were \$489,267.86. The earnings for the last two years compare as follows:

Year ended June 30—	1907.	1906.	Increase.
Profit on operations of the last fiscal year after deducting expenses of manufacturing and selling, interest, divi- dends on preferred stock of the Bullock Electric Manu- facturing Company and pro- vision for doubtful accounts	\$1,226,242	\$ 648,161	\$578,081
Charges for maintenance, re- pairs and renewals on buildings, machinery, plant, tools, etc.	854,503	754,928	99,575
Depreciation on same	253,988	281,655	*27,667
Interest on bonds, loans and notes payable	505,049	.....	505,049
Total	\$1,613,540	\$1,036,580	\$576,957
Operating deficit for year ..	\$ 387,298	\$ 388,422	*\$ 1,124

*Decrease.

As the statement showed a balance in the profit and loss account on June 30, 1906, of \$157,481, the deficit from the operations of the year made a balance sheet deficit on June 30, 1907, of \$229,817. The fact that the results for the year were not as satisfactory as had been expected is due, Mr. Whiteside says, to a "combination of circumstances beyond our control, including the general strike of molders throughout the country; the failure of contractors to complete buildings on time; the delayed delivery of equipment for the new shops; and the large expense contingent upon the organization of the new plant and necessary development of new lines of manufacture."

A full review is given of the work of different departments. The year was marked by a considerable increase in the sale of the products of the electrical and steam turbine departments. It is stated that "a reasonable degree of success has already rewarded our efforts to establish ourselves" in the business of selling air brakes to urban and interurban electric railways. An increase of 45 per cent over the previous year was shown in the foreign orders booked. Looking forward, Mr. Whiteside says that the position of the company, the steadily increasing net earnings in the most recent months and the large volume of orders on hand, aggregating over \$15,478,000 on June 30, 1907, are evidence of future prosperity.

Chairman Willcox of the New York public service commission has announced that after a conference with August Belmont and Theodore P. Shonts he feels safe in stating that the rapid transit subway under the East river, from the Battery to Brooklyn, will be ready for operation by December 15.

POWER SYSTEM OF THE SPOKANE & INLAND RAILWAY.

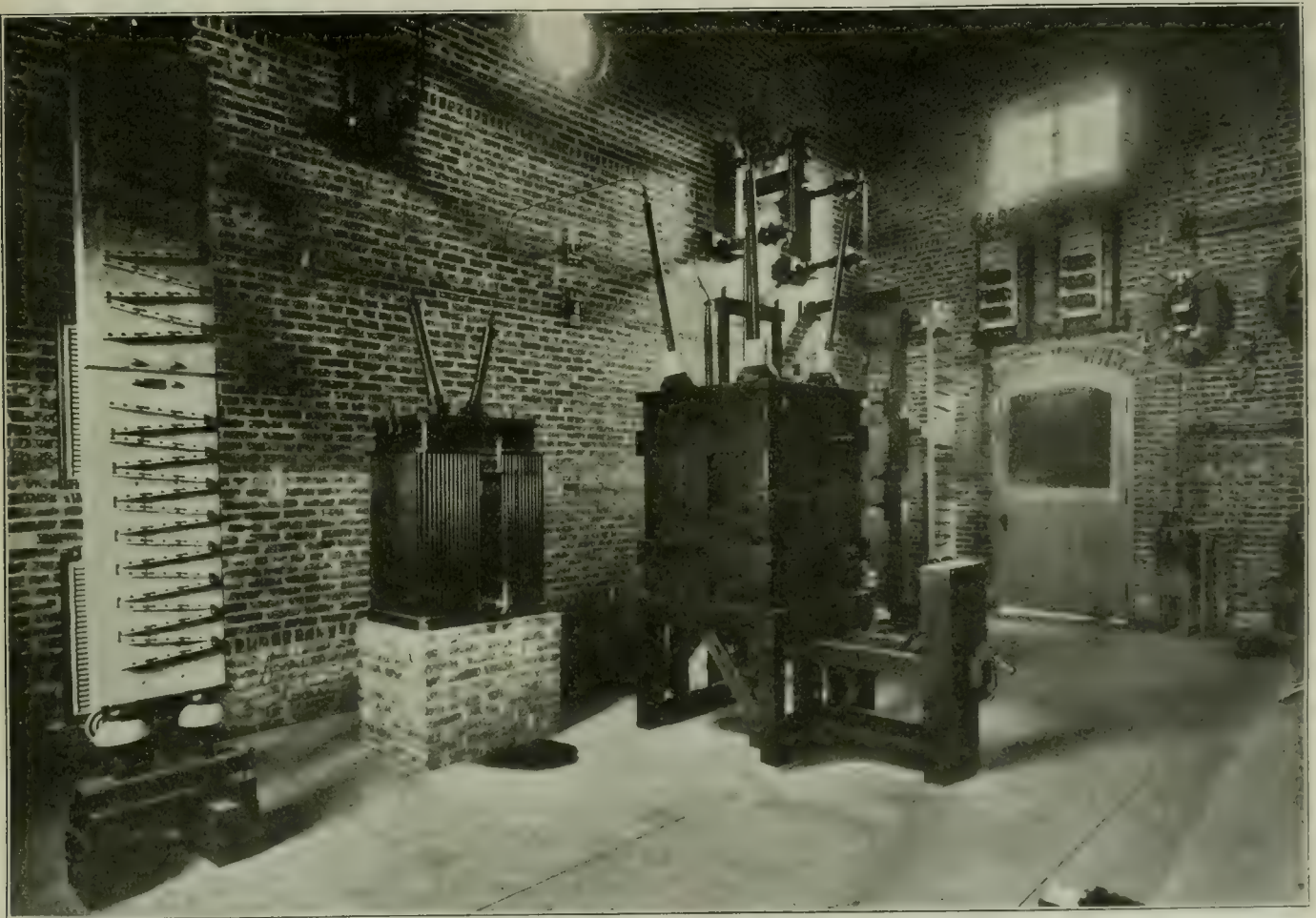
The Spokane & Inland division of the Inland Empire System has had many of its interesting construction features

of this progressive road. It will be remembered that this railway as now operating includes about 120 miles of well-built single-track roadway, extending southward from Spokane in the form of the letter Y.

Outside of the city of Spokane the cars are operated



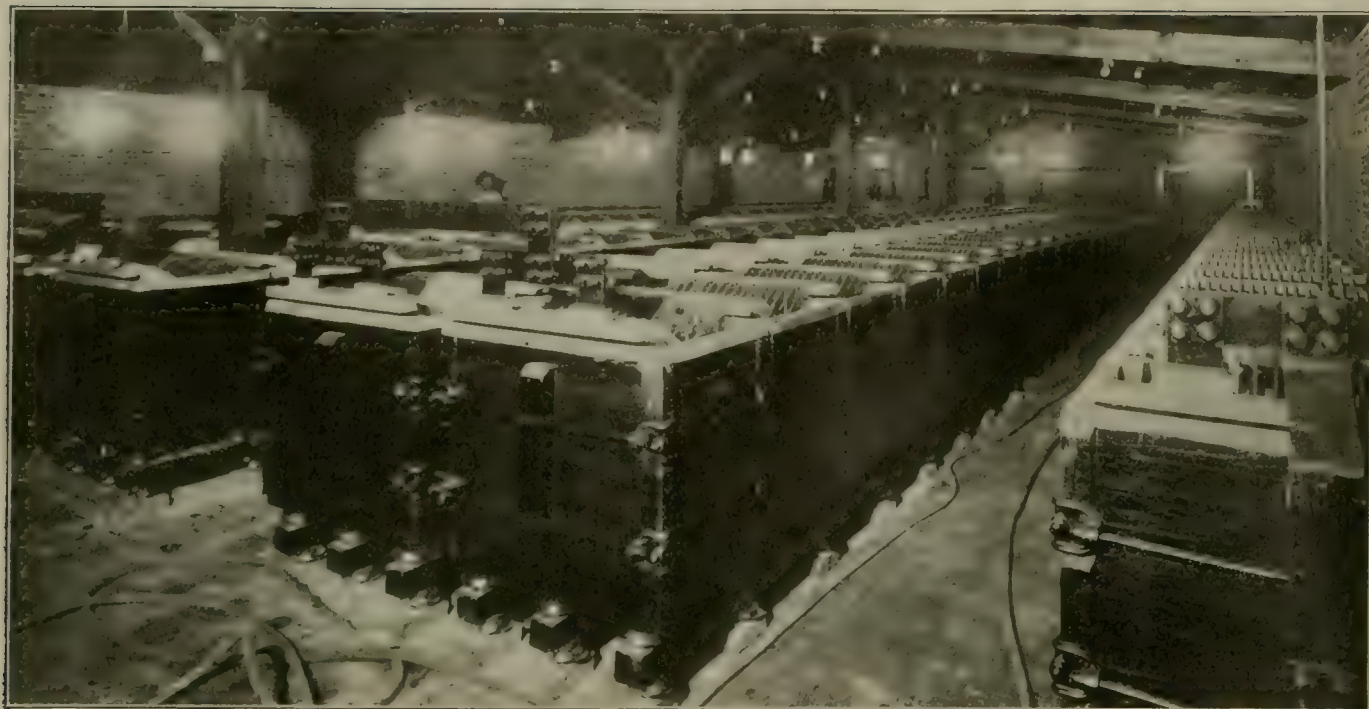
Spokane & Inland Power—Static Transformer Substation.



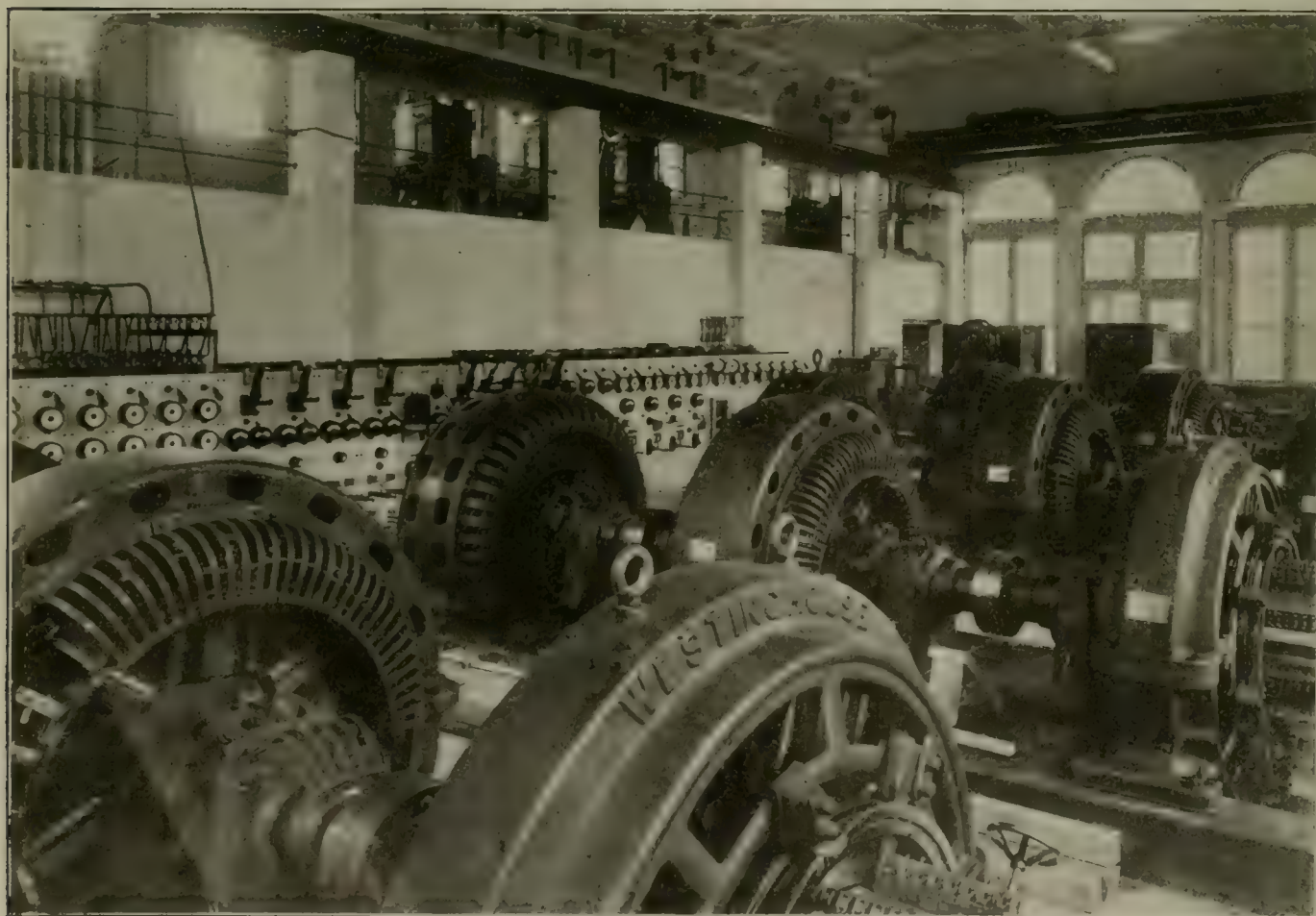
Spokane & Inland Power—Interior of Static Transformer Station, Showing Oil Switch, Transformer and Lightning Arrester Banks.

described in past issues of the Electric Railway Review, but as yet there has not been published an illustrated description of the very interesting phase-changing and battery station which performs such an important part in the power system

with 25-cycle, 6,600-volt alternating current, distributed on a No. 000 trolley wire suspended from a single stranded steel catenary. This trolley as illustrated herewith is substantially built in keeping with all other of the railroad equipment



Spokane & Inland Power—Chloride Accumulator Installation.



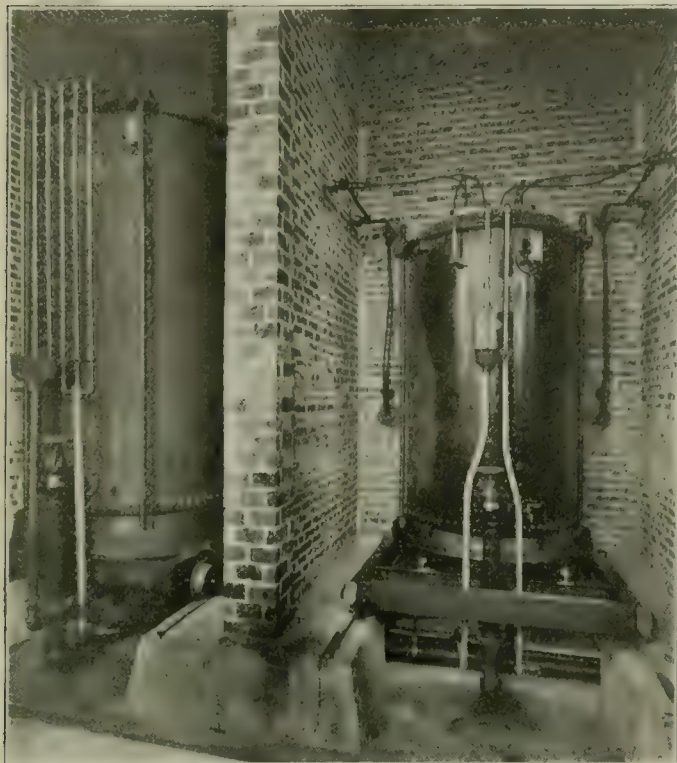
Spokane & Inland Power—Interior of Phase-Changing Station, Showing 3-Machine Units.

Fifteen static transformer stations feed the 6,600-volt trolley, taking current from a 45,000-volt single-phase transmission line, which distributes the output of the phase-changing station located 2.19 miles from the Spokane terminal.

The Spokane & Inland Empire Railroad owns two large water power sites on the Spokane river. The plant for the one at Nine Mile bridge will be completed early in 1908 and

istics to change the frequency from 60 to 25 cycles before feeding the current to the railway transmission line. J. B. Ingersoll, general manager, solved this problem, with the aid of the Westinghouse Electric & Manufacturing Company and The Electric Storage Battery Company by combining phase-changing induction motor-generator sets on the same shafts with direct-current railway machines which utilize a large storage battery as a flywheel.

As earlier stated, the phase-changing and battery station is located near the Spokane end of the railway. The building as illustrated herewith is a brick structure, about 100 by 65 feet, with concrete floors. The "Chloride" accumulators are housed in a separate structure of similar design. The main



Spokane & Inland Power—Transformers Mounted on Trucks in Compartments.

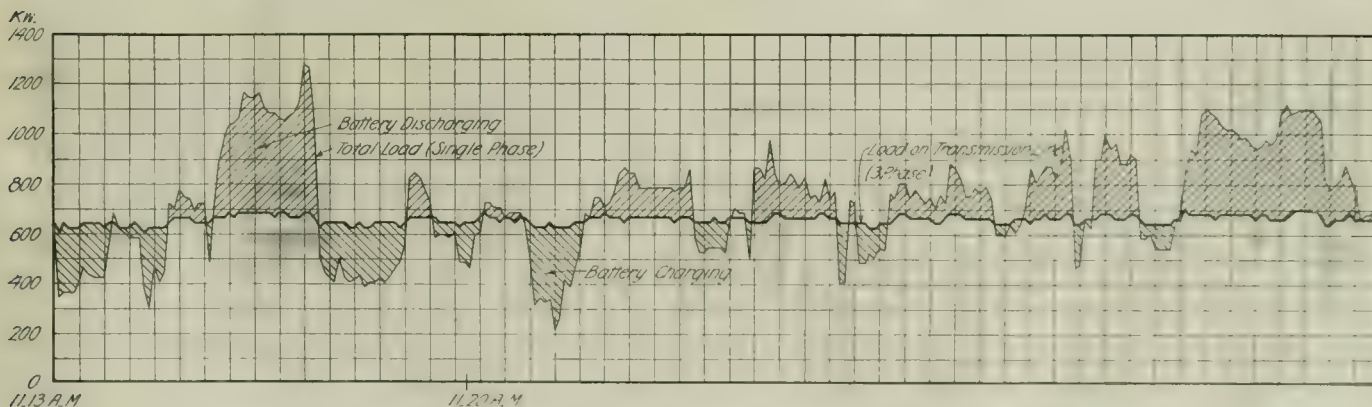


Spokane & Inland Power—Phase-Changing Station Near Spokane.

will develop 20,000 horsepower. About 5,000 horsepower capacity will be required to operate the "Inland Empire System" and the remainder will be sold for power and lighting purposes in and around Spokane.

Since the opening of the Spokane & Inland Railroad the

machine floor of the station is served by a 15-ton Niles hand crane. The accompanying halftone engravings and zinc etching, made from a line drawing, afford a good general idea of the building and the layout of the machinery. Here the three-phase 60-cycle current of 4,000 volts pressure is changed



Spokane & Inland Power—Power Curves, Showing Smoothing Effect of Storage Battery.

Inland Empire System has operated with power purchased from the Washington Water Power Company. The output of this company's plant is 60-cycle, three-phase, 4,000-volt current. In the purchase of this current for the Inland Empire System the charges are based upon the maximum demand during each month, and for this reason it became very desirable to employ some means to flatten the railway load curve as well as it was necessary on account of the motor character-

to single-phase 25-cycle current and fed to the trolley line at 6,600 volts and the transmission line at 45,000 volts pressure.

The feed lines from the Washington water power plant enter the station on the gallery and pass to hand-operated disconnecting oil switches, then through choke coils, instrument transformers and down through the gallery floor to a 3-bar bus. From this power bus leads pass to two Westinghouse type C oil switches, having remote control, and located on

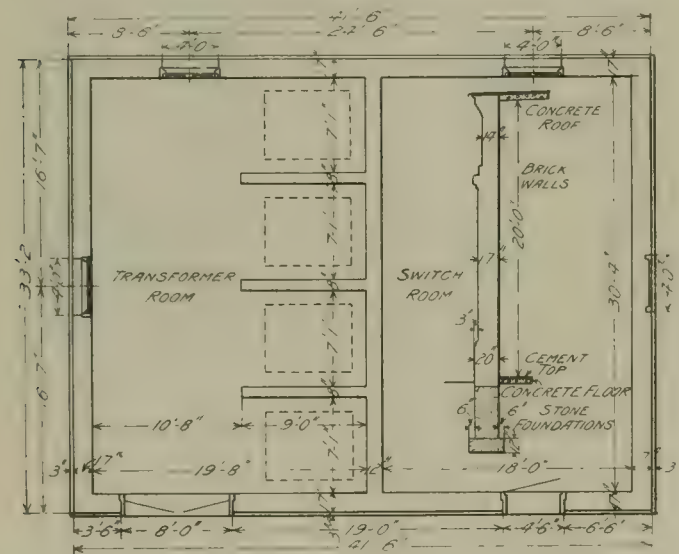
the gallery floor. These switches admit of flexibility in feeding two sets of 4,000-volt machine busbars at the back of the switchboard on the main floor.

The motors of the phase-changing sets can be operated from either set of busbars and the set not in use can be cut free from the high-tension line. The motor switches are the type F Westinghouse oil break, from which current is fed through starting resistance in the secondaries and rheostatic controllers to the induction motors.

The four main units are each made up of three machines. In each set a 1,000-horsepower induction motor takes three-phase 60-cycle current at 4,000 volts from the incoming Washington water power lines. This machine is mounted at one end of a shaft, in the middle of which is a 1,000-kilowatt, single-phase, 2,200-volt, 25-cycle generator, and at the other end of which is a direct-current machine rated at 1,100 amperes and 550 volts. These three machines of Westinghouse manufacture operate at 500 revolutions per minute.

When the load on the generator is light the direct-current machine runs as a generator and charges a 275-cell storage battery and when the load is heavy the direct-current machine runs as a motor, taking current from the battery and assist-

having a discharge rate of 2,880 amperes, furnished by the Electric Storage Battery Company, Philadelphia, Pa. The accompanying chart of 5-second readings affords an idea of the effect the battery has on the supply line load. The single-phase railway load is very irregular, while the three-phase supply line load is comparatively smooth. The regulation of the battery booster is controlled by a carbon regulator operated



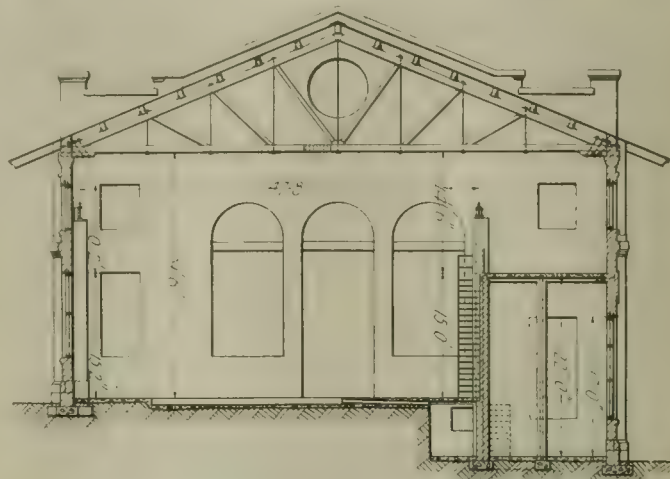
Spokane & Inland Power—Floor Plan and Section of Side Wall of Transformer Station.

ing the three-phase induction motor in driving the single-phase generator. In this connection it will be noted that the single-phase generator has a somewhat larger capacity than the three-phase induction motor, the idea being that the three-phase motor in connection with the direct-current machine will take nearly its full capacity from the line under a large variation of the single-phase load. At times when the single-phase load is excessive the direct-current machine, taking current from the battery, makes up the deficiency. By this method a more uniform load on the three-phase line is had. The periods of light load are thus diminished and the peak of the heavy load materially flattened. These machines are mounted on a common bedplate, each machine having its own pair of bearings and all being connected by fixed couplings, as shown in the accompanying illustration.

The station equipment also includes two battery boosters of 960 amperes capacity and three 50-kilowatt exciter sets for the single-phase generators. These exciters are driven by 75-horsepower Westinghouse type C.C.L. motors, taking three-phase current at 125 volts pressure.

Battery.

The battery across which the direct-current machines are connected is made up of 275 "chloride" cells, type R 33,



Spokane & Inland Power—Section and Plan of Phase-Changing Station.

by changes of current in the three-phase supply line. Small changes in the current in this line cause the battery to charge from or discharge to the direct-current machine and thus keep the power supply load curve flat.

A 30-panel switchboard, from which all the equipment and the battery are controlled, is located in front of the gallery. On the panels for the 750-horsepower direct-current machines starting switches are provided for taking current from the battery for starting and thus not putting the large units

on the three-phase 4,000-volt supply line until the machine is up to speed. The battery is controlled by a carbon regulator and the single-phase 25-cycle generators by Tirrell regulators. For synchronizing a type D synchroscope having an illuminated dial with an illuminated pointer is mounted on a pedestal in front of the switchboard.

Transformers.

The step-up transformers for raising the single-phase 25-cycle current from generator pressure of 2,200 volts to line pressure of 45,000 volts are mounted on cars made of structural iron shapes which stand in brick compartments. These compartments are provided with rails set in the concrete floor and in front of the row of compartments is a track running to a cross track by which the transformers can be taken to the end of the transformer room and the transformer car run from the transfer car to the short track leading under the crane at the end of the station. The transformer compartments are shown in one of the illustrations. From each one of the five 1,250-kilowatt, 2,200-45,000 volt, single-phase, step-up, oil-insulated, water-cooled transformers, two leads pass up through the gallery floor above to 60,000-volt capacity type L Westinghouse oil switches and then through choke coils and hand-operated disconnecting switches to the transmission line. The transmission line comprises two No. 2 hard drawn copper wires mounted on single crossarms at the tops of 40-foot wooden poles.

The local trolley section is fed from the phase-changing station through a 6,600-volt panel on the station switchboard supplied by three 375-kilowatt, 2,200-6,600-volt transformers. As completed there will be 15 static transformer stations located at intervals of 10 miles apart. Each station, as will be noted from the illustrations, is a brick and concrete structure. The equipment includes three 375-kilowatt oil-insulated transformers, connected in parallel and fed through one hand-operated 60,000-volt capacity oil switch provided with automatic release. Lightning arresters are placed on both high and low tension sides of the transformers and 6,600-volt capacity oil switches serve to disconnect the transformers from the trolley.

STREET RAILWAY CAR BUILDING.

Census Bulletin No. 84, issued by the United States department of commerce and labor, bureau of the census, contains the following statistics relating to street car building in the United States for the calendar year 1904, except that the figures from the state of Michigan relate to the year ended June 30, 1904:

The great development of street railroads since 1890 has caused an extraordinary growth in the industries engaged in the construction and repair of street railroad cars. The value of products for these industries nearly quadrupled during the 15-year period from 1890 to 1905, increasing from \$6,268,462 in the earlier year to \$24,281,317 at the last census. The increase for the decade from 1890 to 1900 was \$10,407,717, or 166 per cent, and that for the five years from 1900 to 1905 was \$7,605,138, or 45.6 per cent.

Of the 100 establishments engaged in the street car industries at the census of 1905, 86 were street railway repair shops. Notwithstanding the fact that there were six times as many repair shops as establishments engaged primarily in the manufacture of street railroad cars, the latter represented an investment of \$12,975,703, or 50.1 per cent of the capital employed in the combined industry, and manufactured a product valued at \$10,844,196, or 44.7 per cent of the value of products for the two branches of the industry.

The number of street railroad cars built during the year was 4,694. These cars were valued at \$9,902,310. No cable cars were reported and only 42 were cars for horse-power.

Of the electric cars built in the shops independent of the railroads 2,621 were closed, 554 were open, 502 were combination, and the remaining 251 were of other varieties.

Ohio was the leading state in the value of products of the independent shops, furnished \$1,828,326, or 16.9 per cent of the total value of products for such shops.

New York ranked first in the value of products of the repair shops, with \$3,879,933.

REPORT OF THE COMMITTEE ON PUBLIC RELATIONS.

It has been considered by your committee that the subjects naturally within its scope are those indicated by its title, namely, our relations with the public as distinguished from those matters pertaining to our internal business operations. These external or public relations in the minds of your committee naturally subdivide themselves as follows:

1. Our relations with that portion of the public served by our several lines of transportation; in other words, our patrons.

2. Our relations with governmental bodies, federal, state and municipal.

Under the first heading are embraced such questions as service, rates of fare, transfers, rules and regulations governing the service in so far as they apply to or directly affect our patrons, and in general our methods and ways of transacting our business as affecting our patrons and those persons who are residents of our several transportation districts.

Under the second heading are naturally grouped such subjects as franchises, taxation, including all public burdens and impositions, capitalization, service, rates of fare, public regulation and control. The events of the past year have caused the last-mentioned subject to occupy a position of all-absorbing interest and importance.

The contention for the enlargement of the powers of the interstate commerce commission is familiar to you all and need not be further adverted to here. In addition to this a series of events relating to the management, operation and control of corporate enterprises has directed the attention of all people throughout this country to the subject. The legislatures of more than a dozen states during the past year have enacted laws which in some way or other directly provide to some extent for the supervision and control of corporations engaged in the business of transportation. In some states this legislation has embraced nearly, if not quite all, of the so-called public utility corporations. It may be and undoubtedly is a fact that this riveting of public attention upon this particular subject has in a large measure been brought about by a better understanding on the part of the American public of the facts and conditions concerning municipal ownership and its inapplicability in this country and under the conditions prevailing here to this particular species of property. Public regulation and control and municipal ownership are intimately related. Indeed, it would seem that the one is the alternative of the other. We believe, in fact, that it is so now generally conceded and this seemingly almost universal turning away in this country from attempts at municipal ownership toward practical regulation and control affords evidence of the highest quality of a growing, if not an already established, belief that municipal ownership is impracticable and undesirable in this country.

It is not the purpose of your committee to discuss at length any of the matters herein referred to, but we would briefly call your attention to the statutes of the three states of Massachusetts, New York and Wisconsin as affording the most pertinent examples of this class of legislation.

Massachusetts in 1864 was the first of all the states to establish a state board of railroad commissioners, and in 1885 was again the first to provide a board of gas and electric light commissioners. New York in 1882 established a board of railroad commissioners and a few years since again followed the lead of Massachusetts by establishing a gas and electricity commission. During the past legislative session New York enacted a law to regulate public utilities and placed under state commissions nearly all public utilities, the telegraph and telephone companies being almost the sole exceptions. The New York commissions act of 1907 differed from the previous legislations in that state and also from Massachusetts by committing the regulation and control of the railroads, as well as the other public utilities, to the same commission, and divided the state into two commission districts, but made the subjects of commission jurisdiction the same in both districts. The New York law at the time of its passage was by far the most comprehensive piece of legislation of the kind that had been enacted up to that time. It conferred upon the public utilities commissioners all the powers that had heretofore been invested in the board of railroad commissioners and the gas and electricity commission, and in addition thereto vested in the commissioners the power to fix the capitalization of such corporations, both in stock and bonds, and also the power to make rates and specify and regulate service. It prohibited the capitalization of franchises except in such amounts as had actually been paid by any corporation to the public for any particular franchise possessed by it.

Later in the year the legislature of Wisconsin passed a public utilities law regulating heat, light, water, power and

*Presented before the American Street Railway Association, Atlantic City, N. J., October 19, 1907.

telephone companies, and another law bringing telegraph companies and street railways under the same provisions as steam railways and interurban electric lines, and bringing all these public utilities under the jurisdiction and control of the state board of railroad commissioners. The Wisconsin law goes further than either the Massachusetts or New York laws in that it provides for the physical valuation of the properties of such corporations, and provides for a complete system of uniform accounting with special requirements as to depreciation and construction accounts. It also provides for the so-called sliding scale by authorizing the commission to investigate and sanction such devices; confers the power to regulate rates, fares and charges and establishes what it terms the indeterminate permit, which it defines to be "the right to continue in business until such time as the municipality exercises its option to purchase the property at a just compensation, to be determined by the state commission." This is a most important provision and one far in advance of anything heretofore attempted in any legislation in this country. Under the indeterminate permit feature corporations operating under existing franchises are permitted to surrender them and to receive in place and in lieu thereof by operation of law an indeterminate permit, agreeing thereby to sell to the municipality in the manner therein provided and "to waive the right to insist on the fulfillment of any contracts regarding rates or services which might be set up as a defense against the orders of the state commission." In return the corporations obtain protection against unnecessary competition on the part of other corporations or municipal plants, the question of necessity to be decided by the commission. This indeterminate permit provision does not apply to telegraph or telephone companies. In fixing rates the Wisconsin commission is empowered to act absolutely instead of fixing merely maximum rates as provided by the New York law. An exhaustive statement concerning this Wisconsin legislation, the method of its enactment and the objects sought to be achieved by the legislation is contained in an article upon the subject appearing in the American Review of Reviews for August, 1907, by John R. Commons, professor of political economy in the University of Wisconsin.

A public utilities commissions bill is at present writing pending in the legislature of New Jersey, and there are well authenticated statements concerning the preparation of bills upon the same subject to be introduced at the coming sessions of the legislatures in other states.

Under these circumstances it is not the purpose of your committee at this time to discuss the questions academically. It is a condition and not a theory that confronts us. The powers sought to be conferred upon commissions by legislation of the character above referred to are so far-reaching as to overshadow at the moment any and all of the subjects within the purview of your committee; indeed, nearly all of them are in part or in whole embraced within the scope of such legislation.

In view of the importance of the subject, its delicacy and its far-reaching effects upon street railway properties it would seem to be wise for your association at this time to consider the adoption of some coherent and well-defined policy with reference to the matter.

Position of the Electric Light Association.

During the past year the committee on public policy of the National Electric Light Association has devoted a great deal of attention to this subject, and the reports of that committee and its subcommittee on public regulation and control are respectfully recommended to your attention.

The conclusions of the subcommittee on public regulation and control were stated to be:

1. That the National Electric Light Association should favor properly constituted general supervision and regulation of the electric light industry.

2. That if state commissions be constituted they should be appointed in that manner which will give them the greatest freedom from local and political influences, to the end that their rulings shall be without bias.

3. That state commissions should be clothed with ample powers to control the granting of franchises, to protect users of service against unreasonable charges or improper discriminations, to enforce a uniform system of accounting and to provide for publicity. If the state provides for publicity on the one hand, on the other hand it should safeguard investments. Regulation and publicity would be a grievous wrong unless accompanied by protection.

This report of the full committee was written before the passage of the public utilities bill by the legislature of New York, and while the full committee does not in terms make recommendations embodying the subcommittee's conclusions as stated above, nevertheless its general tenor is in the line

of acquiescence in the general public policy involved in the legislation of regulation and control.

Everett W. Burdett of Boston is the chairman of the public policy committee of the National Electric Light Association, and partly because of his great experience and ability, which peculiarly fit him to be a wise counselor at this juncture, and particularly because of the excellence of the report in question itself, this report, as well as the reports of two of the subcommittee, has been added as Appendix A to the report of your committee.

Your committee does not feel that it would now be justified in recommending any line of action to be pursued by this association or its members when and as it and they shall be called upon to define a line of action as legislative emergencies of this character shall arise in different parts of the country, but we respectfully urge upon you the desirability of formulating such a policy, and to that end beg leave to suggest that at this session of the convention a meeting be held of such of the administrative officers of electric railways as may be in attendance at this convention.

In conclusion the committee apologizes for its inadequate treatment of this subject, but ventures to express the hope that it may still be of assistance in your further deliberations, if any, upon the subject which has formed the burden of this report.

W. CARYL ELY (Chairman), JOHN B. PARSONS, JERE C. HUTCHINS, CHARLES W. WETMORE, HENRY A. ROB-INSON, E. C. FOSTER.

Appendix A—Abstract of the Report of the National Electric Light Association Committee on Public Policy.

(June, 1907.)

The committee has assumed that any subject touching the general relations of the companies to their customers, their employees, the public or the public authorities—in short, whatever involves questions of external as distinguished from internal policy—is within the scope of its consideration.

The following subcommittees were accordingly appointed:

(1) On "Municipal Ownership"; (2) on "Public Regulation and Control"; (3) on "London Sliding Scale as Applied to Electricity"; (4) on "Taxation and Franchises"; (5) on "Industrial Insurance, Rewards and Pensions"; (6) on "Publicity and Popular Education"; (7) on "Rates and Methods of Charging."

The committee on "Rates and Methods of Charging" has not submitted a separate report, but it conferred with the standing committee on rates and made some suggestions about the report of the latter committee, which were adopted.

The committee on "Industrial Insurance, Rewards and Pensions" concurs in the suggestion of the subcommittee that wherever it is possible to adopt such plans, or similar plans to those described in the report, it is well to do so, and agree in the conclusion that the tendency with all such plans is to "lighten the burden of the employe, increase his efficiency and safeguard the interests of the company by encouraging closer, deeper and more harmonious relations between the employe and the company which employs him."

Attention is also called to the practical suggestions of the subcommittee on "Publicity and Popular Education," respecting different methods of exploiting various subjects of common interests to the companies, their customers and the public. In this connection it has recently been well said: "The American public is in the long run fair. It errs oftener from ignorance than from malice. It is sentimental in the highest degree, and can be led by prejudice or emotion to extremes. If it has put before it clearly all the facts, its sound common sense will come to the rescue, and sentimental reformers and schemers with axes to grind will go out of business; but until corporations present their side of the case aggressively and with absolute honesty the public will follow the lead of those who make a living by attacks upon all corporations indiscriminately."

Taxation and Franchises.

Questions of taxation and franchises, which have occupied the attention of one of the subcommittees, are of great importance. We think there should be an agreement among the parties in interest upon some of the fundamental propositions which underlie these questions, particularly with respect to the subject of taxation. It should never be lost sight of that every form of taxation of public service corporation is a tax upon the consumer. While these companies should, of course, pay into the public treasuries their full share in discharge of the general public burdens, whatever is exacted from them in the form of excises or taxes in excess of what others similarly situated are required to pay, distinctly operates against reductions in charges for the service rendered or a limitation of the facilities furnished. The effort of every public service corporation ought to be to increase its facilities and reduce its charges as rapidly as possible, and it should

not be handicapped in doing so by exactions on the part of the public at large, which reduce the ability of the companies to do so by the amounts exacted. In other words, whatever contributions public service corporations make to the public, aside from their proportion of general taxes, should be made to those who use their service. If this simple but fundamental proposition were universally recognized there would be an end of legislation to impose special taxes and excises upon public service corporations, whose use of the public streets is, after all, required by the public for its own convenience. If, however, it shall be necessary in particular instances to acquiesce in a popular demand for special payment for the use of public streets, the public should be educated to the knowledge of the effect upon rates and facilities which the application of such a theory involves.

Another proposition which is fundamentally important, both to the companies and to the public, is that the franchises of the companies should be for such terms and upon such conditions as will best subserve the interests of both. As in the case of taxation, the interests of both are really the same. The undue restriction of franchises is analogous in its results to the imposition of unwarrantable taxes. Both operate to deprive the company of the incentive and the ability to give the public the best service at the lowest rates. A short-term franchise involves the necessity of the creation of a sinking fund, at the expense of the consumer, to protect the stockholder against loss of his investment before the end of the period of natural use. It also removes all incentive for the company to make permanent improvements, particularly in the latter part of the term of its franchise. A short-term franchise operates to induce the company to adjust its charges in view of the limited time in which it is permitted to recoup its investment and make its profits. The natural results are higher prices, larger reserve funds, poorer equipment, less efficiency of service, than would be the case if the tenure of the company were more extended. A long-time limited franchise is subject to the same objections, except that the inevitable day of inadequate equipment and poor service is longer postponed, and the accumulation of necessary reserves involves a smaller tax on the consumer because extended over a longer period.

Public Regulation.

The subjects of municipal ownership and of public regulation and control of public utilities are intimately connected with each other. Neither can be adequately discussed without reference to the other. Indeed, one is the alternative of the other. Municipal ownership is demanded largely because of the absence of proper public regulation and control. Public regulation and control, if efficient, removes the necessity or excuse for municipal ownership by securing fair treatment for the public.

Leaving out of consideration those political theorists who adhere to the doctrine that the government should govern as much instead of as little as possible, and that a public official should be substituted for a private citizen whenever and wherever possible, the great body of our people prefer the original American idea, that the functions of government should whenever practicable be restricted rather than enlarged, and that undertakings of an essentially business character are best intrusted to private enterprise rather than to political manipulation. The public funds should be employed solely for public purposes and the tax levy should not be subjected to the perils of commercial enterprises.

But, adhering to these sound tenets, a large body of the public feels itself driven to the more or less favorable consideration of municipal ownership, by the feeling that in no other way less objectionable on general principles can those results to which the public is entitled be obtained. Where private enterprise results only in private gain and not at all or only insufficiently in public advantage, the demand for municipal ownership is natural and inevitable. This fact alone suggests the antidote. If private enterprise results to the public advantage as well as in private gain, the basis for the demand for public ownership is gone.

That which is now uppermost in the public mind is public supervision and control. In the judgment of your committee some form of such supervision and control is inevitable in many, if not all, of the important states of the Union, and we believe that it should be welcomed by the parties in interest, provided it is put, as we believe it can be, in such form as to preserve the rights and properties of the companies as well as to promote the interests of the public. The practical question is not so much whether there is to be such regulation and control as it is what the nature and form of them are to be. The public demand for it is shown, not only in the pronounced attitude of the President of the United States with respect to interstate railroads, but by the extreme activity of many important state legislatures that are now sitting or

have just adjourned. Bills proposing public regulation and control of public service corporations have this year been introduced into the legislatures of at least 14 states. They deal with the subject in a variety of ways. The diversity of their provisions indicates at once the widespread interest in the subject and the merely tentative hold which as yet those dealing with it often have upon the true principles that underlie it.

While an agreement may be reached upon the general principle that public regulation and control of public service corporations is desirable in the public interest, and is not necessarily inimical to the safety and value of corporate investments, it is another and much more difficult matter to agree upon the nature and scope of it. Three systems may be suggested: First, one like the Massachusetts and New York systems, under which everything is practically left to the judicial or quasi-judicial discretion of state officials, clothed with amplest power. Second, a system that, so far as possible, will be automatic or semi-automatic in its operation, through the application of statutory requirements to existing conditions by administrative officials. Third, a system that will be a compromise between, or involve an application in part of the features of, both of the foregoing.

One great difficulty under systems of undefined public control is the inability or unwillingness of officials to distinguish between the regulation and the operation of corporations. Regulation should stop where operation begins. Matters of business discretion should be left to the decision of those who are responsible for business results. The directors of the affairs of a corporation undoubtedly, in most instances, are better judges of questions of business expediency than outside officials, however enlightened.

But it is always the tendency of public bodies clothed with judicial powers or official discretion to enlarge their own jurisdiction, and it is not therefore to be expected that they will set proper limits to their authority.

The remedy for this difficulty is to have the obligations of the corporations and the authority of the officials so defined by statute as to make the operation of the provisions of the law upon the state of facts in hand as nearly as possible automatic, calling for the interference of public officials only to the extent of applying the law to the facts as found. The ascertaining of the facts need not, and usually would not, involve to any considerable extent the exercise of discretionary or judicial functions. In short, under such a system the supervisory officials are in the position of a jury, accepting the law directly from the legislature and merely applying it to the facts as found by them.

The question of original capitalization or increase of capital becomes simplified by the adoption of the sliding scale, because any tendency to overcapitalization will be restrained by the fact that the securities of the company can be made valuable only as and to the extent that rates are reduced. So far as this consideration does not operate to keep the capitalization within proper limits, it is a comparatively simple matter for public officials to decide how much capital is required for a given purpose, and to limit the amount accordingly. They should have nothing to say about the reasonableness of the purpose for which it is wanted, or as to the wisdom of the investment; those are business questions, the decision of which should lie exclusively within the province of those responsible for the business results of the enterprise. The business necessity for capital having been thus determined, the function and authority of public officials should be limited to seeing that the purpose of the issue is a lawful purpose, and that a sinister design to secure an undue inflation of capital is not hidden behind an apparently legitimate purpose on the part of the corporation.

The questions involved in proceedings for compulsory service are judicial questions, for which the principles of the common law furnish satisfactory solutions. Those principles, supplemented by whatever statutory additions or changes local conditions may seem to require, will be found to furnish an adequate and complete remedy to any one entitled to a remedy.

All things considered, it is not necessary to admit that an automatic or semi-automatic system of public regulation and control is impracticable. Its advantages, particularly in delivering vested interests from the perils inseparable from the exercise of more or less arbitrary discretionary powers, are so great that every effort should be made to secure its adoption in practice.

While the foregoing statement embodies the conclusions to which the studies and consideration of your committee have brought it in dealing with this great question of public supervision and control of public service corporations, it nevertheless recognizes the fact that not much has heretofore been said along the lines followed in this report, and that public

sentiment may not as yet be ripe for the adoption of a system of the character of that advocated herein.

EVERETT W. BURDETT (Chairman), HENRY L. DOHERTY, ALEXANDER DOW, CHARLES L. EDGAR, SAMUEL INSULL, J. W. LIEB, JR., JOSEPH B. MCALIL, SAMUEL SCOVEL, W. H. GARDINER (Secretary).

TURBINES AND AUXILIARIES.

On October 16 August H. Kruesi, engineer General Electric Company, Schenectady, N. Y., presented before the American Street and Interurban Railway Engineering Association, in session at Atlantic City, a paper on "Curtis Turbines in Railway Service." This paper will be found in the Electric Railway Review for October 18, page 609.

In opening the discussion of Mr. Kruesi's paper William Roberts (Northern Ohio Traction & Light Company) thought the author had failed to point out that an increase of maintenance meant a great drawback to the use of both economizers and superheat. Mr. Roberts pointed out that under varying loads at varying steam pressures one could depend upon the turbine to do work that a reciprocating engine could not do. He strongly favored the use of a barometric tube condenser. His were operating without a dry vacuum pump and giving from 28 to 28½ inches vacuum at 1,080 feet above sea level. That was practically 29 inches.

P. E. Mitchell (Knoxville Railway & Light Company) had found surface condensers to be most satisfactory and to give the best boiler water. The cooling water available at his plant was very dirty, therefore he was obliged to use a surface condenser to get good feedwater.

Charles Hewitt said the Philadelphia Rapid Transit Company was using water step bearings and oil step bearings, barometric tubes and surface condensers. He did not feel that there was very much one way or the other to be said regarding the choice.

F. E. Henshaw thought that the efficiency of the electrically driven auxiliary was not so good as that of the steam-driven one, and there were also a good many reasons why it was better to have steam-driven auxiliaries, rather than to go all around to the secondary source of power. With regard to the high speed required for the pump he recently had seen boiler-feed multiple-stage volute pumps driven by steam turbines in the New York Edison Waterside station.

Mr. Roberts had a pump driven by a motor that was lifting water 15 feet to the pump, driving it horizontally 750 feet and lifting it 54 feet at the end of the drive. He was quite sure that plant had not been shut down four hours a year on account of any trouble with the motor-driven pump.

W. Farrand (Public Service Corporation of New Jersey) said there were a number of different phases of the question brought out, some of which added to his experience. His road had a variety of stations, and a variety of engines and turbines. As regards the water step, he had changed to oil, and thought he got a little better results. He did not have any serious trouble with the water, but found he did get better results with the oil; he was able to run with greater clearance and he also found the oil a better lubricant. His company used with all turbines a surface condenser for the reason that there was ample condensing water, but not boiler water. With the change from water to oil on the step bearing the temperature in the condensing water was not quite so high as when water was used. The surface condensers and heaters were designed for use with the water step, but with the oil they gave no trouble whatever during more than three years, so far as the step was concerned. The first turbine was installed in an ordinary steam plant, built for 175 pounds pressure and given only 140 pounds of steam, but allowing for the difference it came up approximately to its guarantee.

Concerning the question of first cost, Mr. Farrand did not see how any company could afford to install anything but turbines in the large installations. The difference in first cost would provide a very much greater capacity, and considering

the investment side of the question alone there was no doubt about the value of the turbines.

Mr. Farmer said that the Old Colony Street Railway had some 10,000 kilowatts capacity Curtis turbines installed at Quincy, and three 500-kilowatt machines installed in the Newport lighting station. The original installation at Quincy had all the auxiliaries electrically driven, but the experience was such that the company soon changed one of them to the steam-driven type and when the fifth unit was being installed it was put in with steam also. The operators expected good results from operation with electrically driven units, but after some practical experience had found it very advantageous to have steam.

Operation was much more flexible where there were some steam-driven units, and besides steam was needed to heat feedwater. With regard to the step-bearing Mr. Farmer had water in use in one plant and oil in the other. He was forced to use surface condensers at the Quincy power plant. The feedwater was expensive and the circulating water was salt, and it was therefore an object to use the surface condensers. The step-bearing water discharged directly into the condenser, and the results were satisfactory. He could say the same thing for the oil step-bearing.

Mr. Kruesi, replying to Mr. Roberts with regard to the water step-bearing, said there were more than 100 machines operating in various parts of the world with water step-bearing, and operating in a satisfactory condition, and in the same way reports had been made of satisfactory operation with oil. He thought the nature of water step-bearing trouble was due to the deposit of salts on the lower wheel, due to the spraying of the water in passing through the turbine, which would throw the turbine out of balance. A similar case arose where good water was not available in Cuba, and one or two other places, and it might be necessary to design oil step-bearings for such machines. As the manufacturers of these turbines did not want two or three designs of step-bearings, it being essential that the things should be standardized, they decided to change everything to oil steps.

A circulating pump for the conditions such as Mr. Roberts had to deal with could be designed for a wide range of speed, and there was no reason why it could not be built for 75 revolutions, as that happened to be the speed of the pumps in the Commonwealth-Edison station in Chicago. Seventy-five revolutions per minute was chosen so that the same engine could drive the air pump and could run at slow speed.

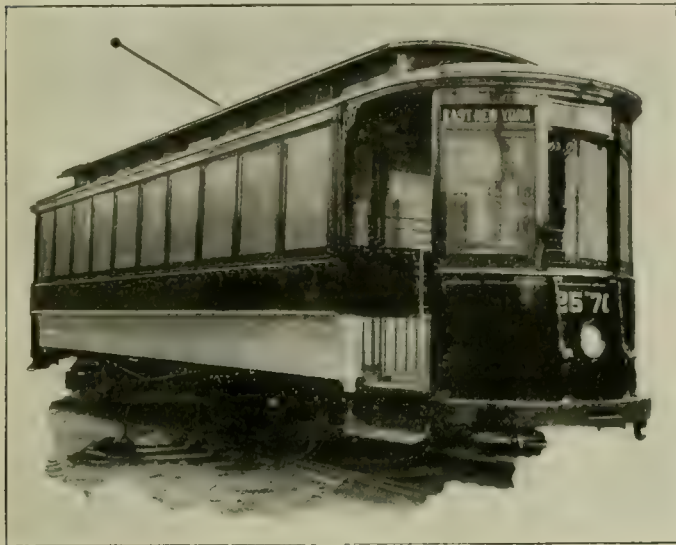
Sufficient steam could be had for motor-driven auxiliaries by taking steam from the first and second stages. All Curtis turbines were furnished with openings so that if any one desired to heat water in that way it could be done. The turbine used the steam down to the point where all the heat was abstracted and therefore turbines had a higher efficiency than most of the engines which would be used for driving auxiliaries. For this reason it would be economical to use no steam-driven auxiliaries. There were other objections on the score of reliability with motor-driven auxiliaries which would offset that. He thought the turbine-driven auxiliaries were absolutely reliable.

With regard to the figures of superheat, pressure and vacuum included in the paper, such statements as he had made must naturally be general statements; unless applying to each particular turbine the percentage of improvement to be gained from a given amount of superheat, the results would depend upon the size of the turbine under consideration, because a 1,000-kilowatt unit, for example, would have a water rate of about twenty pounds, whereas a 5,000-kilowatt turbine would have a water rate of 17 pounds, and 1 per cent on 17 pounds was different from 1 per cent on 20 pounds. The actual improvement in pounds per kilowatt-hour would depend on the particular machine.

The United States navy department has adopted a standard specification for lightning conductors for high brick chimneys.

NEW SURFACE CARS FOR BROOKLYN.

The Transit Development Company has recently purchased and is now equipping and placing in service on the Brooklyn Rapid Transit lines 100 new surface passenger cars of its standard 28-foot body semi-convertible type. These cars



New Brooklyn Cars—Exterior.

were built at the John Stephenson Company works of The J. G. Brill Company. Several improvements have been made on this lot of cars not contained in previous cars of the same type, and a general description at this time should be of interest.

A change in type of car from the 42-foot 6-inch convertible type, of which 452 have been placed in service prior to the



New Brooklyn Cars—Interior.

present lot, was made after carefully investigating the peculiar and perplexing traffic conditions existing during the rush hours in Brooklyn, and considering the type of car that would best meet the exacting requirements for handling the enormous and concentrated traffic which exists.

The crowds that the company is required to handle to and from one terminal—the New York end of the Brooklyn bridge—for several hours during the morning and evening, are

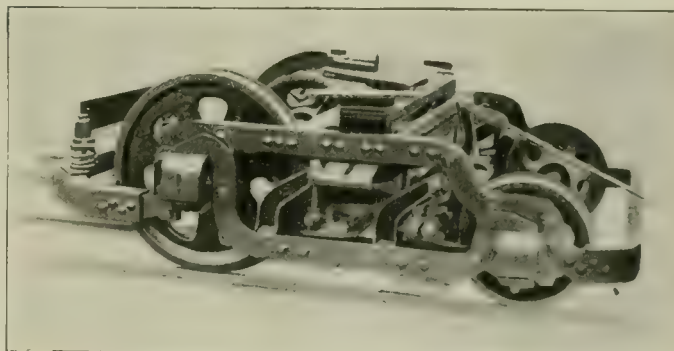
unquestionably the largest encountered by any street railway system in the world. With this in mind a medium-size car has been designed and arranged for quickly taking on or unloading large crowds at one point. Longitudinal seats are the only type suited for these conditions, and doors of the accelerator type have been provided for facilitating ingress and egress. The main feature of this door, which is placed near the step, is that the platforms cannot easily be blocked, thus obtaining an unobstructed entrance.

General Description.

Upon a general inspection of the car one is impressed by the pleasing effect of the predominating plain finish throughout. To the practical eye this suggests an up-to-date, economical construction and a finish that can easily be kept in good condition.

The car is arranged for operation from both ends, and has vestibules open at sides; sides are of the usual curve panel type, with $\frac{3}{8}$ -inch whitewood panels, each in two pieces, spliced diagonally opposite.

There are 10 large removable sashes on each side of the car, held in place by malleable iron retainers extending from belt rail to letter board and fastened to the posts by three $\frac{1}{8}$ -inch phosphor-bronze screws running through the posts with neat polished bronze cup washers on the inside of the posts.



New Brooklyn Cars—Maximum Traction Truck.

During the summer months these sashes are removed and stored in crates provided for this purpose.

The following are the general dimensions of car:

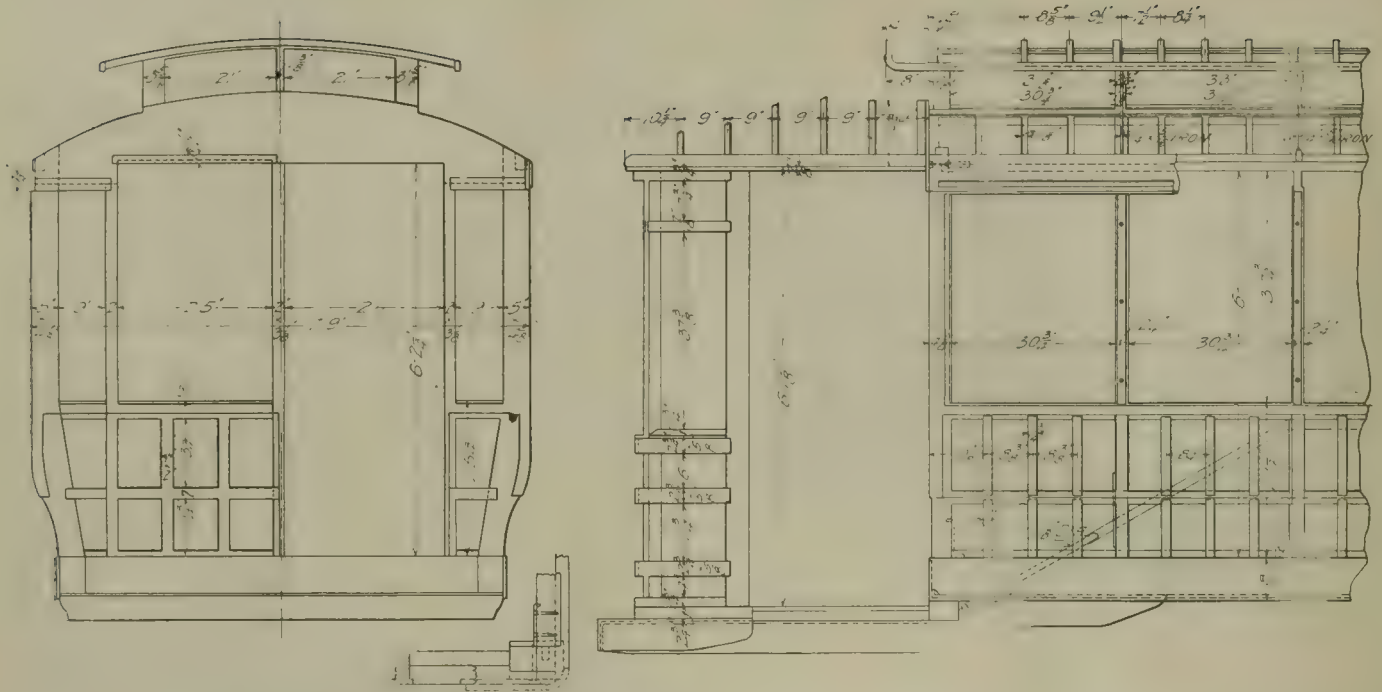
Length over corner posts	28 ft.
Length of platform	4 ft. 7 in.
Length over buffers	38 ft. 3 3/4 in.
Length center to center of bolsters	15 ft. 1 3/4 in.
Width over sill plates	7 ft.
Width over fender rails	7 ft. 11 1/2 in.
Width over drip rails	8 ft. 1/2 in.
Height from bottom of sill to top of trolley board ..	8 ft. 11 3/4 in.
Top of floor to bottom of plate rail	6 ft. 1 in.

Underframe.

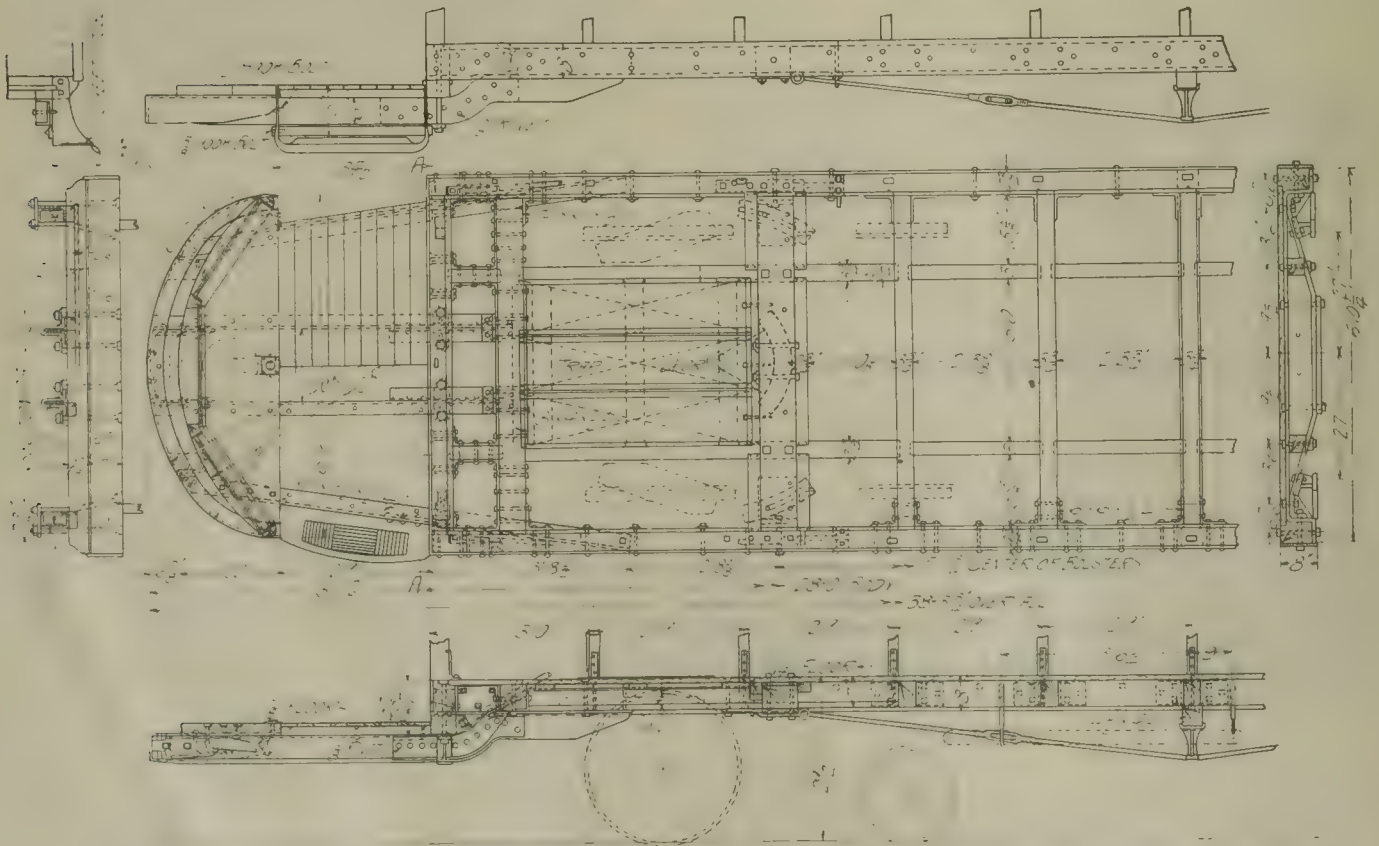
A zinc etching made from a line drawing of the underframe is presented herewith, and it will be noted that the design is of unusually strong and rigid construction, for which the Brooklyn car is noted. All timbers in the underframe are of white oak, excepting the side sills, which are of yellow pine; side and end sills are 4 3/4 by 7 inches, cross timbers are 3 3/4 by 5 3/4 inches; longitudinals, 3 by 5 3/4 inches; auxiliary end sills, 5 3/4 by 5 3/4 inches; subend sills, 5 1/2 by 4 7/8 inches; and trap door timbers, 3 3/4 by 4 1/2 inches.

The entire underframe is double-mortised and tenoned, joints being secured by knee forgings and standard structural steel angles. Steel plates, 8 by 5/8 inches, are securely bolted to the side sills, and extend the entire length of car body. The bolsters of steel plates are framed into the underframe top plate, 8 by 3/4 inches, and bottom, 8 by 1 inches.

Platform bearers extend from subend sill and side sills to the buffer angle iron, and are hung by bolts and steel castings to the end sills; the outside bearers are 3 1/2 by 6 by 1/2



New Brooklyn Cars—Side and End Elevation and Detail Showing Method of Fastening End Plates to Corner Post.



New Brooklyn Cars—Plan, Elevations and Sections of Underframing Showing Details of Connections and Construction of Platform Support.

inch angles, reinforced at bends by 5 by 3 by $\frac{3}{8}$ inch angles, and the middle bearers of 5 by 3 by $\frac{3}{8}$ inch angles are reinforced by an angle of the same size at the bend. The buffer is made of a 6 by $3\frac{1}{2}$ by $\frac{1}{2}$ inch angle, bent to radii, as shown on the plan view. The flooring is of $1\frac{1}{4}$ -inch yellow pine, $3\frac{1}{2}$ -inch face, tongue-and-groove, run lengthwise and sunk flush with and rabbeted in the side sills; each board is secured to each floor timber with two $2\frac{1}{2}$ -inch No. 14 screws, sunk $\frac{1}{8}$ inch into boards and covered with putty. The floor space between is covered with beveled maple strips.

Side Framing.

The side posts are of white oak, $2\frac{1}{4}$ inches thick, with rounded inner edges; each post is mortised into the side sill and plate, gained into plate furring and secured to the sill by $\frac{1}{2}$ -inch strap bolts. The corner posts are of ash, $4\frac{1}{8}$ by 5 inches. The sash rails are 3 by 2 inches, gained into posts and wedged in position. Letter boards are of ash. An inside truss of $\frac{1}{2}$ by $1\frac{1}{2}$ inch flat bar iron is provided in each side of car with forged turnbuckles.

Roof Framing.

Roof framing is of the monitor type and of ash, except clearstory posts, which are of cherry, and the clearstory sill, which is of yellow pine. A steel carline, $\frac{5}{16}$ by $1\frac{1}{4}$ inches, is provided at each post, bolted to upper and lower rafters and turned over at the ends and screwed to plate. The roof is covered with $\frac{1}{2}$ by $2\frac{1}{2}$ inch face tongue-and-groove whitewood boards, nailed to the rafters and covered with No. 6 cotton duck canvas. Bonnets are made independent of car body and attached thereto by lag screws.

Signs, Gates and Fenders.

Brooklyn standard end and side clearstory signs are used; these are in shape of a long narrow sash with "Line" painted in black thereon and set into the clearstory so as to be illuminated by light from inside of car at night. The destination signs are of a novel design, recently adopted as a standard for the Brooklyn system. They consist of a 4-sided block sign, painted black, with the destination painted with aluminum paint on each side. An incandescent lamp is placed in the hood of the vestibule above and in front of the sign for illumination at night, thus making it a very effective and serviceable sign for both day and night service. One R. W. Bliss Company's Wood patent gate is provided on each platform and one Brooklyn Rapid Transit standard pantagraph gate at opposite side from Wood gate.

Cars are equipped with Brooklyn standard "Empire" fenders.

Interior Finish.

All interior woodwork, except the side and corner posts, headlining and floor, is of cherry, natural finish. Side posts are of white oak and finished in natural color.

Equipment.

All light wiring is run in electrobestos conduit, with "transite" backing. Control wiring and all wires running down in corner posts are run in loricated iron conduit. The cars are equipped with two Westinghouse 93-A2 60-horsepower motors; gear ratio of 17 to 70, giving maximum speed of 26 miles per hour at 550 volts. One K-28-L controller is used on each platform of the cars. This controller is similar to the Westinghouse 28-B, with the exception that it is arranged for two motors instead of 4-motor equipment.

The trucks used under these cars are of novel design, being an entirely new departure in maximum-traction truck construction. An illustration of a truck is presented herewith and the thoroughly compact arrangement of all parts will at once be noted. The trucks are equipped with the double elliptic springs, something heretofore not obtained on the maximum-traction truck, which affords exceedingly easy riding qualities. The side frames are of solid forged steel, without

welds; the brake rigging is hung from brackets attached to the equalizer bars, thus providing an even shoe wear and providing an arrangement that will always keep the shoes at the same point on the wheels, irrespective of weight on truck. The car body swivel plates are provided with conical rollers, which allow the truck to take curves easily and with less friction on the wheel flanges.

Trucks were designed and built by the Standard Motor Truck Company, Pittsburg, Pa., subject to the approval of the superintendent of equipment of the Transit Development Company.

These cars were designed under the direction of W. G. Gove, superintendent of equipment Transit Development Company, to whom we are indebted for the information presented in this article.

RAIL CORRUGATION.*

BY A. L. C. FELL, CHIEF OFFICER LONDON COUNTY COUNCIL TRAMWAYS.

In May, 1905, the author visited America, and on his return presented a report to the London county council in which he made a few remarks on the subject of rail corrugation. The following is an extract from this report:

In this country corrugation has appeared on the rails of nearly every electric tramway system, the corrugations varying in length from $2\frac{1}{2}$ to 5 inches, the worst corrugations appearing at curves, where a short wave is formed on the outer rail and a long wave on the inner rail. The corrugation at first appears on the outer rail. I would here point out that corrugation gave great trouble shortly after the cable tramways started running on the Brixton section, but in this case it was found that the corrugation at the curves started on the inner rail, and was transmitted to the outer rail, and the long corrugation was on the outer rail and not on the inner rail. No corrugation has been noticed on the rails used for horse traction; it has appeared on steam-driven tramways, but never on steam railways. In every city I visited in America, except Buffalo, corrugation is to be found in a more or less marked degree. Apparently the higher the speed the greater the length of the corrugation wave. On several of the interurban lines the cars are run at speeds of from 20 to 30 miles per hour, and the corrugation in some instances was as much as 8 inches long. On the Boston elevated railway, where the cars are run at upward of 40 miles per hour, the corrugation was no less than 31 inches long. The trouble on this line is so serious that the rails have to be renewed every few months.

Before going to America I had for a considerable time been engaged in investigating this matter, and formed the theory that the trouble was originally caused by unevenness on the rail surface setting up a slight jumping or bounding action in the car wheels. I consider that the unevenness might be due to three causes:

1. Chattering or vibration of the rollers when commencing to roll the ingot into a rail, causing a rough rail surface.
2. Uneven or wide joints between rail ends, rigidly supported on a concrete bed.
3. Jumping action set up in car wheels by variations of the wheel or track gauge.

Results from Grinding.

To ascertain if my first theory was correct I made some tests in the New Cross car shed before the rails had been used in any way by the cars. A long emery block, fitted under a truck, was lightly run over several lengths of track and a distinct corrugation was noticeable on the rail surface, although in some instances it was not very regular in form. About nine months ago I had a water tank car fitted up with a grinding apparatus, consisting of a carborundum block, 10 inches long by $2\frac{1}{2}$ inches wide, which could be pressed down on to the running rails. By this means some of the worst corrugations were ground out, and have not yet reappeared. The corrugation of the rails is becoming somewhat serious on all the sections, but additional grinding apparatus is being fitted on the new water tank cars, which will shortly be delivered, and I hope to be able to grind out the waves. I find that no attempt has been made hitherto in America to get rid of the trouble in the manner now suggested. With new rails arrangements should be made, if possible, for passing them through a grinding machine after rolling; the corrugations are so slight that very little would have to be done to prevent the trouble developing in a serious manner at a later date.

Since the above report was written many causes and

*Abstract of paper presented before the Municipal Tramways Association, Manchester, England, September 17, 1907.

remedies have been suggested, and apparently it is only by a process of elimination that we can hope to get rid of corrugations entirely.

Possible Causes of Corrugation.

After further study and investigation on various tramway systems the author has come to the conclusion that corrugations are not due entirely to one cause. The following are, in his opinion, some of the chief producers of the trouble:

1. Original roughness of rail after rolling.
2. Cold rolling of rails by the car wheels.
3. Soft rails and heavy cars.
4. Sand and grit on head of rail.

It is quite possible that the use of sand on street tramways may cause corrugation. As a rule sand is applied to the rail intermittently and lies in small heaps at short intervals. The natural tendency would be for the wheels, when revolving rapidly, to grind the head of the rail when passing on to each fresh heap of sharp sand; this would account for corrugations appearing at irregular intervals. It may be argued that under this theory there would be corrugation at all stopping places, but this is not a fact, and is probably due to the reduction in the speed of the cars before they arrive at the stopping places where sand would be applied. It has been found that at most of the stopping places the rails present a bright regular surface.

5. Defective and open joints.
6. Tight or wide gauge of track or wheels.
7. Loose or springy rails and points.
8. Defective trucks being out of square and buckling.
9. Slip of wheels at curves.
10. Wheels not being same diameter.
11. Flats on wheels.
12. Rapid acceleration and retardation, causing wheels to slip.

With reference to the question of corrugation being caused by rapid acceleration, the author has made experiments and found that if a car is too rapidly accelerated, distinct signs of corrugation appear. The markings are not very deep, but would most probably develop.

13. Defective brake mechanism, or by a too rapid application of the brakes, causing chattering and a series of short skids.

These and many matters may be responsible for the trouble, but the author still considers that the "original sin" is produced when the rails are rolled, and will quickly develop into corrugation unless the surface of the rails is ground immediately after they are laid.

Generally speaking, the outer rails of the curves are most deeply marked, and the pitch of the corrugations is fairly regular, the average being 2 inches. The inner rails of curves are usually marked in irregular patches. On straight tracks, however, the corrugations are not so irregular. On inclines the corrugations are deeper and more regular on the up than on the down grade. As a rule, corrugations do not appear on down grades where track brakes are regularly used as service brakes. In places where the rails are not anchored the corrugation is much worse than on lines where the rails are anchored or laid on extended yokes.

When ordering additional rolling stock about two years ago the author came to the conclusion that the ordinary stock trucks on the market were unsuitable for heavy service. He, therefore, in conjunction with eminent truck manufacturers, set to work to design a truck that would meet the requirements, and be a thoroughly sound mechanical job. This was done, and the results have been very satisfactory. Some of these trucks were put into service on the Aldwych subway line, and similar trucks were put into service on the Poplar line. On the subway line, where the rails are laid on longitudinal sleepers, corrugations were noticed a few days after the line was opened. These were ground out, but appeared again after a few months' working, and it was anticipated that the trouble would become serious, but for the past three months there has been practically no change; if anything the corrugations are somewhat less marked. On this line the steel cars are fitted with magnetic track brakes and sand boxes of the intermittent flow type. On the Poplar route, which has been running with a heavy service of cars for upward of 10 months, no corrugations have yet appeared. In this case the rails are mounted on extended yokes and are anchored. The author thinks the chief cause of corrugation on the subway lines is the fact that the rails are on a springy bed, and the cars run at speeds up to 20 miles per hour. On the Poplar route the cars cannot be run at a very high speed, owing to the heavy vehicular traffic. The cars on this route are fitted with magnetic track brakes, and sand boxes of the continuous flow type.

On tramways where magnetic track brakes are used constantly as service brakes, corrugation has not appeared to any

appreciable extent. Several routes in London have been running for nearly 12 months under these conditions. If this state of affairs continues, it will support the theory that corrugations may sometimes be caused by the application of the wheel brake, but experience generally shows that corrugations may appear at any time, and in the majority of cases the trouble does not become serious until after about two years' service; this, of course, depends on the service of cars run on each particular tramway.

An important question, which has to be answered before the root of the evil can be discovered, is: "Why are corrugation waves the same length with varying speeds within certain limits, say from 4 to 16 miles per hour?" One possible explanation is that corrugation may be in some instances caused by the cold rolling of the rail by the car wheels. With a light car, such as a horse car, the rolling is almost imperceptible. With a heavier electric car the weight is sufficient to start cold rolling, and a wave starts at the softest part of the rail and travels forward until the weight of the car is not sufficient to carry the wave farther; the wheels then ride over the top of the wave and violent oscillation is set up, and the corrugation gradually extends. This theory will possibly partly account for the non-appearance of corrugations on heavy railways. In this case the weight of the train would be sufficient to roll the rail throughout its whole length, especially as the whole of the wheels under the carriages are simply acting as rollers.

Numerous instances can be given of corrugation appearing on manganese and cast-steel special work. In most of these instances the corrugation has appeared on the rail butting up to the special work or on a movable point tongue, the corrugation gradually extending to the fixed casting.

A peculiar instance of corrugation was observed by the author in St. George's road, in London, where there are patches of corrugation 18 inches long and 9 inches apart extending throughout the length of one 45-foot rail. The centers of the corrugations are three inches apart. It has been suggested by many engineers that corrugations most frequently appear at stopping places. This has not been the experience in London.

Corrugation on Cable Tramways.

The fact that corrugation has appeared on cable tramways with light cars rather opposes the theory of cold rail rolling, but this is a subject which should be dealt with separately. One fact, however, might be mentioned, viz., that on the Birmingham tramways some years ago corrugation appeared on one of the two systems then in operation. On one system the cars were, I believe, run at a speed of eight miles per hour, and on the other at six miles per hour. On the higher speed the corrugation was serious, but on the slow-speed line no corrugations appeared. Corrugation also appeared on the Streatham Hill line in London, where the cars were run at a speed of eight miles per hour. This supports the theory that speed in some degree is responsible for corrugation. No doubt in this instance it was caused by the vibration transmitted by the cable at the particular speed of eight miles per hour.

Suggested Remedies.

The following suggestions will, in the author's opinion, be found beneficial in reducing the trouble to a minimum:

Track.

(1) The rail should be anchored down at intervals of not less than 7 feet 6 inches. (2) A hardwood packing block $\frac{3}{4}$ inch thick should be placed between the anchor and the rail flange. (3) All joints should be close butted and carefully filed. Possibly it would be an additional safeguard if the rail joints were welded. (4) A water car fitted with carborundum grinding blocks should be run over the line to remove all irregularities before the cars commence running. This will be found a simple, quick and inexpensive process if carried out immediately after the track is constructed, and the development of corrugations will be deferred for a considerable time. (5) Immediately the slightest sign of corrugation appears, to grind the rails, as suggested above. (6) By partly filling up groove of outer rail so that outer wheels run on flanges at sharp curves.

Rolling Stock.

(1) Secure first-class trucks of good mechanical design, which will not buckle or get out of square at sharp curves. (2) See that the trucks are absolutely square. (3) The diameter of the wheels should be kept equal as nearly as possible. (4) By separately driving each wheel or by introducing differential gear, as in the case of a motor car. (5) By using continuous flow sand boxes. (6) By using magnetic track brakes as service brakes.

PAY-AS-YOU-ENTER CARS FOR THE NEW YORK CITY RAILWAY.

Early in December there will be placed in service on the Madison avenue line of the New York City Railway Company

elsewhere will be with regard to the arrangement of the railing dividing the entrance and the exit. In the New York cars the railing is so constructed as to permit of the removal of a section directly in front of the sliding or exit door. With this construction the two doors leading to the front platform



Pay-as-You-Enter Cars for New York—Side View.

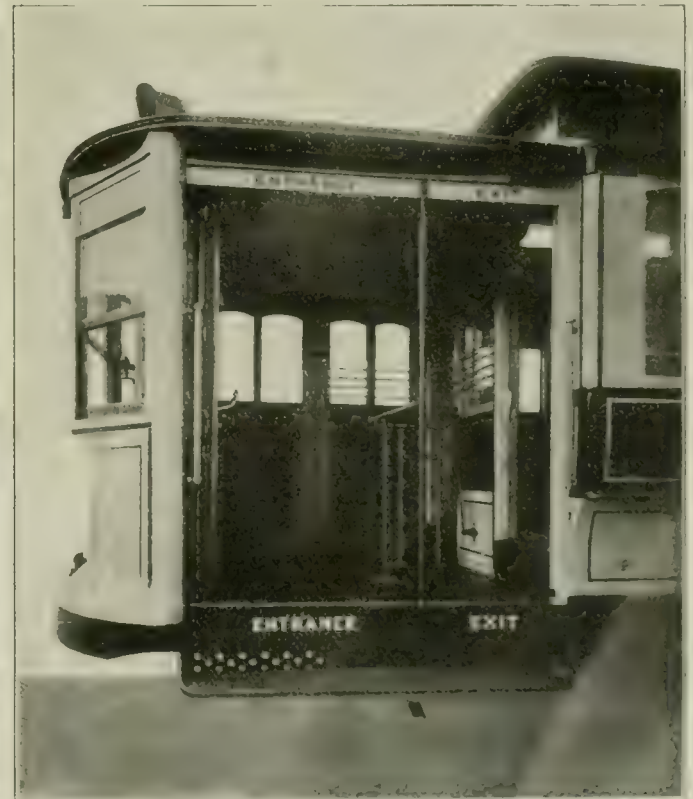
155 cars of the pay-as-you-enter type. In general, the cars will be the same as those for the Chicago City Railway Company which were described and illustrated in the Electric Railway Review of September 21, 1907, page 332. They will

may both be used as exits. The arrangement is shown in the accompanying illustrations, in one of which the railing appears in the regular position for the rear platform. The other shows the section of the railing removed to allow passengers to leave the forward end of the car by both doorways.

It is believed that by this arrangement, which accomplishes the object of giving three exits, the movement of



Pay-as-You-Enter Cars for New York—Front Platform, Showing Dividing Railing Removed.



Pay-as-You-Enter Cars for New York—Rear Platform, Showing Dividing Railing.

have a length over all of 48 feet, the car body being 32 feet long, and will be built by The J. G. Brill Company.

The principal change from the practice in connection with cars of this type which are now in service in Montreal and

passengers will be materially facilitated, though it is probable that it offers greater possible advantage in New York where smoking is not allowed on the front platforms and women accordingly use the front exit with greater freedom than in

cities where the front platform is given over to smokers.

The introduction of the cars in New York follows the careful investigation of the operation of pay-as-you-enter cars in Montreal by several representatives of the New York City Railway Company. Though it is believed that the cars will materially relieve congestion at the rush hours and facilitate loading and unloading of passengers, some doubt is expressed as to the attitude which the New York public with its peculiar eccentricities will assume toward the cars. As a preparation to their introduction a campaign of education is being carried on in the daily papers, the features of speed, comfort and safety being emphasized. The cars will not be placed in service until the entire number is received from the builders, when the present equipment of the Madison avenue line will be replaced with them.

As compared with the regular type of closed car now in service the new cars are nearly 11 feet longer over all and the car body is four feet longer. There is also a material increase in weight. The cars will be equipped with four General Electric motors and both hand and air brakes.

IMPROVEMENTS AUTHORIZED ON THE NEW YORK CITY RAILWAY.

On October 19 Judge Lacombe, of the United States circuit court, New York, approved recommendations made by Adrian H. Joline and Douglas Robinson, receivers for the New York City Railway and controlled and leased lines, calling for an expenditure of \$3,151,733.

In their petition to the court the receivers state that in April last the equipment of the roads was seriously impaired by a fire in the car house at One Hundred and Forty-sixth street and Lenox avenue, when 300 cars, including a number of sweepers, were destroyed. On October 9 fire in the car house of the Dry Dock East Broadway & Battery Railroad Company burned 80 cars. Nearly all the cars destroyed were of the closed type. It was learned by the receivers that nine cars could be purchased immediately from The J. G. Brill Company ready for operation and that by placing an order at once 80 additional cars could be obtained for delivery by January 1, 1908. The 80 cars have been ordered for delivery by this date. It will also be possible to obtain 155 pay-as-you-enter cars for delivery up to the latter part of 1908. Additional electrical equipment will also be purchased. It was reported that the 80 car bodies could probably be purchased for about \$236,000. The purchase of the 155 special cars will require an expenditure of about \$540,000, but the necessary electrical equipment, including air brakes, will cost another \$430,000. Incidental to the installation of this equipment an additional expense will be required for registers, heaters, fenders, hand brakes, wheels, etc., aggregating about \$88,000.

An appropriation of about \$37,000 was asked to buy 22 new snow sweepers. It is the desire of the receivers to purchase also 10 scraper cars to be used in removing snow and ice from the conduits of the system.

The receivers were also given permission to rebuild the car house at One Hundred and Forty-sixth street and Lenox avenue, where the large repair and overhauling shops of the company were located. The operation of the cars has been seriously crippled because of inadequate facilities for maintaining the equipment. A great number of the cars now in service are in a defective condition because proper inspection has been impossible. Since the fire the cars have been left standing in the streets when not in service, and this demands the employment of men to watch them and renders the cars liable to deterioration from exposure to the weather. The sum of \$665,000 was allowed for building new car barns and about \$70,000 to equip the present cars with vestibules.

At the time the receivers were appointed the installation of a conduit electric system on First avenue from Fifty-ninth street to One Hundred and Twenty-fifth street was in progress. To complete this work an expenditure of approximately \$275,-

000 will be necessary. Of this amount nearly \$100,000 will be required to defray the expense of repaving. The question was presented in the petition as to whether or not it was advisable to spend the additional \$175,000 to complete the conduit system or to allow for an expenditure of \$50,000 for the purchases of horses and providing stable facilities. The receivers recommended the completion of the electric conduit and as the appropriation for this has been granted it will be finished.

New substation equipment will be installed to insure the supply of power at all hours and to provide additional current for properly heating the cars during winter weather. The sum of \$100,000 is necessary to cover this latter item.

Owing to underground terminal work which is now being completed by the city of New York at the west end of the Williamsburg bridge for the purpose of furnishing facilities for the operation of the Brooklyn elevated and surface cars about \$70,000 will be needed to change the grade in the street at that point and to change the tracks a considerable distance on Delancy and Clinton streets. This work has to be undertaken at once or the department of bridges of New York City will do the work and charge the expense to the railway. This would increase the cost.

Because of the present condition of the car houses it is impossible to secure more than 75 per cent of the proper amount of insurance. The receivers asked permission to install automatic sprinkling equipment with as little delay as possible and to put in fireproof floors and fire gongs. Automatic sprinkling apparatus is desired in seven car houses at an aggregate cost of \$492,733.

In addition to these sums the receivers asked for authority to spend \$128,000 for sundry improvements, including fire extinguishers, rearrangement of lighting circuits and additional lighting circuits, automatic circuit-breakers for car houses, auxiliary fire alarm systems and other miscellaneous apparatus.

HEAVY ELECTRIC TRACTION.*

The more important electric railroad projects begun or materially advanced during the past year have all been bulletined, and many of them described in the technical press. A review of these would be out of place here, but it may be of interest to summarize these in a brief list, which is therefore below appended:

Continuous Current 500 to 600 Volt Installations.

New York Central & Hudson River Railroad, New York City.—This noteworthy installation, which has been in progress for some years, and which comprises thirty-five 100-ton locomotives, and 131 multiple-unit cars, has been practically completed and is in successful operation.

Detroit River Tunnel Company, Detroit, Mich.—Six 100-ton locomotives.

United Railways, Portland, Ore.—One 35-ton locomotive.

Boston Elevated Railway Company, Boston, Mass.—This company, which has operated heavy elevated service for a number of years, has under construction three hundred and eight 160-horsepower motors for use as double equipments.

Metropolitan West Side Elevated Railway Company, Chicago, Ill.—Two hundred and twenty-eight 160-horsepower motors have been added to the previous equipment of this company's motive power for use with multiple-unit control as double equipments.

Philadelphia & Western Railroad, Philadelphia, Pa.—One hundred cars, each equipped with four 125-horsepower motors.

Brooklyn Rapid Transit Company, Brooklyn, N. Y.—This company has added to its rolling stock 100 elevated cars, each equipped with two 200-horsepower motors, operated with multiple-unit control.

West Jersey & Seashore Railroad (Pennsylvania Railroad), Camden, N. J.—Eighty cars, each equipped with two 200-horsepower motors.

Philadelphia Rapid Transit Company, Philadelphia, Pa.—This company has added to its equipment one hundred and seventy 125-horsepower motors for use in 2-motor equipments.

*Abstract of report presented before American Street and Interurban Railway Association, Atlantic City, N. J., October 18, 1907.

The Hudson Companies, New York, N. Y.—Fifty cars, each equipped with two 170-horsepower motors.

Buffalo Lockport & Rochester Railway, Rochester, N. Y.—Nineteen cars, equipped with four 75-horsepower motors each.

Texas Traction Company.—Fifteen cars, each equipped with four 75-horsepower motors.

West Shore Railroad Company (Oneida Railway Company), Utica, N. Y.—Fifteen cars, each equipped with four 75-horsepower motors.

Pittsburg Harmony Butler & New Castle Railway Company.—Twelve cars, each equipped with four 75-horsepower motors. This equipment is noteworthy as contemplating the use of 1,200 volts on the trolley, two 600-volt motors being connected in series.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—Eight cars, each equipped with four 100-horsepower motors.

Single-Phase Alternating-Current Installation.

New York New Haven & Hartford Railway Company, New York, N. Y.—This installation comprises thirty-five 90-ton locomotives, operating either from 11,000-volt single-phase trolley or a 650-volt continuous current supplied from the third rail.

Spokane & Inland Railway, Spokane, Wash.—This installation comprises 14 locomotives, also 21 passenger cars, each equipped with four 100-horsepower motors. This road is operating partly from 6,600-volt trolley and partly from continuous current. Length of track, 146 miles.

Sarnia Tunnel, Grand Trunk Railroad.—Five 62-ton locomotives; trolley voltage, 3,300 volts.

Illinois Traction System, Springfield, Ill.—One 50-ton locomotive and 11 cars, each equipped with four 75-horsepower motors; trolley voltage, 3,300.

Erie Railroad, Rochester Division.—Six cars, each equipped with four 100-horsepower motors; trolley voltage, 11,000. Length of track, 34 miles.

Washington Baltimore & Annapolis Railway Company, Baltimore, Md.—This equipment comprises 21 cars, each equipped with four 125-horsepower motors; also four cars, each equipped with two 125-horsepower motors; trolley voltage, 6,600.

Richmond & Chesapeake Bay Railway Company, Richmond, Va.—Four cars, each equipped with four 125-horsepower motors; trolley voltage, 6,600.

Polyphase Installations.

Great Northern Railroad, Cascade Tunnel, Washington.—This equipment will comprise four locomotives, each of 100 tons, to be operated on a 3,000-volt, three-phase alternating current. This installation will doubtless be watched with great interest and will give an opportunity of demonstrating the advantages for and objections to polyphase currents for heavy railroad use.

Continuous-Current 1,200-Volt Installations.

Southern Pacific Company, Oakland, Cal.—This equipment will comprise 44 cars, each to be equipped with 125-horsepower motors, to be operated continuously two in series on 1,200 volts. There will also be 40 trail car equipments.

Indianapolis & Louisville Traction Company.—Ten cars, each to be equipped with four 75-horsepower motors, connected two in series for 1,200-volt operation.

Much interest has been attracted to the investigations of the Pennsylvania Railroad, which is preparing to equip its new New York City terminal and the tunnels connecting Manhattan Island with New Jersey and with Long Island by electricity. For the purposes of demonstrating the various possibilities this company has arranged to test both large continuous-current and large alternating-current locomotives, that comprising the greatest novelty being a 152-ton 15-cycle single-phase alternating-current locomotive for operation from 11,000-volt trolley.

CALVERT TOWNLEY, Chairman.
E. B. KATTE.
L. B. STILLWELL.

The subject of electrical canal haulage has received considerable attention in Europe of late. In one installation, the electric locomotives weigh eight tons, have a pull of 1.3 tons and run on 40-pound rails. They are equipped with two 20-horsepower motors, which is sufficient to tow four boats carrying 290 tons of freight two miles per hour.

The New York Electrical Trades School has recently opened a new building equipped with every facility for practical instruction at 39 West Seventeenth street, New York City. The school is now making a feature of giving free public lectures on electricity. These began on Tuesday evening, October 15.

PIPING AND POWER STATION SYSTEMS—LIX.

BY W. L. MORRIS, M. E.

Class Q 10—Steam Drips from Automatic Pump.

In the best station practice moving parts are eliminated wherever it is possible to obtain desirable results in other ways. The automatic drip pump generally possesses some detail that requires considerable attention. If the float is air tight and sealed it is liable to break and become water logged or collapse. If it is an open bucket with a counterbalance, it is liable to become filled with mud and cease to operate. The open bucket is the most reliable and to overcome the difficulties arising from the collection of mud a blow-off should be attached to clean out both the receiver and the bucket, as shown in Figure 333 (Q 10-1). The register type of balance valve is often used on a pump for this service, an automatic lubricator being placed above the throttle to lubricate the sliding parts.

The work for an automatic pump is much like a low-pressure service. The difference in pressure is very slight, but the pressure to which the pump may sometimes be subjected is three or four times the boiler pressure. For this work the outside-packed plunger pump is objectionable for two distinct reasons, one being that the plunger packing is difficult to maintain for high temperatures, and the other that plungers must be packed to stand high pressure, while the pump is only doing low-pressure service. In the latter event

the power required to move the plunger in the packing is much greater than the power required to pump the water.

The pump shown in Figure 277 is suited for this service, as it has a 1-piece brass lining in place of the packing and gland, the slight loss by slippage being much less than the frictional loss in a packed

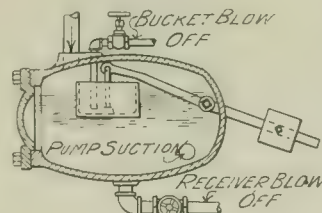


Figure 333 (Q 10-1).

piston. In the pump shown water can flow from the reservoir into the cylinder without lowering the pressure on opening the suction valves. The lowering of pressure on high temperature water is accompanied by re-evaporation, causing the pump to become steam bound and unless the valves are mechanically operated the receiver should be placed not less than 18 to 24 inches above the pump.

Class Q 11—Steam Drips from Exhaust Main and Branches.

The collection of drips from the exhaust main is a low-pressure service, and, unless the cost of water is excessive and an oil separator used, it is desirable to let them go to waste. Exhaust mains under atmospheric pressure are quite readily drained by a U-shaped water seal, as shown in Figures 161 and 162. A very simple drain trap can be used for this service, consisting of a buoyant exhaust valve, as shown in Figure 334 (Q 11-1). The water fills the trap body and the partial vacuum causes the valve to rise to the surface of the water and return to its seat when the water is discharged. This trap is operative under a more limited range than that shown in Figures 161 and 162. When possible the branches and main should be laid out so the drips will be delivered to one point.

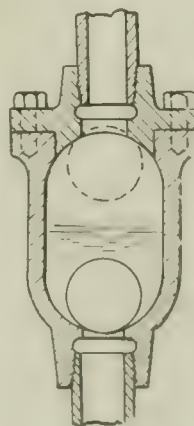


Fig. 334 (Q 11-1).

Class Q 12—Steam Drips from Vacuum Separator and Steam Traps.

The ordinary form of grease extractor is shown in Figure

154. The drips from a vacuum line require a special trap or entrainer, which part of the time may be under the same pressure as the vacuum line, then again under sufficient pressure to discharge against the atmosphere. This is accomplished by having a steam line running to trap and valves in both the drip line and steam line, one of which is closed when the other is open, a float device being used to operate the valves. Figure 335 (Q 12-1) shows one form of this device in which the steam line is closed when the drain is open. When the float rises the line to the vacuum drip is closed and the steam valve is open, forcing the water in the trap through the spring-closed discharge. In some types the float operates a pilot valve which admits pressure to and operates a multiported piston, there being but two working combinations of port openings. The pilot valve control is very successfully used for steam traps of the type shown in Figure 336 (Q 12-2). A very small float, with but a fraction of an inch travel, will control a large discharge valve.

Two steam traps of the same resistance are able to discharge the same quantity of water against the same head. The capacity of a steam trap can be intelligently stated by

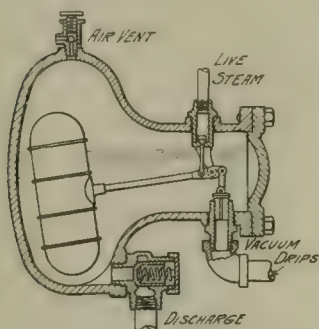


Figure 335 (Q 12-1).

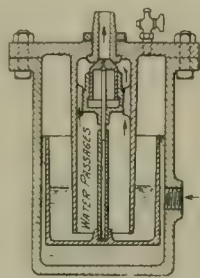


Figure 336 (Q 12-2).

giving its head loss when discharging a given quantity of water. The size of pipe connections have little bearing on the capacity of a trap. The head loss should be the loss in pressure as measured at the inlet and the outlet pipes close to the traps, being the loss occasioned by resistance. In specifying for a trap it should be stated that the trap shall have not less than a given number of gallons capacity, with a loss of pressure not to exceed a certain number of pounds, when passing through the trap.

Class Q 13—Steam Drips from Outside Buildings.

This service is in nearly every case of a complex nature. The collection of drips from different parts of the various buildings invariably offers many obstacles to systematic or reliable arrangement. Some drains may be delivered at high elevation, others at a lower one. The pressure may be high at times and at other times very low. A system for this purpose must be able to take drips at any temperature, elevation or pressure and in almost any quantity.

Steam lines can be carried long distances, first to a high elevation, then to a lower one, and then up, and so on, without any other limitation than to care for the expansion and the drips. The high-pressure line can generally be drained by steam traps at the different low points, delivering into a special drip main, the pressure being sufficient to return the drips to the boiler room. In places that have drips of a lower pressure an automatic receiver pump would be used. Such buildings or points having drips of a pressure higher than the drip main would require steam traps to discharge drips into the drip main.

When the pressure of the drip main is higher than that of the line drained a pump must be used. These limitations must be observed in all the drains provided; that is, the drips cannot be handled if below the drip main pressure. Another difficulty is in the maintenance of a constant drip main pres-

sure. This is necessary if return drip pumps are used and the pressure can generally be maintained by using a relief valve set at some desired pressure and allow drips to pass from the drip main through this relief valve.

When drips are returned from many points in large quantities it is customary to use a drip storage tank, and feed the water to the boilers. A plant having many mains and a great variety of steam condensing devices can reduce radiation loss and insure better results in general by using boiler feed regulators that will increase feed to boilers at the same time the quantity of returning drips is increased. There are so many governing features in drip returns that each separate feature must be considered. The following points must be considered and each condition safeguarded.

1. The drips have approximately the same temperature as the steam and on discharging into a lower pressure, much steam is formed.

2. Steam traps invariably discharge some steam before they close.

3. Water moving in "slugs" separated by steam will strike the fittings much the same as if it were a solid bar.

4. The velocity that water will travel and strike fittings is governed more by the rapidity of steam condensing in the drip lines than the normal flow of the drips.

5. High velocity drips prevent water and steam separating into large volumes of each, the entire mass being broken up and water hammer practically eliminated.

6. The lower the drip line pressure the greater will be the volume of vapor.

7. To carry a partial vacuum on drip lines serves to lower the temperature, the action of water, steam and air in the lines being the same as at any other pressure.

8. The less the pressure difference between a drip main and that drained, the less will be the difficulties from water hammer.

9. Drips can be carried to a high elevation with very slight head loss, the steam and water being intermingled in the riser pipe.

10. Whenever possible the steam pressure should be reduced so that the drips are but slightly greater in pressure than the drip main.

11. The discharge from an automatic pump must be of higher pressure than its suction.

12. The high condenser pipe of a steam return loop must have its air removed with a vacuum pump if its pressure be below atmosphere.

(To be continued.)

In the New York public service commission's investigation of the old accounts of the Metropolitan Street Railway and the Metropolitan Securities Company, which the commission's experts are endeavoring to reconstruct from check books and vouchers, Grant B. Schley of the brokerage firm of Moore & Schley was called on October 18 to testify with regard to some of William C. Whitney's accounts with the firm. His testimony showed that in 1899 Mr. Whitney had transferred \$264,000 worth of Electric Storage Battery stock to the account of the Metropolitan Securities Company at 145, while it was selling in the market between 165 and 167. Seven months later the stock had dropped to 80, the inference being that Whitney had unloaded on the company. Fred C. Cocheu of Brooklyn testified that a syndicate of which he was a member had sold three franchises in 1899 to William C. Whitney for \$1,600,000, which had cost the syndicate \$150,000 to \$152,000. These franchises were later turned over to the Securities company for the cost price and accrued interest. Richard W. Meade, vice-president of the Securities company, testified that that company owns 10,000 shares of the New York Transportation Company and that the Transportation company owns all of the stock of the Fifth Avenue Coach Company, which in turn owns all of the stock of the Park Carriage Company.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Passengers May Assume Platforms and Steps or Running Boards to be Reasonably Safe.

Smithers v. Wilmington City Railway Company, 67 Atlantic Reporter, 167.—The superior court of Delaware says that the platforms and steps or running boards of a railway car are the proper and usual means by which passengers are expected to enter and depart from the car, and a passenger has a right to assume that such means are reasonably safe for the purposes for which they are used, provided he does not know, or by the exercise of ordinary care could not have known, they were not.

Passengers Riding on Lower Steps.

Coffey v. Omaha & Council Bluffs Street Railway Company, 112 Northwestern Reporter, 589.—The supreme court of Nebraska holds that it is a question of fact for the jury whether or not a passenger, who is riding on the lower step of a platform of a crowded street car, and who is thrown therefrom and injured by reason of the negligent operation of the car, is, by voluntarily riding in such place, guilty of such contributory negligence as will defeat a recovery of damages. It is said that it would seem that a street railway company which permits the use of its platforms and steps for the carrying of passengers, and collects fares from the passengers riding in such places, is bound as a common carrier to use proper precaution for the protection of the passengers riding in such positions; and, in the absence of any warning to the passenger that such position is dangerous, and in the absence of any rule of the street railway company brought to the knowledge of the passenger that it will not be liable for injuries received by passengers riding upon the platform or step, it cannot be said to be negligence per se (by itself) for a passenger to ride in such position. A passenger riding in such position does not assume the risk of injury arising from the negligent operation of the car.

Publisher of Newspaper Cannot Litigate Right of Company to Have Advertising in Cars.

Burns v. St. Paul City Railway Company, 112 Northwestern Reporter, 412.—The supreme court of Minnesota holds that where the publisher of a weekly newspaper, containing, among other things, advertisements, sought to enjoin a street railway company from placing advertisements on the upper inside parts of its cars, because, as a result, that company diverted a large and lucrative business, which otherwise he might have been able to secure, this was not sufficient to entitle him to litigate the question whether the acts of the company were ultra vires (beyond its corporate powers) or not.

The court says that with a vivacity that was refreshing and a plausibility that was rather surprising, counsel for the plaintiff marshaled authorities to the effect that "this application is not a path breaker. The path is not only broken, but is well paved—macadamized with precedents." But the cases cited, in which courts of equity have interfered, not only upon the information of the attorney-general, but also upon the information of private parties directly affected, to enjoin public nuisances or trespasses, were not in point. By no reasonable construction could the acts of the defendant be regarded either as a nuisance or a trespass.

Apart, however, from specific decisions, the court is at a loss to see why the plaintiff had any occasion to seek equitable relief. His damages, if they existed at all, were entirely conjectural and extremely remote. The advertising business was incidental to the running of cars. Incidental thereto was the expenditure of considerable sums of money. That, incidentally, might result in a decrease in newspaper advertising. That,

incidentally, might take from plaintiff's paper advertisements which might otherwise have come to it. Even if the street car company exceeded its powers, which, as at present advised, the court thinks it did not, the plaintiff's damage was too remote to give him any standing in a court of equity.

Counsel's quotation from "Troilus and Cressida," Act II, Scene 2, was apt:

"There is a law in every well ordered nation
To curb these raging appetites that are
Most disobedient and refractory."

The court concludes, however, that the plaintiff had not shown himself entitled to raise the question in this case whether the defendant's "appetite" was "disobedient and refractory."

Must Provide for Cars Being Readily Controlled—Care Required When Rails are Slippery—Overloading.

Percell v. Metropolitan Street Railway Company, 103 Southwestern Reporter, 115.—The Kansas City court of appeals says that in the operation of powerful and dangerous machinery over the public streets of a city it is the duty of a street railway company so to construct its road and equip and operate its cars that the latter may be readily controlled by their operators, under all conditions and in all situations reasonably to be anticipated. It will not do to say that anyone has the right to turn loose an uncontrollable force in a public thoroughfare where people have a right to be.

The gripman knew, or should have known, when he started his train, consisting of a grip car and a trailer, down the hill, that the rails ahead of him were slippery, and that greater care would be required in the making of a proper descent than would be necessary if the rails were dry. He should have exercised the highest degree of care to meet the exigencies presented by that condition.

The defendant did not contend that the brakes and other equipment provided were inadequate to the task of keeping under control on a slippery track a train carrying an ordinary load, but argued that the unusually heavy load of passengers on this particular train, together with the condition of the track described, made the accomplishment of the task impossible. This argument, instead of excusing the conduct of the defendant, accused it of negligence.

The defendant and its servants in charge of the train must be presumed to have known the extent of the load they could carry in safety down that hill in the existing weather conditions. The fact that passengers crowded into the cars to the point of dangerously overloading them was not the fault of the passengers, but of the defendant. It not only was the right, but the duty, of the defendant to limit the load of the train to safe proportions.

Passengers boarded the cars at the invitation of the carrier, and on the implied assurance that the highest degree of care was being exercised to afford them safe transportation. The same assurance was being held out to travelers on the public thoroughfares traversed by the cars. They had the right to presume that the defendant would not negligently overload its cars, and thereby imperil the safety of its passengers, as well as that of themselves.

A portable substation has recently been placed in service on the interurban line of the Northern Texas Traction Company, between Dallas and Ft. Worth, Tex. It is located halfway between the terminal cities and consists of a box car containing a 400-kilowatt rotary converter, with the necessary transformers, switchboard and wiring. The distance between the main power station and substation No. 1 near Dallas is 20 miles, and the voltage on the line about halfway over has always been very low. Since the portable substation has been in operation the voltage over the entire system is very nearly even, schedule time is more easily made and the trip over the line is greatly improved in comfort to the passenger.

News of the Week

Accidents in New York City.

Secretary Whitney of the New York public service commission on October 18 made public data with regard to the railroad accidents occurring within the commission's jurisdiction during September. The number of persons killed is given as 56 and the serious accidents as 208. Other accidents were as follows:

Persons injured in car collisions.....	214
Persons injured in collisions with vehicles.....	641
Persons struck by cars.....	309
Persons injured boarding cars.....	503
Persons injured alighting from cars.....	915
Employees injured	597
Derailments	23
Injuries on stairways	35
Other accidents	1,669

Total 4,906

Recent Accidents.

In a collision between two Sherman Heights cars of the Chattanooga Railways Company on October 18, four passengers were killed and 25 injured. The cars were going at a rapid rate, the incoming car being loaded with passengers. Most of the killed and injured were on the latter car. The accident is said to have been caused by a confusion of signals, due to the heavy fog over the city at the time.

Nineteen persons were injured in a head-on collision between two cars on the Cleveland Akron & Bedford line of the Northern Ohio Traction Line Company near Cuyahoga Falls on October 20.

An accident which narrowly escaped serious results occurred on the Metropolitan West Side Elevated Railway in Chicago at 10:45 p. m. on October 18, when a train ran part way up the incline of the opening bascule bridge at Van Buren street and nearly ran over the end of the bridge. The bridge was being raised to permit the passage of a steamer and the motorman failed to stop the car; but the angle of 45 degrees to which the bridge was raised overcame the momentum of the train and it slipped back, telescoping the first two cars. There were less than half a dozen passengers in each car and no one was seriously injured. The accident occurred at a busy hour and traffic on the line was blocked for several hours.

Chicago Traction Reorganization.

Arguments were presented before Judge Grosscup of the United States circuit court at Chicago on October 22 regarding the attempt to have the Chicago Union Traction Company properties sold to satisfy claims of creditors.

Colin C. H. Fyfe, on behalf of the Central Trust Company of New York, argued that the receiver was acting illegally in spending for improvements the money that should go to payment of bonded interest.

Judge Grosscup said he did not believe a single case would be found in which the courts have said that a receiver, acting under the sanction of the court, may not suspend payment of interest for the good of the property. No new lien is created in this application of the earnings; the receiver is either putting the earnings into the treasury or into the property, where it constitutes an asset for the bondholders.

W. W. Gurley, general counsel for the Union Traction Company, said that nothing is being done that is not absolutely necessary for the preservation of the property. Not an item of the new work is in the nature of anything but a repair, Mr. Gurley said. He added that the company must do this work if the property is to be maintained.

Judge Grosscup took the matter under advisement.

The reorganization committee of the Chicago Railways Company has extended the time for the deposit of securities under the reorganization plan to and including October 31.

The Cleveland Situation.

During the past week Mayor Johnson and Theodore E. Burton, the two candidates for mayor of Cleveland, have been carrying out their campaign, which is largely based on the street railway fare situation, by means of nightly addresses before large tent meetings. Mr. Burton has announced that he is in favor of a rate of fare not higher than seven tickets for a quarter, the rate at which the Cleveland Electric Railway is asking a renewal of its franchises. He has several times attacked the form of revocable franchise granted to the low-fare companies, pointing out that they are revocable only on purchase of the property by the city at the cost of reproduc-

tion of the property, plus 10 per cent, and that they permit a transfer of the property to another company with no restriction as to rate of fare.

Mr. Johnson charges Mr. Burton with being a representative of the Cleveland Electric Railway and states that the Cleveland Electric is not only paying his campaign expenses indirectly, but that it is buying space in the news columns of the daily papers in which to present its side of the case. He denies the charges that he is in favor of a zone system and declares that, while he is especially interested in securing a 3-cent fare for the city of Cleveland, he does not propose to wait until that rate can be put in force all over Cuyahoga county.

On October 21 seven new ordinances in the interests of the Forest City Railway were introduced in the city council. Six were for extensions of the Denison and Fulton lines and one was to fix terms under which the Forest City may secure joint use of the Cleveland Electric tracks on Bridge avenue, N. W., and West Sixty-fifth street. All of the ordinances were referred to the committees on street railways and ordinances and to the city solicitor.

Suit Against Chicago City Railway.—C. H. Venner of New York has filed a bill in the superior court of Cook county demanding that the franchise of the Chicago City Railway be declared void.

Western Ohio Increases Freight Service.—The Western Ohio Railway of Lima, O., will next week install a through freight service between Toledo and Wapakoneta, O. The company has placed in service three new cars, which will be used in addition to those employed in the local service.

Railroad Adopts Retrenchment Policy.—It is reported that the forces employed in track work and construction on both the steam and electric lines of the New York New Haven & Hartford Railroad, near Bridgeport, Conn., have been reduced two-thirds and that orders have been given to reduce the forces in the shops and offices.

Massachusetts Half-Fare Law Tested.—The constitutionality of the Massachusetts law requiring street railways to carry school children for half fare was questioned in the case of the Interstate Consolidated Street Railway of Pawtucket, R. I., against the commonwealth of Massachusetts, heard before the United States supreme court on October 16.

Holders of Metropolitan Street Railway Securities Organize.—The shareholders' protective committee of the Metropolitan Street Railway, New York, has organized by electing F. J. Lisman as chairman. The bondholders' protective committee has appointed an expert accountant to investigate the security behind the Metropolitan Street Railway refunding bonds.

Western Society of Engineers.—An extra meeting of the electrical section of the Western Society of Engineers was held in the society rooms in the Monadnock block, Chicago, on Friday, October 25. Prof. Leon Gerard, past president of the National Society of Electrical Engineers of Belgium, addressed the meeting on "The Use of Electricity in the Purification of Water."

Illinois Traction System Not to Connect with Indiana Lines.—Following a recent conference of the officers of the Illinois Traction System, President McKinley and General Manager Fisher have been quoted as saying that the company has no intention of extending from Danville, Ill., to connect its lines with the Indiana system, as reported, and that if the lines are connected the work must be done by the Indiana companies.

Regular Interurban Service Columbus to Seymour, Ind.—Regular interurban service was started on the line of the Indianapolis Columbus & Southern Traction Company between Indianapolis and Seymour, Ind., on October 21, the extension from Columbus to Seymour, 18 miles, having been completed. Regular service from Indianapolis to Louisville over this line and the line of the Indianapolis & Louisville Traction Company is expected to be started before the close of the year. An hourly service is given each way between Indianapolis and Seymour from 6:10 a. m. to 9:10 p. m.

Will Recommend T-Rail for Detroit.—C. L. Glasgow, chairman of the Michigan railroad commission, in an address before the Detroit Credit Men's Association on October 22, stated that the board will recommend, in spite of the opposition of the city council, the use of the T-rail on the city lines of the Detroit-United Railway in place of the grooved rail now in use. He said: "This will be done for the reason that the dust and litter gathers in the groove. The flange rides in this groove, wearing down to such dull roundness that when the interurban cars reach the country they are much more apt to

ride the rail and go off the track than if they were provided with a deep, sharp flange. In cities of even less importance than Detroit the grooved rail is being abandoned for the T-rail."

Philadelphia Crusade Against "Ambulance Chasers."—The Philadelphia director of public safety has given orders to the police and detective force of the city to aid in every way possible the crusade of the Philadelphia Rapid Transit Company against "ambulance chasers" and others who are said to have defrauded the company of large sums in the past few years through fraudulent damage claims. The mayor has approved the order. On the following day two former employees of the company were arrested, charged with having fraudulently represented themselves as agents of the company and with having caused damage suits, which had already been settled by genuine agents of the company, to be reopened in court. A hospital orderly was arrested on the following day charged with having received compensation from a firm of lawyers for reporting accident cases to them at once. He was held in \$1,000 bail.

United Railroads of San Francisco to Increase Service.—General Manager Charles N. Black of the United Railroads of San Francisco on October 16 stated to the San Francisco board of supervisors that the company would increase its car service 50 per cent within the next 30 days. Lack of power has hitherto prevented the company from operating its entire number of cars. Mr. Black said that the company was producing 7,000 kilowatts from its own plants and was receiving 6,000 from the California Gas & Electric Company and was assured of an additional 4,000 from the City Electric Company within 30 days. Moreover, within seven months two new power companies, the Stanislaus Power Company and the Western Power Company, were expected to deliver power in San Francisco. The supervisors are considering passing measures to compel the company to build an additional power plant of its own.

Montreal Street Railway Willing to Transport Freight.—In response to the request of city officials and a number of prominent merchants of Montreal the Montreal Street Railway on October 18 submitted a communication to the city council stating on what conditions it would agree to transport freight. The principal conditions named were that the company should be allowed to operate freight cars during all hours of the day, with the exception of from 5 to 7 p. m. and 6 to 8 a. m., the rush hours; that the company should have the right to construct whatever lines are necessary, as well as freight stations, sidings, etc. In return for the general privilege, the company agrees to pay to the city 4 per cent of the freight earnings up to \$200,000, 6 per cent on earnings between that amount and \$500,000, with corresponding percentages on larger amounts. The company agreed to pay for all damages to property and to pave between the rails of all sidings and for 18 inches each side of the rails. The freight service is not to be allowed to interfere with the passenger service. The speed of the cars is not to exceed eight miles an hour and employees in the service of the company shall not be held to work more than 60 hours per week.

Straphangers' League in St. Paul.—The Twin City Rapid Transit Company, operating in St. Paul and Minneapolis, Minn., has had to contend of late against a vigorous protest by St. Paul citizens with regard to the number of cars operated in rush hours. A "Straphangers' League" has been organized, of which anyone may become a member upon payment of 10 cents for a button, whose object is to secure legislation to compel the company to operate more cars. It is complained that St. Paul is being discriminated against in favor of Minneapolis; that the company is not using all of its cars, for instance, that more cars were operated during state fair week; and that the company has shipped cars to the Duluth Street Railway, which is controlled by allied interests. On October 22 a committee of 28 citizens, appointed by the mayor, visited the new Snelling avenue shops to see what was being done to improve the conditions. General Manager W. J. Hield stated that the company did not have enough cars at present to furnish a seat for everyone during rush hours and that they could not get enough cars to give entirely adequate service until about July 1. The company is now operating 245 cars in St. Paul and 300 in Minneapolis. Mr. Hield said that 90 new cars for both cities would be ready by July 1, but that they could not get the necessary number of motors before that time. The company now has equipment for 14 cars that are now being built at the Snelling avenue shops and 150 motors of a new type have been ordered from the General Electric Company, which will be delivered this winter and in the spring. The city council has passed an ordinance requiring increased service, but the mayor is withholding his signature, pending a report from the investigating committee.

Construction News

FRANCHISES.

Atlanta, Ga.—The Georgia Securities Company, which proposes to build the Atlanta Griffin & Macon Electric Railway, has applied for an extension of one year's time in which to begin the construction of the line and two years' additional time in which to have the road in operation.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y.—Permission has been obtained by this company from the public service commission to cross the tracks of the Lehigh Valley Railroad in Auburn. This will allow a connection for this road with the Rochester Syracuse & Eastern at Port Byron.

Chicago, Ill.—The Calumet Electric Street Railway, operating 80 miles of electric railway in Chicago, has applied to the city council for a consolidation of all of its franchises under one general franchise with a 20-year limit. The company is now operating under grants which expire at various dates between 1909 and 1919.

Greeley, Colo.—The Denver & Greeley Electric Railway is seeking entrance into Greeley from the west for a passenger and freight line and also asks permission to build a loop in the city for handling passenger traffic only. The franchise covering these requests is for 99 years, the company agreeing after 10 years to pay the city \$500 per annum and after 20 years \$1,000 per annum. A bond for \$25,000 also will be filed by the company as a guarantee of the carrying out of its contract.

Macon, Ga.—The Macon Railway & Light Company has applied to the county commissioners for permission to extend its line on Columbus road to Brown place.

Oakland, Cal.—The Southern Pacific company is reported to have withdrawn its recent application for a franchise in Oakland for converting its Webster street road for electrical operation. The action is said to have been taken because of the need of arranging more of the details regarding the conversion of all its lines in that city. When these have been decided upon it is stated that franchises covering the entire system of the proposed changes in Oakland will be applied for at the same time.

Onalaska, Wis.—The La Crosse & Winona Traction Company has applied for a franchise to operate its interurban line through Onalaska. The line is a branch of the La Crosse Water Power Company, which is building a large dam at Hatfield, and which will furnish power for the operation of the proposed road.

Owosso, Mich.—The city council has granted a renewal franchise to the Saginaw Owosso & Lansing Electric Railway for the operation of its interurban line through the streets of Owosso. The company has 18 months in which to begin construction work and 2½ years in which to have the line in operation.

Paducah, Ky.—Interests representing the Paducah Southern Electric Railroad, which will be built from Paducah to Mayfield and Hickman, Ky., have applied for a franchise to enter Paducah at Twenty-fifth and Tennessee streets. The Southern Construction Company, which is financing the road, recently engaged the American Engineering Company of Indianapolis, Ind., to make the preliminary surveys and it is stated that these have been completed between Paducah and Mayfield.

Platteville, Colo.—E. N. Reaser, president of the Interurban Construction Company, which proposes to build an electric line connecting Denver and Greeley, Colo., has opened negotiations for a franchise in Platteville.

Portland, Ore.—An extension of time in which to construct an electric railway from Portland to and beyond Linnton, Ore., has been applied for by Lafe Pence, who was granted a franchise for this purpose some months ago. A feature of the new franchise is the suggestion that a "common user" clause be inserted in the grant. It also specifies 25 feet instead of 20 feet for the right of way, in order to allow for a double track.

Salt Lake City, Utah.—The Utah Light & Railway Company has refused to accept the franchise granted by the city council on September 22 because of a clause in the franchise allowing interurban cars to use the company's tracks when they are built from the city limits out for a distance of not less than five miles. Objection also is made to the provision

requiring the company to sprinkle and flush the streets in the paved districts through which its cars run. On October 18 the company filed with the city clerk a draft of a new franchise, identical with the former, except that the clause with reference to street sprinkling is omitted and the clause with regard to permitting interurban roads to use the city tracks is amended to apply only to roads running from more than 10 miles out of the city. Accompanying the franchise was a communication from President W. H. Bancroft, stating the company's willingness to enter into a contract for sprinkling the streets for a reasonable compensation, to be less than the present rates paid by the city.

Terre Haute, Ind.—The Grand Central Traction Company has asked for a franchise to enter this city for its branch line from Bloomington. The company agrees to build a commodious passenger station and allow other traction lines to use its tracks at a compensation to be fixed by arbitration. H. A. Morgan is chief engineer.

Thermopolis, Wyo.—S. A. Broadwell, Omaha, Neb., has secured a franchise to construct an electric railway in Thermopolis and to nearby towns and mining camps, work on which will be started within 90 days.

RECENT INCORPORATIONS.

Bethany Trolley Syndicate, Wheeling, W. Va.—This company is reported incorporated to build an electric railway from Bethany to Wellsburg, W. Va., and also a power plant and waterworks. Incorporators: J. L. D. Queen, R. M. Addleman, H. O. Moon, B. S. Honecker and C. J. Schuck, all of Wheeling.

Ensley (Ala.) Street Railway.—Incorporated in Alabama to build and operate an electric railway in Ensley, Ala. The company also will maintain an electric light and power plant, will acquire, improve and sell land and operate an amusement resort in connection with its street railway. Capital stock, \$25,000, of which one-half has been subscribed. J. J. Walker, president and general manager; H. S. Meade, vice-president; J. D. Matlock, secretary and treasurer. The principal offices will be in Ensley.

Lima (O.) Southern Railway.—Incorporated in Ohio with \$20,000 capital stock to operate electric railway trackage in the yards and shops of the Lima Locomotive & Machine Company and connecting that plant with the works of the Ohio Steel Company and also with the Lima street railways. A. L. White, managing director.

Memphis Covington & Northern Railway.—Incorporated in Tennessee to construct and operate a street and interurban railway in Covington and in the counties of Tipton and Shelby. Capital stock, \$14,000. Incorporators: G. B. Gillespie, John T. Garner, J. B. Witherington, W. M. Abernathy, H. N. Sullivan, C. H. Stovall, W. A. Black and R. W. Sanford.

Southwestern Interurban Railway, Mangum, Okla.—Incorporated in Oklahoma to build an interurban railway from Mangum to Hollis, Okla., by way of Francis; also a line to Granite and Cordell, with a branch from Granite to Hobart and from Mangum to Altus, a total of 119 miles. Capital stock, \$1,000,000. Incorporators: W. T. Funderburk, D. J. Doyle, E. E. Pinkerton, T. P. Clay, H. M. Ferguson and R. C. Echols, all of Mangum.

TRACK AND ROADWAY.

Ashland (Wis.) Light Power & Street Railway.—It is reported that A. E. Appleyard, formerly of Columbus, O., has recently secured control of this company and that he has announced a proposed extension of the line from Ashland to Washburn, Wis. Power will be secured from a plant to be erected at Copper Falls.

Bartlesville (I. T.) Interurban Railway.—This company has let a contract to R. S. Gilfillan of Iola, Kan., to grade its line from Bartlesville to Dewey, I. T., four miles.

Bayou Teche Railway & Light Company, New Orleans, La.—P. M. Schneidau, president, H. R. Fine, manager, and other officers of this company recently made an inspection of the route of the proposed line in New Iberia and the interurban line to Jeanerette, La., and announced that construction would begin at an early date. Later it is expected to extend the line to a number of neighboring towns.

Boston Elevated Railway.—Several spans of the steel structure forming the southerly approach to the new Washington street tunnel have been placed as far as Pine street, one block south of the starting point at Oak street. The masonry support for the structure across the steam railroad cut has been completed to the level of the Washington street bridge

and the entrances and exits to the new tunnel in Washington near Boylston street also are practically finished. It is stated that additional portions of the hotels Tivoli and Mieset will have to be removed before final connection can be made with the subway portal.

Boston & Eastern Electric Railroad, Boston, Mass.—This company, which was recently denied a certificate of public convenience and necessity for its proposed line from Boston to Lynn, Mass., because of several features of the plan which did not meet the approval of the Massachusetts railroad commission, has filed new plans which eliminate the scheme for a connection with the Boston Elevated Railway at Sullivan square, which was objected to, and which provide for a double-track tunnel under the harbor, 300 feet south of the East Boston tunnel, from Revere to Central wharf on Atlantic avenue and thence by a 2-track subway to a large terminal station in Postoffice square. This change of plans, besides necessitating a new tunnel 5,400 feet long, necessitates a double-track steel deck bridge nearly one-third of a mile long across the Chelsea river to Breed's island. Provision will be made to connect the new tunnel with the East Boston tunnel if desirable. John H. Bickford of Boston is chief engineer. The plans of the Boston & Eastern Railroad were described in an article in the Electric Railway Review of July 20, 1907, page 72.

Brookings & Sioux Falls Electric Railway, Brookings, S. D.—Grading on this line between Brookings and Sioux Falls has been started and it is hoped to have this work completed as far as Egan, 25 miles south of Brookings, before severe weather sets in. The road will run in a direct line south of Brookings, touching the townsite of Medary, and it is stated that when the tracks have been laid to this point the town, which was abandoned in 1879, will be rebuilt and become an important shipping point on the line.

Brooklyn Rapid Transit Company.—The new electric line through Livingston street, between Flatbush avenue and Court street, was put into operation on Monday of this week. The tracks on Lafayette avenue, between Fulton street and Flatbush avenue, have been laid, but operation cannot be started until the pending injunction proceedings instituted by the trustees of the academy of music have been adjusted.

Buena Vista, Cal.—At a recent meeting of Buena Vista citizens Charles A. Reiss, a New York capitalist, outlined a proposition for a new electric railway to tap the rich mining district west of Buena Vista. It is stated that 12 miles of the line will be in operation by next summer.

Butler, Pa.—Pittsburg capitalists are said to be interested in an electric railway from Butler to Meadville by way of Franklin, Pa. Preliminary surveys indicate that the line will follow the Butler and Mercer pike to Mercer and thence by way of Polk to Franklin.

Centralia, Wash.—It is stated that construction work on the Centralia-Chehalis electric railway will be started within 30 days and that offices in Centralia will be opened in the near future. B. J. Weeks is promoting the road.

Chicago-New York Electric Air Line Railroad.—The abutments of the steel viaduct across the Monon railroad, which this company intends to cross with its proposed line, have been completed in Laporte, Ind., and it is stated that the remainder of the steel work is ready for delivery. A long trestle is being built over the Big Coffee creek flats. One thousand tons of 85-pound steel rails and the ties for tracklaying are said to be on the ground at South Laporte. Traffic agreements with the Gary & Interurban Railroad are said to have been reached by which the Air Line cars will be run to the steel mills in Gary over the tracks of the Gary local line.

Chicago & Oak Park Elevated Railroad.—This company is reported to have signed a contract with the Chicago & Northwestern Railway, whereby the latter company will bear the expense of elevating the tracks of the Oak Park road from Canal to Union street and otherwise improve the elevated structure. This arrangement was agreed upon in order that the Chicago & Northwestern company may build a depot at that point.

Cincinnati Reading & Middletown Railway, Cincinnati, O.—This company has just completed surveys for a proposed line from Middletown and Franklin to Bond Hill and Norwood, O., 35 miles, connecting with Cincinnati by the suburban lines of the Cincinnati Traction Company. R. W. Mallon of Cincinnati is interested.

Citizens' Electric Company, Eureka Springs, Ark.—The property of this company, including the street railway system, electric light plant and ice plant, has been purchased by a syndicate organized by George Sengel and George Tilles of Ft. Smith, Ark. It is stated that the street railway will be ex-

tended south three miles to the lake, where a club house will be built, and also to Beaver, six miles, where an amusement park will be established. The following officers have been elected: President and treasurer, George Sengel; vice-president, George Tilles; secretary, L. P. Miles, all of Ft. Smith.

Compania Tranvia de Chihuahua, Chihuahua, Mex.—General Manager A. C. Nash announces that work on the conversion of this horse car line to electricity will be started at once on Avenida Juarez, the street on which the cars now run to the Mexican Central depot. An extension also is planned to Nombre de Dios, a suburb three miles from Chihuahua, and another to the smelter on the Rancho de Avalos, six miles out.

Connecticut Valley Street Railway, Greenfield, Mass.—This company is now strengthening its bridge across the Connecticut river at Montague City, Conn., at a cost of \$10,000, so that the bridge will be able to stand the strain of the heavier cars which are to be operated. The work is being done by the United Construction Company of Albany, N. Y.

Delaware River & Atlantic City Railway, Philadelphia, Pa.—This company has been organized with the following officers: William J. Thompson, president; Edward Butler, secretary; Gustavus A. Miller, treasurer. The company intends to build an electric railway connecting Philadelphia and Atlantic City, with Gloucester, N. J., as the northern terminus. It is stated that New Jersey capitalists will finance the road.

Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.—This company has entered upon the work of reballasting its line between this city and Logansport. The floods during the past spring washed the ballast away from the track. The work is being done principally during the night time.

Ft. Worth Weatherford & Mineral Wells Interurban Railway.—G. R. Turner announces that steel for the construction of this line has been ordered from Pennsylvania and that delivery has been promised by January 15, 1908. Seventy-pound rails will be used.

Grey Bull, Wyo.—It is reported that local capital will construct a proposed electric railway between Grey Bull and Germania, the preliminary survey for which is said to have been made.

Indianapolis Logansport & South Bend Traction Company, South Bend, Ind.—At a recent meeting of stockholders of this company, organized to build an interurban line from Logansport to South Bend, the following directors were chosen: Horace J. Crismond, J. G. Power, Logansport, Ind.; Prof. Jerome J. Greene, Notre Dame; Samuel S. Perley, Alexis Coquillard, Virginus Nicar, E. P. Taylor, Hugh H. Tansey, T. P. Moredock, South Bend. Officers were elected as follows: S. S. Perley, president; V. Nicar, vice-president; T. P. Moredock, secretary-treasurer.

Kansas City & Olathe Electric Railroad, Kansas City, Mo.—The first car was operated over this company's 5-mile extension from the end of the Rosedale line to Merriam, Kan., on October 19. It is hoped to complete an extension to Shawnee, Kan., by January 1 next.

Le Raysville, Pa.—Local citizens have organized a company to build an electric railway from Le Raysville, Pa., to Nichols, N. Y., via Warren Center, West Warren and Windham, Pa. The following officers have been elected: President, Dr. J. C. Trinn, Warren Center; vice-president, N. W. Pendleton, South Warren.

Lima & Toledo Traction Company, Lima, O.—This company will inaugurate service on its interurban road from Leipsic to Milton, O., 27 miles south of Toledo, by December 1. Entrance to Toledo probably will not be gained until spring.

Louisville & Northern Railway & Lighting Company, New Albany, Ind.—On October 17 service on this line between Jeffersonville and Sellersburg was abandoned and turned over to the Indianapolis & Louisville Traction Company, which has opened its lines as far north as Scottsburg. It is expected that within the next month there will be a direct service all the way to Indianapolis without transfer. There is some work yet to be done between Scottsburg and Seymour, but the link which connects Seymour and Indianapolis has been complete by the Indianapolis Columbus & Southern Traction Company and regular service has been started. The cars of the newly opened line will handle the Sellersburg traffic, but the Louisville & Northern Railway & Lighting Company will still maintain its former service to Charlestown.

Marshall, Mich.—J. M. Pope, a civil engineer representing Chicago capitalists, states that he will make a favorable report on the proposition to build an electric railroad between Coldwater and Lansing, Mich., touching Union City, Tekonsha, Marshall, Eaton Rapids and several villages.

Milner & North Side Electric Railway, Milner, Idaho.—It is stated that this company, which was recently organized, expects to let contracts within 30 days for its lines from Milner in a northwesterly direction through Jerome and Wendell, to a connection with the Oregon Short Line at a point near Gooding, about 70 miles. Surveys have been made and capital and right of way secured. D. C. MacWatters is president and Paul S. A. Bickel is chief engineer.

Orlando, Fla.—Dr. George T. Bennett of this town is interested in the promotion of an electric light, power and railway company, which proposes to build from Sanford to Kissimmee, Fla., via Orlando, 40 miles.

Philadelphia Delaware & Montgomery Railroad, Philadelphia, Pa.—Control of this company, which was formed in April, 1906, with a capital of \$140,000, is said to have passed from the hands of the original incorporators to capitalists who will at once undertake the construction of the first section of this proposed 14-mile electric line from Lafayette station on the Schuylkill valley division of the Pennsylvania Railroad to a point on the Delaware river in Delaware county. It is proposed to build a tunnel under the river at this point and connect either with the Pennsylvania's electric line at Woodbury or construct a separate road to Atlantic City. It is estimated that it will cost \$2,000,000 to build the tunnel and it is possible that a ferry service across the river will be established instead. Should the line be built it is stated that traffic arrangements with the Pennsylvania Railroad may be entered into by which passengers may travel from Atlantic City and other seashore points without change of cars. As now planned two main power stations will be built, one at the du Pont farm, which the company owns, and the other at Lincoln park. Eight substations also will be built along the line. The names of the new owners have not been made public; the original incorporators are: Peter J. Hughes, Edward L. Graham, Charles T. Maginnis, Bernard A. Hughes, Samuel J. Dallas, John M. Bradley, Charles H. Harvey, J. Robert Whitely, Thomas F. Daly and George W. Emlen, trustee.

Rochester Syracuse & Eastern Railroad.—It is expected that this road will be completed to Port Byron, N. Y., by the first of the year. If this is done through connection from Rochester to Syracuse and from thence to Utica and Little Falls, a total distance of 155 miles, will be afforded.

Saratoga, Wyo.—J. B. Hassett of Saratoga is promoting an electric railway from Denver up the North Platte river. The line would serve an undeveloped country rich in coal and other mineral deposits, as well as a growing farming population.

Seattle & Tacoma Short Line, Seattle, Wash.—This company, which was incorporated last week, has retained L. B. Stillwell, New York City, as consulting engineer. Much of the right of way has been secured and it is expected to have the line in operation within 20 months. It will be a double-track air line, 30 miles long, and will be six miles shorter, it is said, than the present interurban road operating between the two cities. Offices have been opened in Seattle and Tacoma.

Springfield (Mass.) Street Railway.—The recent agitation for an extension of this company's St. James avenue line to the Chicopee line, which is said to have been in the interest of real estate promoters, resulted in a summons to General Manager Page to attend a hearing before the railroad commissioners in Boston on October 11. The railway company is opposed to the extension on the ground that the district which the line would traverse is so thinly settled that public interest does not demand such an outlay on the part of the company. It is stated that this company will expend within the next 15 months about \$465,000 in improvements on its lines, \$100,000 of which is for the erection of a new car shop and car barn.

Steubenville & East Liverpool Traction & Light Company, Steubenville, O.—This company is now building a double-track line from Steubenville to Vanport and Rochester, Pa. Westinghouse, Church, Kerr & Co. have the contract and tracklaying is about half completed. J. C. Rothery, general manager.

Stonewall Valley Electric Railroad, Trinidad, Colo.—Grading has been started on the road from Trinidad to Stonewall Mountain, Colo., and will be continued this year as far as Cokedale, 4½ miles. The line is an extension of the Trinidad Electric Railroad. Frank P. Read, president.

Suffolk Traction Company, Patchogue, N. Y.—Rossiter, MacGovern & Co. of New York have been awarded the contract for building this company's lines from Brookhaven to Babylon, via Patchogue, N. Y., 23 miles; from Patchogue to Port Jefferson, 17 miles, and also to Bellport, Sayville, Oakdale and Islip, all on Long Island. It is probable that a power house will be built at Patchogue and two substations at other

points. Thomas L. Hughes, 5 Nassau street, New York, is president; J. C. Brackenridge of New York is chief engineer; A. R. Applegarth of Patchogue is resident engineer. Construction has been delayed until recently by an injunction, but the road is now under construction and will be pushed to completion.

Toledo Railways & Light Company, Toledo, O.—This company is laying new girder rails on its Summit avenue line and on Norwood avenue between Twenty-second street and Lawrence avenue.

United Railroads of San Francisco.—This company has begun the work of rehabilitating its Sacramento and Clay street cable lines, which have been out of service since the fire. The tracks on Sacramento street are being raised four feet to conform with the city grade. The company also is building a switch connecting the outside tracks on the south side of Market street with the south end of the loop.

Utah Light & Railway Company, Salt Lake City, Utah.—A large force of men is at work on this company's city lines, some of which are being relaid with 65-pound rails and other double tracked. It is expected that this work will be completed in about two weeks. Other improvements are contemplated later in the winter.

Washington Railway & Power Company, Vancouver, Wash.—This company has been reorganized and the assets have been taken over by local capitalists, who propose to continue the work of building the proposed 7-mile line in Vancouver, Wash., and also the first four miles of an interurban line. E. M. Rands, president; J. H. Elwell, vice-president; H. C. Phillips, treasurer; and M. M. Conner, secretary.

Waterbury & Milldale Tramway Company, Milldale, Conn.—This company, which proposes to build an electric railway connecting the points named in the title, has engaged Sanderson & Porter of New York as engineers. E. S. Todd of Milldale is treasurer.

Waycross Electric Railway.—It is stated that this company may begin construction about November 1 on its lines from Waycross to Blackshear and Waresboro, Ga. George W. Deen, Waycross, and Burdett Loomis of Hartford, Conn., are interested.

Wooster & Mansfield Electric Railway, Wooster, O.—It has been announced that this company has secured all of the necessary right of way for its line from Wooster to Mansfield, O. David Collier of Plimpton, O., is vice-president.

POWER HOUSES AND SUBSTATIONS.

Baltimore & Annapolis Short Line Railroad.—It is reported that this company will erect a substation at Jones Station, about six miles from Annapolis.

Bethlehem & Nazareth Passenger Railway Company, Bethlehem, Pa.—The power house at Broadhead station, which has furnished the power for the operation of this road, has been abandoned. Power is now supplied from the Hecktown storage battery, which takes current from the main plant at Allentown.

California Gas & Electric Corporation, San Francisco, Cal.—This company has been compelled to abandon work on the Deer Creek power plant, owing to its inability to secure water pipe.

Central Arkansas Electric Railway, Pine Bluff, Ark.—It is reported that this company is to erect a power plant. The present plan is to purchase coal mines and build the power plant near the mines, but as yet nothing definite has been decided upon.

Connecticut Valley Street Railway Company, Greenfield, Mass.—It is reported that this company will install a regulating battery and an additional 300-kilowatt rotary converter at its Greenfield station, at an approximate cost of \$20,000.

Detroit (Mich.) United Railway.—Arrangements are being made to install additional machinery in the plant of this company at Birmingham, Mich.

Lexington Interurban Railway, Lexington, Ky.—Work will soon be commenced on the new power house of this company, to be erected at Valley View, Ky., which will cost between \$400,000 and \$500,000 and will furnish power for the Lexington street railways.

Northern Electric Company, Chico, Cal.—This company will erect a permanent substation at Encinal to take the place of the portable substation now in use.

Personal Mention

Mr. J. V. McFarland has been appointed general manager of the Macon Railway & Light Company; effective on October 16.

Mr. Thomas Goodrich will succeed Mr. S. L. Logan as passenger agent of the Marion Bluffton & Eastern Traction Company at Bluffton, Ind.

Mr. C. T. Converse, who has been connected with the Woonsocket (R. I.) Street Railway since last February, has been appointed traveling auditor of the New England Investment & Security Company, with headquarters at Boston, Mass.

Mr. Millard B. Herely, formerly connected with the transportation department of the Chicago Union Traction Company, has been appointed superintendent of local transportation of the city of Chicago, succeeding Dr. Maurice F. Doty.

Mr. George Caywood of the Allis-Chalmers Company, Milwaukee, Wis., has been appointed chief engineer and superintendent of power stations of the Twin City Rapid Transit Company of Minneapolis, Minn., succeeding Mr. D. W. Dozier, resigned.

Mr. W. H. Davies has been appointed comptroller of the United Traction Company, Albany, N. Y., succeeding Mr. L. H. Stewart, recently resigned on account of ill health. Mr. Davies is now acting comptroller of the Delaware & Hudson, in place of Mr. Stewart, who was also comptroller of that company.

Mr. Carl J. Printz, for the past year and a half superintendent of the Milwaukee Electric Railway & Light Company, has resigned to become chief engineer of the John Inglis Company at Toronto, Ont. Previous to his connection with the street railway company Mr. Printz was for 17 years associated with the Allis-Chalmers Company of Milwaukee.

Mr. E. E. Potter has resigned as general superintendent of the Union Street Railway, New Bedford, Mass., to become associated with the Seattle (Wash.) Electric Company as operating manager under Mr. H. F. Grant, general manager. Mr. E. S. Wilde, treasurer of the Union Street Railway, will for the present assume the duties of general superintendent at New Bedford.

Mr. S. S. Neff, heretofore superintendent of the Atlantic City & Shore Railroad and the Atlantic City Electric Railway, Atlantic City, N. J., has been appointed general manager of both companies. Mr. N. M. Edwards has been appointed to succeed Mr. Neff as superintendent of the Atlantic City Electric Railway, which is operated as a street railway division of the West Jersey & Seashore Railroad.

Mr. Albert H. Stanley, who resigned last February as general manager of the Public Service Corporation of New Jersey, to become general manager of the London Underground Electric Railways Company, has recently been appointed general manager of the Metropolitan District Railway of London, in addition to his other duties. The following lines are now under his jurisdiction: Metropolitan District Railway, Baker Street & Waterloo, Great Northern Piccadilly & Brompton, Charing Cross Euston & Hampstead, Underground Electric Railways.

Mr. W. H. Williams has been elected second vice-president of the United Traction Company, Albany, N. Y., with headquarters in New York City. He recently was made third vice-president of the Delaware & Hudson Company in charge of the financial and accounting departments and in his new position will have charge of the same departments of the United company. Until recently Mr. Williams was assistant to President Loree of the Delaware & Hudson Company, and therefore is especially fitted to take over much of the detail work in connection with the United company matters in New York City.

Mr. W. B. Tarkington, for the past 14 months superintendent of transportation of the Milwaukee Electric Railway & Light Company, has resigned, effective on November 1. Mr. Tarkington has been connected with street railways in an official capacity since 1890, his experience covering all departments of electric railway operation. He was at one time general manager of the Omaha & Council Bluffs Street Railway which was the first electric line built by the old Thompson-Houston Company. In April, 1903, he was appointed general superintendent of the Detroit Monroe & Toledo Short Line, which position he held until his appointment in August, 1906, as superintendent of the Milwaukee Electric Railway & Light Company.

Financial News

Chicago Union Traction Company.—Earnings of the north and west side lines for the fiscal year ended June 30, 1907, compare as follows:

North Chicago Street Railroad.		
Year ended June 30—	1907.	1906.
Gross	\$3,507,014	\$3,518,004
Expenses	2,392,684	2,185,694
Net	\$1,114,330	\$1,332,310
Other income	21,069	25,172
Total income	\$1,135,399	\$1,357,482
Charges, etc.	1,111,506	1,260,877
Surplus	\$ 23,893	\$ 96,605

West Chicago Street Railroad.		
Year ended June 30—	1907.	1906.
Gross	\$6,850,050	\$6,573,964
Expenses	4,651,086	4,335,737
Net	\$2,198,964	\$2,238,227
Other income	34,282	50,404
Total income	\$2,233,246	\$2,288,631

Consolidated Traction Company.		
Year ended June 30—	1907.	1906.
Gross	\$1,951,270	\$1,833,559
Expenses	1,667,869	1,314,409
Net	\$ 283,401	\$ 519,150
Other income	82,452	82,881
Total income	\$ 365,853	\$ 602,031
Charges, etc.	689,795	705,010
Deficit	\$ 323,942	\$ 102,979

Interborough Rapid Transit Company, New York.—The following statement has been issued.

Year ended June 30—	1906.	Increase.
Gross earnings ...	\$22,363,802.33	\$19,695,594.12
Operating expenses ..	9,593,331.03	8,400,823.59
Net earnings..	\$12,770,471.30	\$11,294,770.53
Other income.....	815,832.63	715,503.16
Gross income..	\$13,586,303.93	\$12,010,273.69
		\$1,576,030.24

Interest on bonds and 3-year gold notes and rentals..	\$ 4,375,894.86	\$ 3,586,822.86	\$ 789,072.00
Taxes	1,377,965.37	1,390,560.13	*12,594.76

Total interest, rentals and taxes	\$ 5,753,860.23	\$ 4,977,382.99	\$ 776,477.24
---	-----------------	-----------------	---------------

Balance	\$ 7,832,443.70	\$ 7,032,890.70	\$ 799,553.00
7 per cent on Manhattan Railway Company stock..	4,116,000.00	3,864,000.00	252,000.00

Net income.....	\$ 3,716,443.70	\$ 3,168,890.70	\$ 547,553.00
-----------------	-----------------	-----------------	---------------

Dividends on \$35,000,000 Interborough Rapid Transit Company capital stock	3,150,000.00	2,887,500.00	262,500.00
Surplus	\$ 566,443.70	\$ 281,390.70	\$ 285,053.00

Operating expenses—per cent of gross earnings.....	42.89	42.65	0.24
Passengers carried.	449,287,884	395,716,386	53,571,498

*Decrease.

The company has also given out a statement showing the number of passengers carried and the car mileage on the elevated lines during the six months ended June 30, 1907, as compared with the corresponding period in 1902. The statement was prepared for the purpose of refuting the charge of the

Civic Club that the Interborough company was giving poorer service at the present time than it gave five years ago. In giving out these figures a representative of the company called attention to the fact that the charge of the Civic Club was based on train mileage instead of car mileage. The figures follow:

Car Mileage.			
Lines—	1902.	1907.	Increase, per cent.
Second Avenue	3,176,982	4,746,109	49.3
Third Avenue	8,426,855	12,492,877	48.2
Sixth Avenue	7,091,135	7,671,172	8.2
Ninth Avenue	4,174,964	6,057,057	45.0
Total	22,871,936	30,967,237	35.4
Passengers Carried.			

Lines—	1902.	1907.	Increase, per cent.
Second Avenue	14,788,283	23,886,006	61.5
Third Avenue	43,880,451	62,845,547	43.2
Sixth Avenue	44,187,599	44,053,340	*0.3
Ninth Avenue	12,880,164	16,513,617	28.2
Total	115,736,497	147,293,510	27.2

*Decrease.

Macon (Ga.) Railway & Light Company.—Control of this company has been purchased by W. J. Massee and other capitalists of Macon, and J. S. Collins of Savannah. The new interests have purchased a large part of the holdings of Herman Meyers, Sigo Meyers and W. W. Osborne of Savannah and J. H. Fall of Nashville. Under the plan of reorganization J. H. Fall, Herman Meyers, Sigo Meyers, S. Guthman, J. H. Hertz, Henry Horne and W. W. Osborne have retired as directors. Their places have been taken by W. J. Massee, M. Felton Hatcher, F. B. Stubbs, Joseph N. Neel, A. T. Small and M. H. Massee of Macon and J. C. Walker of Marshallville. The old directors who continue to hold office are Jacob S. Collins and Jacob Paulson of Savannah and Leon S. Dure, T. J. Carling, Morris Hopp and E. G. Harris of Macon. The following officers have been elected: President, W. J. Massee; first vice-president, Jacob S. Collins; second vice-president, M. Felton Hatcher; general superintendent, J. W. McFarland; secretary and treasurer, J. E. Jaudon.

ELECTRIC RAILWAY EARNINGS.

Northern Ohio Traction & Light Company, Akron, O.		
September—	1907.	1906.
Gross earnings	\$185,341.34	\$163,289.84
Operating expenses	96,173.60	87,966.76
Net earnings	89,167.74	75,323.08
Fixed charges	43,278.78	40,596.86
Surplus for stock	45,888.96	34,726.22

Aurora Elgin & Chicago Railroad.		
September—	1907.	1906.
Gross receipts	\$139,193.72	\$125,850.69
Operating expenses	72,334.55	63,288.70
Net earnings	66,859.17	62,561.99
Fixed charges	24,654.31	24,772.46
Surplus	42,204.86	37,789.53

July 1 to September 30—		
Gross receipts	\$442,043.24	\$393,082.78
Operating expenses	220,706.29	190,917.11
Net earnings	221,336.95	202,165.67
Fixed charges	79,149.61	74,650.72
Surplus	142,187.34	127,514.95

Duluth Street Railway Company.		
September—	1907.	1906.
Total earnings	\$74,397.90	\$67,763.37
Operating expenses	35,438.82	35,198.15
Net earnings	38,959.08	32,565.22
Deductions	17,921.83	17,860.42
Net income	21,037.25	14,704.80

January 1 to September 30—		
Total earnings	\$625,672.25	\$570,469.98
Operating expenses	309,623.77	297,926.20
Net earnings	316,048.48	272,543.78
Deductions	159,807.52	158,645.31
Net income	156,240.96	113,898.47

Dividends Declared.

Cape Breton Electric Company, Ltd., Sydney, N. S., preferred, 3 per cent.

West Penn Railways Company, Pittsburg, Pa., preferred, quarterly, 1¼ per cent.

Manufactures and Supplies

ROLLING STOCK.

Washington Railway & Electric Company, Washington, D. C., is reported to be in the market for 20 cars.

At Calgary, Alberta, S. J. Clarke, chairman public works committee, will receive bids, until November 1, for six semi-convertible cars with electrical equipment.

Kansas City Railway & Light Company, Kansas City, Mo., as noted in the Electric Railway Review of October 19, has placed an order with the St. Louis Car Company for 25 double-truck cars.

Maj. H. J. Crowley, 1729 McKean street, Philadelphia, Pa., reported in the Electric Railway Review of September 28 to be in the market for 100 street railway cars for South American service, advises us that the order has been placed and delivery will be made in 90 days.

Burlington Traction Company, Burlington, Vt., has purchased three car bodies from J. M. Jones' Sons, three sets of double trucks from the Taylor Truck Company and will equip the cars with Westinghouse equipment, Parmenter fenders, Consolidated heaters and New Haven registers.

Waterloo Cedar Falls & Northern Railway, Waterloo, Ia., which the Electric Railway Review of October 12 reported to have bought new rolling stock to replace that destroyed in the loss of the company's car houses by fire, has placed an order for two cars with the McGuire-Cummings Manufacturing Company.

Utah Light & Railway Company, Salt Lake City, Utah, was reported in the Electric Railway Review of October 19 to be building an electric locomotive. Joseph S. Wells, general manager of the company, writes that only the platforms for three electric locomotives are being built at Salt Lake City. The trucks were purchased from the Baldwin Locomotive Works and the electric motors from the Westinghouse Electric & Manufacturing Company.

New York City Railway, New York, N. Y., Adrian H. Joline and Douglas Robinson, receivers, has been given permission by the United States circuit court to make an expenditure of approximately \$3,000,000, a part of which will be utilized in the purchase of 276 new cars. Nine cars ready for operation will be purchased at once from The J. G. Brill Company, and 80 cars of the standard closed type have been ordered from the same company for delivery January 1, 1908. Orders will also be placed for 22 snow sweepers and 10 scraping cars. Recommendations were made for the purchase of 155 pay-as-you-enter type cars, the last of which must be delivered the latter part of 1908. Other equipment to be bought includes fenders, registers, heaters, hand brakes, wheels, etc.

SHOPS AND BUILDINGS.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—Work has been commenced on the construction of car houses and repair shops at South Bend. The buildings will be built of steel and brick and equipped with modern machinery.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—The contract for the erection of the passenger station at Princeton, Ind., previously mentioned in the Electric Railway Review, has been awarded to Anderson & Veach of that place.

Grand Rapids Holland & Chicago Railway, Holland, Mich.—An option on land, 100 by 400 feet, at Market and Island streets, Grand Rapids, Mich., has been secured by this company, and it is the intention to erect an interurban freight depot, if the common council of the city will permit the laying of a spur track from Ellsworth avenue through Island street to the west side of Market street. The depot planned will be of brick, 35 by 170 feet, and one story high.

Michigan United Railways, Lansing, Mich.—The car houses of this company at Kalamazoo, Mich., were damaged by fire on October 15. The entire south side of the building was destroyed, together with three cars used for city service and one interurban car. Press reports place the loss at \$10,000.

Northern Electric Company, Chico, Cal.—Plans for a freight and passenger station at Encinal, Cal., are under preparation.

Waterloo Cedar Falls & Northern Railway, Waterloo, Ia.—

George F. Scales of Waterloo has been awarded the contract for the construction of a car house to replace the one destroyed by fire, as reported in the Electric Railway Review of October 19. The new building will be of fireproof brick, with concrete roof, 70 by 200 feet in size. Work will be started at once and is expected to be finished in five weeks. The contract price is reported to be \$12,000.

TRADE NOTES.

Morden Frog & Crossing Works, Chicago, has removed its offices from 618 The Rookery to 823-829 Commercial National Bank building.

Thomas & Neall, New York and Boston, is the name of a new firm of electrical engineers recently formed by Percy H. Thomas and N. J. Neall.

Columbus Malleable Castings Company, Columbus, O., has an additional furnace under construction at its plant which, when completed, will give the company a daily output of 40 tons.

Consolidated Car-Heating Company, 42 Broadway, New York, has closed a contract with the Cleveland Electric Railway for 760 car heaters to be installed in the motormen's vestibules.

E. A. Pittis, representative of the Midvale Steel Company in the South Atlantic and gulf states, will again resume his duties on November 1 after a year's absence on account of serious illness from which he has entirely recovered.

Central Inspection Bureau, 17 State street, New York City, is inspecting a large number of double-truck passenger and express cars for the Buffalo Lockport & Rochester Railway at the works of the Niles Car & Manufacturing Company, Niles, O.

Raymond Concrete Pile Company, Chicago and New York, has been awarded the contract for the foundations of the power house of the Home Electric Light & Power Company, Tyrone, Pa.

Consolidated Car Fender Company, Providence, R. I., announces that after a thorough investigation by a committee of the city council, the Peoria Railway has awarded the company the contract for equipping the cars in Peoria, Ill., with "Providence" fenders.

General Fireproofing Company, Youngstown, O., gave to those in attendance at the recent conventions in Atlantic City nickel-plated specimens of its Lug Bar and Trussit. The section of lightweight roof, reinforced with Trussit, well illustrates the use of this metal for roofs and floors.

Railway Equipment Company, Portland, Ore., will build shops for the repairing of locomotives and rebuilding of cars on six acres of land which it has just purchased on the Willamette river, near Portland. Machinery for making frogs, switches and general track work will also be installed.

Danville Car Company, Danville, Ill., has purchased the entire stock and good-will of the H. F. Vogel Contracting & Railway Supply Company of St. Louis, Mo. The organization and office at St. Louis will be maintained and an office will shortly be opened in Chicago in addition to those already maintained for both companies in New York and Boston.

A. Grothwell has opened an office at 136 Liberty street, New York, in order to introduce his Mogul insulating specialties, which are electrical compound, armature varnish, acid and alkali compound, boiler and stack paint, brine and ammonia varnish, damp-proofing and preservative paints, etc. These specialties are extensively used on the Pacific coast, where Mr. Grothwell has been established for several years.

Cobbs Car Company, Limited, Lake Charles, La., the incorporation of which was noted in the Electric Railway Review of October 19, writes that the plant is now being built and it is expected to have the machinery installed and the manufacture of cars begun within 30 days. The officers of the company are: A. Thomson, president; B. J. Banker, vice-president; D. Z. Thomson, secretary and treasurer; B. J. Cobb, general manager.

Allis-Chalmers Company, Milwaukee, Wis., has sold about 1,250 Christensen air brakes to the New York New Haven & Hartford Railroad for use of the electric railways under the road's control. Some of these have been in daily service since 1898, and the New York New Haven & Hartford has recently closed a contract with the Allis-Chalmers Company in which it agrees to purchase all of its air brake equipments and repair parts from the Milwaukee concern.

American Bridge Company advises us that the press re-

ports, noted in the Electric Railway Review of October 19, greatly exaggerated the fire loss suffered by the Pencoyd Iron Works, near Philadelphia, on October 14. Two small frame buildings, located in a somewhat isolated position from the rest of the plant, together with their contents, consisting of lumber and erectors' tools, were destroyed. The loss, which is about \$6,000, is fully covered by insurance, and does not interfere with the operation of the plant.

Northern Electrical Manufacturing Company, Madison, Wis., has established a district office at Pittsburg, Pa., in charge of C. A. Poe, formerly of C. A. Poe & Brother. The office is conveniently located at 618 Park building. Northern customers and others desiring to consider Northern machines will find the Pittsburg office in position to act promptly on inquiries for information or assistance. Mr. Poe is not unknown to Northern customers in the Pittsburg district, having represented the company in conjunction with other lines for several years. His entire attention is now devoted to the Northern work.

David B. Carse, who has recently resigned as chairman of the advisory committee of the United States Steel Corporation, will devote his entire time to the business of Carse Brothers Company, engineer and dealer in machinery and supplies for railway work.



David B. Carse.

Mr. Carse and his brother, John B. Carse, have composed the advisory committee of the steel corporation since the committee's formation five years ago. The latter still remains with the steel company, and will take care of the future work of the committee. David B. Carse is well known to the railway men of this country. Previous to his connection with the United States Steel Corporation he was president of Carse Brothers Company, Chicago, and before that general manager of Greenlee Brothers & Co. The firm

of Carse Brothers Company has been reorganized, and its offices moved from Chicago to 12 Broadway, New York. Realizing the large part electricity will play in the operation of steam roads, a department of electricity has been established by the new company.

Charles R. Earll, 11 Broadway, New York City, manufacturer of the Earll trolley retrievers and catchers, exhibited four different styles of retrievers at the Atlantic City conventions. These were his No. 2 retrievers with non-compulsory set without emergency release, the No. 3 having non-compulsory set with emergency release, No. 4 with compulsory set but without emergency release and No. 5 with compulsory set and emergency release. The retrievers, aside from some slight improvements in minor details, were the same as were exhibited the previous year, experience having shown that no material change was desirable. In addition to the retrievers a new trolley catcher was exhibited. The trolley catcher is made either with or without emergency release and fits the same socket as the retriever so that it can be formed into a retriever by the substitution of the retriever drum and parts attached to it for the catcher drum. The representatives at the convention were C. I. Earll, C. A. Coutan and Ernest Miller.

Willard Storage Battery Company, Cleveland, O., has recently moved into a new factory, located on the corner of Marquette road and Lakeside avenue. This affords a large increase of floor space over the old factory and a correspondingly larger output will be possible. The new factory consists of one large 3-story brick building, in addition to which there is a 1-story frame building. The total floor space, including the frame building, is 400 by 200 feet. The power for the factory is generated by three Crocker-Wheeler generators, operated by two Bruce-Meriam-Abbott gas engines and one steam engine. The ground floor is devoted to rolling, cutting, forming, lead-burning, assembling, etc. On the second floor are located the assembling department and offices; on the third floor are the carpentering and painting departments. The Willard Storage Battery Company will continue in the

manufacture of storage batteries for all purposes; the most important of which are train-lighting, automobile, signal, telephone, stationary, etc.

The Westinghouse Electric & Manufacturing Company, the **Westinghouse Machine Company** and the **Security Investment Company**, all of Pittsburg, on Wednesday found themselves temporarily embarrassed by the pinch in the money market and, while the several concerns are conceded to be solvent and to be doing a large and profitable business, it was thought best to conserve the interest of all concerned by resorting to receivership. For the Security Investment Company (a holding corporation largely owned by George Westinghouse), the Fidelity Title & Trust Company of Pittsburg, was appointed receiver; for the Westinghouse Electric & Manufacturing Company, T. H. Given, H. S. A. Stewart and E. M. Herr were appointed receivers; for the Westinghouse Machine Company, William McConway, W. H. Donner and E. E. Keller were appointed receivers. On Wednesday afternoon Mr. Westinghouse issued the following statement: "When the Pittsburg clearing house committee, after full investigation and conference with me, concluded that, although the Westinghouse Electric & Manufacturing Company and the Westinghouse Machine Company were solvent, receiverships were advisable as the best means of protecting the interests of all concerned, it was clearly our duty to follow its friendly advice. The necessity for the receiverships is due solely to the acute financial stringency and consequent inability to renew our maturing paper. Both the electric company and the machine company are solvent and are doing the largest and most satisfactory business in their history, and each company is earning liberal dividends on its stock and has quick assets substantially equal to its liabilities. I most confidently believe that every creditor of each company will be paid in full, and that with wise management under the direction of the receivers appointed by the court the properties will soon be restored to the stockholders. The loans to the Security Investment Company and myself are secured by the stocks of the Westinghouse manufacturing companies, chiefly stock of the electric and machine companies, the sudden decline in the market value of which on Monday and Tuesday of this week has made it impossible for us to margin our loans. I strongly advise all holders of such loans to hold their collateral, the value of which, I am confident, will in time be sufficient to pay the loans. The sacrifice of the collateral in the present condition of the market can benefit no one. A policy of patience and forbearance is what the situation requires."

ADVERTISING LITERATURE.

Electric Storage Battery Company, Philadelphia, Pa.—The "Chloride Accumulator" for alternating current regulation is made the subject of a folder (Bulletin No. 106) from this company. Bulletin No. 107 treats of the "Chloride Accumulator" as applied to the single-phase system of the Spokane & Inland Railway.

H. W. Johns-Manville Company, 100 William Street, New York.—The causes for the accuracy of Noark fuses are presented in a little booklet, entitled "Fuse Talks."

Ridgway Dynamo & Engine Company, Ridgway, Pa.—A unique conception being distributed is that of sets of templets showing the floor space occupied by this company's standard generating units in sizes from 10 kilowatts to 200 kilowatts, inclusive. The templets are made to a scale of ¼ inch to the foot and will doubtless prove of great value to consulting engineers, architects and others who have occasion to lay out power plants.

Chase-Shawmut Company, Newburyport, Mass.—Catalogue No. 100 illustrates and quotes prices of "Shawmut" inclosed fuses, cut-outs and fittings. This company is also mailing several pieces of advertising literature. One is descriptive of the "Shawmut" pocket test lamp, another is devoted to porcelain cut-outs and two folders have to do with "Shawmut" all-copper ground connection clamps and "Shawmut" extended terminal inclosed fuses.

Walter B. Snow, 170 Summer Street, Boston, Mass.—Under the title of "Productive Publicity," a booklet of facts regarding Mr. Snow's profession of publicity engineer is being distributed among those interested. Attention is called to the fact that this is the day of specialists and that the publicity specialist is as much a necessity as the various kinds of engineering specialists. It is said that the title of publicity engineer properly belongs to an engineer who has devoted himself to publicity as distinguished from an advertising writer who has acquired some knowledge of engineering.

Teredo-Proof Paint Company, 17 Battery Place, New York City.—Catalogue No. 63820, which is descriptive of Kennon's

teredo-proof paint, has recently been issued by the company. Attention is called to this paint as a protection for submerged wood against the attacks of the teredo and Limnoria and for exposed wood against decay from atmospheric changes, being especially adapted for the treatment of dredges, piling, ties, poles, crossarms, etc. A large number of testimonials from companies which have used this paint are given in the back of the pamphlet, showing the efficiency and satisfaction resulting from its application.

General Electric Company, Schenectady, N. Y.—In Bulletin No. 4534, recently issued, Curtis horizontal shaft type steam turbine sets up to 300 kilowatts capacity, both direct current and alternating current, are described. They can be arranged to operate either non-condensing or condensing, those built for condensing service being suitable for non-condensing work in case of necessity. The generators have commutating poles and special commutator construction particularly adapting them to continuous operation with little attention. They are extensively used for exciting alternating-current generators in central power stations. Mercury arc rectifiers is the subject of Bulletin No. 4530. It describes the simplicity and reliability of these devices for producing direct current for charging storage batteries and for many other commercial purposes. A brief outline of the theory of the apparatus is given in the bulletin and various types of rectifying sets are described and illustrated.—The catenary system of line construction described in another bulletin, contains great improvements in mechanical as well as electrical features over ordinary trolley line construction. A radical departure from previous methods was made necessary by the advent of high-tension alternating current distribution for electric railway operation. The catenary system, while providing ample insulation surface for the high potentials used or contemplated, affords the important mechanical improvement necessary with high speeds of modern suburban and interurban operation and steam railroad electrification. Bulletin No. 4538, just issued by the General Electric Company, comprising 32 pages, gives a very complete description of the devices manufactured by it for this class of overhead construction. A great many new designs in frogs, crossings, hangers, etc., have been made necessary and numerous illustrations of separate parts as well as of complete installations are of immediate interest. The system consists essentially of a slack messenger cable, from which the trolley wire is supported by means of special hangers so distributed as to maintain it practically without sag between suspension points. The catenary system offers mechanical advantages of longer pole spacing and straighter trolley wire and a flexibility in the line which avoids the hammer blow of the collector at suspension points and reduces the danger of mechanical breakage.

BROOM MACHINE EXHIBITED AT ATLANTIC CITY.

Brooms for rotary sweepers wear very rapidly and replacement of the reeds by hand is a very tedious job. Sectional brooms as manufactured by the Columbia Machine & Mal-



Broom Machine Exhibit.

leable Iron Company, Brooklyn, N. Y., and exhibited at Atlantic City, can easily be refilled by the use of the machine shown in the accompanying illustration. In this machine the reeds are cut to the desired length, bent to the proper angle and clamped in position. The assembled broom is made up

of four sections, attached to a central shaft. With this machine brooms of any desired diameter can be made and one or more of the sections can easily be replaced or strengthened in much less time than it can be done by hand. As may be noted from the illustration, the broom-making machine formed an important feature of the attractive exhibit of the Columbia Machine & Malleable Iron Company at the Atlantic City conventions.

GENERAL ELECTRIC DISPLAY AT ATLANTIC CITY.

The accompanying illustration is reproduced from a photograph of the very attractive exhibit of the General Electric

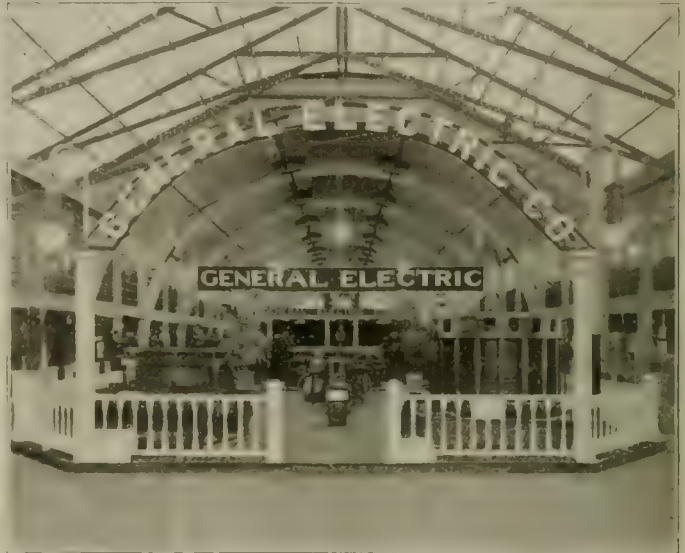
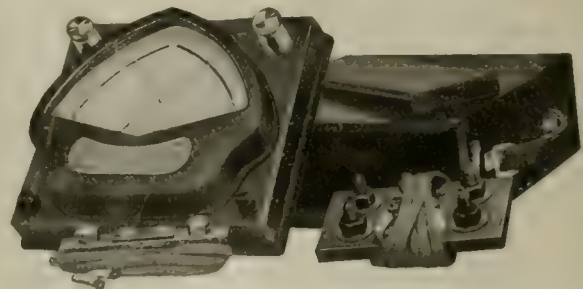


Exhibit of General Electric Company.

Company at the Atlantic City convention. This display occupied one of the largest spaces on the Steel Pier and its location gave ample opportunity for an arrangement of machinery that could easily be inspected by visitors. Among the more important of the products exhibited were the Curtis steam turbine, air brake outfits, commutating-pole railway motors under test, multiple-unit control apparatus, lightning arresters, power circuit arc lamps, catenary overhead materials and general supplies.

THE JOHNS-MANVILLE CATALOGUE.

Catalogue No. 404 of the H. W. Johns-Manville Company, 100 William street, New York, which treats of Victor combination meters, is one of the handsomest pieces of advertising literature ever published by this company. The Victor



The Victor Combination Meter.

meter embodies a new principle in meter construction and fills the requirement for a reliable measuring instrument in connection with any electrical machinery. The booklet describes the various types of Victor meters in an unusually complete manner, and the illustrations, one of which (Type B-1) is reproduced here, are of the very best kind.

Jones & Laughlin Steel Company, Pittsburg, Pa., through its president, B. F. Jones, Jr., advises us that the reports that this company would erect a steel rail mill are not correct. Mr. Jones states that no plans have been prepared and that the story was made out of whole cloth.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 18

CHICAGO, NOVEMBER 2, 1907

WHOLE No. 236

TABLE OF CONTENTS.

Editorial:

George Westinghouse, Genius.....	723
—Attractive Passenger Terminals.....	723
—Tacoma Type Car.....	723
—Keeping Circuit-Breaker Records.....	724
—Owl Car Service.....	724
—Supporting the Piston Rod.....	725
—The Tentative Classification of Operating Expense Accounts.....	725
Annual Reports:	
—Spokane & Inland Empire Railroad.....	726
—Allis-Chalmers Company.....	726
Adjusting Controller Resistances in Boston (Illustrated).....	728
Redondo Power Station of the Pacific Light & Power Company (Illustrated).....	729
Tacoma Type Cars (Illustrated).....	733
The Tentative Classification of Operating Expense Accounts.....	735
New Terminal Building at Hamilton, Ont. (Illustrated).....	736
New Terminal Plans of the Boston & Eastern.....	737
Boston Elevated Station Changes (Illustrated).....	738
Piping and Power Station Systems—LX. By W. L. Morris, M. E. (Illustrated).....	739

Recent Electric Railway Legal Decisions. By J. L. Rosen-

berger, LL. B.	741
The Westinghouse Receivership.....	741
News of the Week:	
—American Railway Association Considers Rail Sections... ..	742
—The Cleveland Situation.....	742
Construction News:	
—Franchises.....	743
—Recent Incorporations.....	743
—Track and Roadway.....	743
—Power Houses and Substations.....	745
Personal Mention.....	746
Financial News:	
—Electric Railway Earnings.....	747
Manufactures and Supplies:	
—Rolling Stock.....	747
—Shops and Buildings.....	747
—Trade Notes.....	748
—Advertising Literature.....	749
Gasoline Motor Inspection Cars (Illustrated).....	749
Sherwin-Williams Company Convention (Illustrated).....	750
Davis Cast-Steel Wheel.....	750

The embarrassment of George Westinghouse is a regrettable development of an extraordinary financial situation. The causes which produced the difficulties are plain. They comprise an expansion founded upon a phenomenal volume of business and an inability, on account of the abnormal condition of the money market, to maintain adequate working capital. In these causes there is no reflection upon character. Of the genius and of the evolutionary importance of the part of Mr. Westinghouse in the world's work there can be no question. He has aided in a strong way in the development of street and interurban railways, and his name can never fairly be separated from the progress in the transportation facilities which they furnish. That the temporary embarrassment will prove to be of even shorter duration than is now generally expected is the hope not only of ourselves, but of the electric railway managers who have availed themselves of the improvements upon which the Westinghouse fame rests.

The attractive terminal station recently erected for the Hamilton Terminal Company, as described and illustrated on another page of this issue, calls attention to the great progress being made in the direction of larger and handsomer buildings as well as in other departments of the service.

Attractive Passenger Terminals.

Added to the great convenience to the public afforded by a well-appointed centrally located terminal station may be the many advantages realized in having buildings of architectural beauty. These features should not be underestimated. Besides the excellent advertisement of a company's progressive methods which is furnished by such a structure, its value as an influence on public opinion in other ways may well be considered. Especially in a small city, where a building such as the one described is an addition to the city's attractiveness, the company erecting it is more likely to be considered in the light of a public benefactor playing an important part in the welfare of the community, instead of merely as the soulless corporation that grabs the people's nickels. There are few communities where the elec-

tric terminal station idea can be carried to such an extent as in the well-known stations at Indianapolis and Los Angeles, but the Hamilton station and the passenger terminal erected last year by the Spokane & Inland Empire Railroad (described in the Electric Railway Review of February 2, 1907, page 148) are excellent examples of what may be done in a medium-sized city having a number of interurban lines.

Temperature and weather conditions influence largely the general design of a car. In the eastern states it is found advisable to operate at different times of the year open and closed cars or a type of convertible car body which affords like service. In Denver and on the Pacific slope the combination open and closed types of car find much favor for city and short suburban runs. Illustrated articles in recent issues of the Electric Railway Review have described several types of cars of the latter design for use at Denver and Los Angeles. Another type, and one which is thought to be unique, is that designed by W. S. Dimmock for the Tacoma Railway & Power Company of Tacoma, Wash., of which Mr. Dimmock is manager. This car includes several features much to be desired by other roads which are withheld from adopting some of them by physical and operating conditions. With reference to the construction of the car body it has a center side entrance with the forward portion of the car closed and the rear portion roofed over but not inclosed except by curtains. The motorman is partitioned off and an entrance afforded by one side of the front platform. Elsewhere in this issue construction drawings are reproduced showing the detail design of these cars. While this type is approached by cars in use in Denver and Los Angeles there are differences in the seating arrangement and the steps. Among the noteworthy features not frequently seen in the east are: The front vestibule door operated by the motorman from his closed compartment, drop seats placed in heretofore unoccupied corners of the car affording about 10 per cent increase in seating capacity, high dash around open rear platform affording a convenient standing place for smokers, arc

Tacoma Type Car.

light illumination, provision for gates at center side entrance, lights under the steps to facilitate loading and unloading at night and other minor details which combine to make a car especially suitable for service in the mild climate of the Puget sound region. The general arrangement and details of this car offer a subject worthy of careful inspection, reflecting as they do the thorough and extended experience of its designer.

The importance of keeping a close watch upon all operating irregularities in a large system is so great that unless records of unusual occurrences are kept by the operating department a systematic study of the working of the system is almost impossible. Among these operating irregularities probably no occurrence is more frequent than the blowing of a feeder circuit-breaker. In the great majority of plants the incident is considered closed as soon as an open breaker has been reset, and unless the open circuit is in a high-tension line little heed is paid to it afterwards. An exception to this easy-going policy is found in the case of a large eastern company which operates nearly a dozen power stations. Whenever a breaker opens on one of the switchboards, a note of the feeder or generator number, time and duration of current cessation, is made by the switchboard operator, and later recorded in a card catalogue in the desk of the chief power operator. Each feeder is provided with a separate card, so that the company has a complete record of the behavior of its overhead and underground lines and cables at all times, and can very quickly run down any unusual tendency to short-circuit or loss in insulation resistance. When known, the causes of interruptions are noted on the cards. It might appear that a switchboard operator would find it difficult to note the numbers and times of open circuits when several occur close together, but experience at the boards makes this an easy matter to remember. Any interruption in excess of 30 seconds and less than 60 is listed as a minute for convenience. Notes are not made until the feeder is in service complete, and the record has proved to be of sufficient value to be regularly submitted to the executive officers of the company.

OWL CAR SERVICE.

In connection with the present general demand on the part of the public for an increase of the transportation facilities furnished by street railways several cities have recently begun agitation for the purpose of inducing the companies to establish all-night or "owl car" service. One of the latest of these is Des Moines, Ia., a city of 62,139 population, according to the 1900 census. An ordinance has recently been introduced into the city council to require the Des Moines City Railway Company to operate owl cars hourly on six of its lines from 1 to 5 a. m. The officials of the company have opposed the ordinance on the ground that the night traffic of the city was not sufficient in its promise of increased revenue to justify the expense of owl cars. In order to support its contention the company addressed communications to various street railway companies in different cities asking for information with regard to their night service. Replies were received from 28 companies. The information thus secured was then put into tabular form and submitted to the newspapers of the city with a letter from J. S. Polk, president of the Des Moines City Railway, stating that a careful analysis of the figures presented would show that owl car service, especially in a city of the size of Des Moines, where six tickets are sold for a quarter, is not profitable.

Of the 28 cities from which replies were received 15 have an owl car service. Six of these report that the service pays expenses, as follows: The company operating in Davenport, Ia., population 35,254 (1900 census), Rock Island, Ill., 23,009,

and Moline, Ill., 20,478, reports that one of its cars pays, while two do not. In Louisville, Ky., 204,731, seven cars are operated, without conductors, the average receipts per car per night being \$3.00. In Denver, Colo., 133,879, six cars are operated on six lines out of 25, the average receipts per car being \$12. In Boston, 560,892, on the elevated line 40 cars are operated. In Richmond, Va., 85,050, two cars are operated. In Clinton, Ia., 22,768, one car is operated, with an average of 120 passengers from 12 p. m. to 5:30 a. m.

Seven cities reported that the owl service is operated at a loss: Kansas City, Mo., population 163,752, 20 cars, average receipts per car per night, \$4.25; Minneapolis, Minn., 202,718, 35 cars, receipts per car, \$2.25; St. Paul, Minn., 163,065, 35 cars, average receipts per car, \$2.25; Detroit, Mich., 285,704, 17 cars; Boston, Mass., 560,892, surface line, four cars, average 125 passengers per car; Atlanta, Ga., 89,872, one car; Camden, N. J., 75,935, three cars.

In all of the 15 cities a straight 5-cent fare is charged during the day, except in Richmond, Va., where six tickets are sold for 25 cents. In two cases, Camden, N. J., and Atlanta, Ga., 10 cents is charged for a night fare, and both companies report a loss on the night cars.

Only two companies operating in cities of the size of Des Moines or less, according to 1900 figures, operate owl cars, the Clinton (Ia.) Street Railway, in a city of 22,768 population, and the Tri-City Railway, operating in Rock Island and Moline, Ill., and Davenport, Ia. The latter company runs three owl cars, two of which do not pay and one, running between Rock Island and Moline, where the shops of the Chicago Rock Island & Pacific Railway are located, which pays. In Davenport, Rock Island, Moline, Denver, Boston, Richmond and Clinton power and light are furnished all night. Nine cities, with a population considerably greater than that of Des Moines, have no owl service.

The inevitable conclusion to be drawn from these figures is that a street railway company operating in a city of 60,000 can hardly expect to derive a profit from the operation of cars after midnight. But is the question of immediate profit on this particular form of service the all-important one to be considered? Many cars operated in the middle of the day, or on lines through sparsely settled districts, do not pay; many cars operated in high-speed limited service do not pay; United States mail service on electric roads often is operated at a loss; but who will say that they are not a profitable investment in the long run? In nearly every business there are certain branches that do not pay, but are necessary to the conduct of the business. Every merchant handles certain lines of goods at prices below the cost of manufacture and reaps his reward from their advertising qualities, because they attract other and more profitable business. Public utility corporations especially, in discharging their duties to the public and in return for the franchises granted them, must necessarily perform many services that are not in themselves profitable, but which are essential to good service and are counterbalanced by the increased profits at the time of peak load. The fat must be taken with the lean.

Owl cars are necessary to a large city and may play an important part in the development of a smaller one, which always redounds to the benefit of the street railway company. They develop the suburbs, which always means increased business for the company. Without a night service people are likely to maintain their residences near the business districts, where they use the cars less; or if they do live farther out from the city they will travel less in the evening.

The Cleveland Electric Railway Company, in its publication, "The Trolley," hits the nail on the head in the following expression: "We don't stop running cars when the clock strikes 12 just because it costs more money to run them all night. If we did we would not be giving good service, and owl cars are a necessary part of that kind of service."

Undoubtedly in small cities the companies should be al-

lowed to collect an extra fare for owl car service. At any rate, it is worth while to consider whether a liberal policy on the part of the company will not be justified and a present loss be compensated for by the prospect of future increased earnings.

SUPPORTING THE PISTON ROD.

In European stationary engineering practice tail rods are fitted to all large horizontal engines and in many cases to vertical engines. To American engineers this practice may be considered as one of the usual cumbersome appendages found in many European designs. It is, therefore, interesting to note that tail rods have been fitted to the 8,000-horsepower engines installed in the Pacific Light & Power Company's plant described elsewhere in this issue.

Tail rods are valuable if fitted with slippers of proper dimensions, guided by a sufficiently rigid support, especially when the piston speed is as high as in the engines under discussion. It certainly is more logical to support the weight of the piston and piston rods on guides outside the cylinder where they can be properly inspected, adequately oiled and easily adjusted, than to permit the weight of the piston and piston rod to be carried by the bull rings and piston rings.

In large horizontal engines running at high piston speeds it not infrequently is found that the bottom of the cylinder is worn $\frac{1}{8}$ inch and in some cases $\frac{3}{4}$ inch out of round, requiring frequent reboring in the efforts to maintain a fairly steam-tight piston.

In the present instance the use of 100 degrees superheat makes the use of tail rods extremely desirable, because under these conditions cylinder lubrication is not so easily maintained as with saturated steam. The subject of superheated steam has led to the investigation of engine efficiencies and the effect of superheated steam in the engine cylinder; and it has been pointed out by some of the most careful and competent investigators that the reduction of valve and piston leakage no doubt plays an important part in producing the economy attained by the use of superheated steam.

There have been too few tests made to determine the piston leakage in large horizontal engines after they have been in operation for a year or two years; and no doubt, were accurate tests made to determine this leakage, it would be found that unequal wear in large horizontal engines causes the steam leakage to increase far beyond what ordinarily would be supposed.

In designing an engine with tail rods there are certain points which must be carefully considered and great care and accuracy must be obtained in the manufacture of an engine or the tail rods will be of little or no value. It is probably for this reason that the use of tail rods has been abandoned in America. As formerly made, they failed to serve the purpose for which they were intended. It is evident that a piston weighing a ton or two tons mounted at the middle of an end-supported piston rod 12 to 14 feet long will cause considerable deflection. If the rod were perfectly straight without its load and were supported at its ends by the crosshead and slipper block, the weight of the piston would bring about sufficient deflection, so that practically all of the weight of the piston would be carried by the cylinder walls and only a very small portion by the crosshead and slipper.

This difficulty can be obviated by cambering the piston rod such an amount that it will be exactly straight when supported at its ends with the piston mounted at the center of its length, thus distributing the load equally between the crosshead and slipper block and relieving the cylinder from the weight of the piston.

As the weight of the piston when thus supported does not come on the cylinder the piston can be made of a lighter construction and the piston rings can be properly designed for securing a steam-tight fit, rather than with the object of

supporting the weight of the piston. The face of the piston need not be so wide, consequently the cylinders can be made shorter, reducing the cylinder surface condensation and permitting a better balance of the reciprocating parts being obtained. Furthermore, the use of tail rods prevents the springing of the piston rod due to the friction of the piston on the bottom of the cylinder and materially avoids springing the piston rod should water enter the cylinders.

THE TENTATIVE CLASSIFICATION OF OPERATING EXPENSE ACCOUNTS.

In our issue of October 5, 1907, we published in parallel columns the classifications of operating expense accounts of the interstate commerce commission, the Ohio Electric Railway of Cincinnati, O., and the last recommended form of the American Street and Interurban Railway Accountants' Association.

We present in this issue the tentative classification presented by the committee on "Standard Classification of Accounts and Form of Report" of the Accountants' association before the annual meeting at Atlantic City last month. At that meeting some amendments were recommended and the classification was referred to the committee for final revision with full power to act.

It is understood that a further revision will be made before a classification is finally recommended for use. It is impossible at this time to determine what changes will be made by the committee eventually. The effort of the committee is to work in harmony with the several state boards of railway commissioners and with the interstate commerce commission in the hope that the classification as finally promulgated will be acceptable to all interests.

In the classification as recommended by the committee there were 51 primary accounts and the number was reduced to 50 by the combination of two accounts into one by the association. In the old classification recommended by the association there were 38 primary accounts. It will be observed that the new classification provides for a subdivision for "Traffic Expenses," following the form prescribed by the interstate commerce commission for steam railways. By comparing the committee report with the last classification approved by the Accountants' association, it will be noted under the heading of "Maintenance: Way and Structures," that while there are in the new form, as in the old, three primary accounts, under the subheading "Track and Roadway," or "Roadway and Track," as suggested by the association, 11 subaccounts appear; and that under "Electric Line" there are five subaccounts, while under "Buildings, Fixtures and Grounds" eight subaccounts are shown. No subaccounts appeared under the primary accounts in the old classification.

Under "Maintenance of Equipment" in the new classification, provision is made for substation equipment, and there is a subdivision between the classes of cars used for different purposes. Under "Transportation: Operation of Cars," provision is made for the operation of signal and interlocking systems, telephone and telegraph systems and for other expenditures which may be made by interurban railways.

Rapid progress is reported on the work of grading the line of the Twin City & Lake Superior Railway from Minneapolis, Minn., to Superior, Wis., which has been completed as far as Sunrise on the west bank of the St. Croix river. A 15-foot fill has been made at this point and it is stated that rails will be laid at once for the hauling of the steel for the new 3-span bridge over the St. Croix. The line will be double track when completed and will greatly relieve the congested freight conditions of this section. The offices of the company are in the Railway building, Minneapolis.

ANNUAL REPORTS.

Spokane & Inland Empire Railroad, Spokane, Wash.

The first annual report of the Spokane & Inland Empire Railroad Company of Spokane, Wash., has been filed with the Washington railroad commission. It shows that on September 24, 1906, the Spokane & Inland division began the operation of 34 miles of track. This mileage was increased as follows: On February 1, 1907, 11.8 miles; on April 5, 24.8 miles; on June 1, 47.6 miles; and the Coeur d'Alene & Spokane division began on July 19, 1907, the operation of an extension to Hayden Lake, Idaho, 8.2 miles. The company operates now 123½ miles of track aside from its lines in Spokane.

The company has \$20,000,000 capital stock, of which one-half is preferred. On the preferred stock a 2½ per cent dividend was declared during the year. The report shows that 330 shares of preferred and 165 shares of common stock were issued to Sanderson & Porter as part payment of their fee as designing and constructing engineers for the electric power plant; to the Westinghouse Electric & Manufacturing Company, 1,000 shares of preferred and 500 shares of common were issued as payment on contract for machinery and supplies; to J. P. Graves, F. Lewis Clark and F. A. Blackwell, 2,000 shares of common stock were issued in lieu of salary during the construction period. Other stock was issued as follows: For acquiring stock of the Spokane Traction Company, 18,619 common and 1,020 preferred; for stock of the Spokane & Inland Railway, 56,997 common and 6,749 preferred; for stock of the Coeur d'Alene & Spokane Railway Company, Ltd., 1,557 common and 1,444 preferred. The stock of the Spokane Terminal Company was owned jointly by these three companies.

Gross earnings of the entire line for the year ended June 30, 1907, were \$478,784. Operating expenses were \$259,604, leaving a net income from operation of \$219,180. To this was added \$189,264, derived as follows: Net income from the city traction lines, \$37,864; interest received from funds loaned, \$146,687; rent of buildings, \$4,653; interest on Spokane Country Club bonds, \$60. This made a total net income from all sources of \$408,444. From this the company paid \$7,500 in taxes, a dividend aggregating \$91,940 and interest on funded debt of \$146,993, leaving a surplus for the year of \$162,011.

The operating expenses of the entire line include \$29,461 for maintenance of way and structures, \$19,959 for maintenance of equipment, \$176,101 for conducting transportation, and \$34,083 for general expenses. The total operating expenses were 54.22 per cent of gross earnings.

The company reports the following contracts with other companies:

With the United States government for the transportation of mails, at \$2,747 per annum.

With the Spokane International Railway for the interchange of freight, agreement dated April 14, 1905; on lumber, this company receives 3 cents per 100 pounds; on other freights, rates are divided on a mileage basis, with a minimum of 25 cents for one shipment.

With the Great Northern Railway for interchange of freight, agreement dated May 9, 1907, division on a mileage basis, with a minimum of 25 cents.

Agreement with the Coeur d'Alene & St. Joe Transportation Company for interchange of passengers and freight, the company receiving the local rate.

The entire line employs 182 men, at an average compensation of \$3.01 a day. The road carried a total of 672,412 passengers, receiving a revenue from this traffic of \$274,781, or a little more than an average of 40.5 cents per passenger, or about 18.5 mills per passenger-mile. The road also hauled 194,583 tons of freight, receiving as revenue \$144,252, an average of about 72.6 cents a ton, or less than 2½ cents a ton-mile.

The company added seven locomotives during the year and now has 12 in service; it added 22 cars to the passenger service, making 50 in use. Seventy-four box cars and 40 flat

cars were also added, making a total of 318 cars in the freight service. The total number of cars owned by the company is 395. There were used during the year 2,002.3 tons of bituminous coal in the freight locomotives, an average of 85 pounds per mile run. An average of \$6.00 a ton was paid for the fuel.

The report shows that during the year four employes were killed and 10 injured, while four passengers were injured and two other persons were killed and three injured.

The company paid \$3,418.85 to other roads for the use of freight cars. An interesting feature is the statement covering the physical characteristics of the portion of the road in Washington. This shows that on 102 miles of track there are 280 curves, 50 ascending and 36 descending grades, and about 66 miles of perfectly straight track and 21 miles of level track.

Allis-Chalmers Company.

Among the large industrial corporations of the country which the recent financial crisis has not affected adversely, Allis-Chalmers Company of Milwaukee, Wis., is especially prominent for the reason that its name has previously been coupled with various sinister rumors circulated largely for speculative effect. That this company now stands unmoved, notwithstanding the enormous amount of orders being executed in its shops and the necessity for large working capital which such a condition of prosperity inevitably entails, is to be attributed to the foresight of its present management, which, perceiving the trend of events, evidently made provision far enough in advance to effectually safeguard the interests of the company.

At the annual meeting of stockholders in Jersey City, N. J., on October 24, the policy of President W. H. Whiteside was indorsed, and the present strong position of the company, with reference to work actually completed or for which orders are in hand and from the standpoint of close alliances with many of the most powerful financial interests on this side of the Atlantic ocean, was brought out.

Among the members of the board of directors now are Elbert H. Gary, chairman of the board of directors, United States Steel Corporation, who is also chairman of the board of directors of Allis-Chalmers Company; Charles MacVeagh, general counsel of the United States Steel Corporation; and Edmund C. Converse and Alexander F. Banks, directors of that corporation, and also prominent in financial institutions of New York and Chicago; Cornelius Vanderbilt; William V. Kelley, president of the American Steel Foundries; Herman Falk, president of the Falk Company, Milwaukee; Edward D. Adams and William A. Read, New York capitalists; George Bullock and Joseph Neave, who control important business interests in New York and Cincinnati; Mark T. Cox, who has long been identified as a banker with leading industrial and railroad properties of the central and New England states; Max Pam of Chicago; Charles Allis of Milwaukee; and Lahman F. Bower and Henry Woodland, vice-presidents of the company, who, with President Whiteside, also a director, represent the company's home interests.

The directors unanimously re-elected Mr. Whiteside president, thus insuring a continuation of the businesslike policy which has characterized the operations of the company since he became its executive head. In the future, President Whiteside, with Chairman Gary, will be in full charge of the affairs of the company, and its business will be continued along lines already laid down by them.

Reports presented at the meeting show that the net profits in April were more than \$37,000; in May, \$69,000; and in June, \$93,000, with a total during the quarter ended June 30 of more than \$200,000. The net profits were \$81,000 in July, \$101,000 in August and \$106,000 in September. It is thus shown that the net profits for the half year were nearly \$500,000. The orders on the books of the company aggregate more than \$15,000,000 and business continues good.

The figures presented show steady and substantial improvement since April 1, 1907, when the company first began to receive the benefits from the newly developed lines of machinery built in its enlarged West Allis plant, provided therefor. The net earnings in excess of all expenses and charges for the six months ended September 30 were \$489,268. The quarterly reports are as follows:

Quarter Ended June 30, 1907.

	April.	May.	June.	Total.
Gross profit	\$228,660	\$268,893	\$282,724	\$780,277
General and selling expenses, interest on bonds, etc.	191,261	199,475	189,183	579,919
Net profit	\$ 37,399	\$ 69,418	\$ 93,541	\$200,358

Quarter Ended September 30, 1907.

	July.	August.	September.	Total.
Gross profit	\$270,451	\$289,745	\$292,640	\$852,836
General and selling expenses, interest on bonds, etc.	189,449	188,045	186,432	563,926
Net profit	\$ 81,002	\$101,700	\$106,208	\$288,910

From the foregoing it will be seen that the monthly net profit has nearly tripled in the short space of six months, notwithstanding the fact that conditions during the past year have been generally unfavorable, due to a combination of circumstances beyond the control of the company, including the general strike of molders throughout the country; the failure of contractors to complete buildings on time; the delayed delivery of equipment for the new shops; and the large expense contingent upon the organization of the new plant and the necessary development of new lines of manufacture. The management, however, has effected such improvements in methods that with a large increase in the number of workmen, being more than 38 per cent for the year, the rate of production per employe per annum is now over \$2,000.

Beginning with the last quarter of the fiscal year ended June 30, 1907, most of the adverse conditions were overcome and the company entered upon an era of increasing net earnings. This important result, with the development and growth of the company, its eminent position in many lines and the large volume of orders on hand, aggregating over \$15,478,000 on June 30, 1907, is evidence of future prosperity.

An abstract of President Whiteside's statement to stockholders in the annual report follows:

During the past year much attention has been devoted to systematizing the work of the engineering department; improving and simplifying standard designs, thereby reducing cost of production and installation without impairing efficiency or sacrificing quality; perfecting new designs; and at the same time effecting economies and that close co-operation with the other departments so necessary to a proper conduct of the business.

Development work in our several new lines of machinery, namely, gas engines, hydraulic turbines, steam turbines, turbo-generators, induction motors, transformers, etc., has been carried to practical completion, and has been extraordinarily large because of the wide range in the standard sizes and types adopted. The uniformly successful results that have been attained in practical operation, and demonstrated by various tests, are gratifying in the extreme, and it may be safely stated that the accomplishments of the past year mark an important step in advancing the engineering reputation of our company and strengthening its position in the trade.

In order to protect our new and important designs in machinery and auxiliary devices, numerous applications have been made for letters patent covering many novel yet valuable features. A larger number of patents has been issued to the company, and healthy activity in this direction is manifest throughout the entire engineering organization.

The past year has been marked by a very considerable increase in the sale of the products of the electrical and steam turbine departments, in connection with the sale of our other products to regular as well as to many new customers. Thus we have introduced our electrical apparatus and steam turbines where other types were used exclusively.

Steam Turbines.—Probably the most important work which has been brought to a commercial consummation has been the development of our steam turbine units, the unique

features of which are fully protected by various patents owned by the company. In 1903 we designed and built our first turbo-generator, and its detail has required no material change—a strong testimony to the scientific accuracy of the principles first adopted. It is asserted with confidence that our turbo-generators are the best designed and most efficient machines on the American market. Sizes ranging from 500 to 7,500 kilowatts have been completed and tested, and the success of these units under actual operating conditions is thoroughly established. Notwithstanding our recent advent into this field our sales of steam turbines have already reached nearly 100,000 kilowatts normal capacity, and, compared with the previous year, show in orders booked an increase of \$800,000.

Gas Engines.—In this important branch of our business substantial progress has been made. Each of our standard sizes has been designed, constructed and installed during the year, and our first gas engines are in successful operation. Orders to August 1, 1907, for the horizontal, twin-tandem and double-acting type of gas engines, ranging in capacity from 500 to 5,000 horsepower, aggregate 189,350 horsepower. One of our notable contracts covers the electrification of a steel plant requiring gas engine electrical units of an aggregate capacity approximating 60,000 horsepower. This order is believed to be the forerunner of a great many others of similar character, because of the great saving effected by this means in the utilization of gases produced in the manufacture of steel and hitherto wasted. Another important contract, which has been awarded us by an electric railway company, is for traction purposes the largest installation in America of electrical units driven by gas engines to operate on producer gas. The equipment comprises three horizontal, twin-tandem gas engines of 1,500 horsepower each, direct connected to 1,000-kilowatt, three-phase, 25-cycle alternators of our manufacture, and includes all substation apparatus.

Hydraulic Turbines.—Although we have but recently undertaken the manufacture of hydraulic turbines, we installed and placed in operation during the year 10 complete hydro-electric plants, having a combined output of 105,000 horsepower, and it is gratifying to report duplicate orders from the largest companies interested in these plants. Particular reference is made to the highly satisfactory performance of a 32,000-horsepower installation furnished one of the largest water power developments in the south, for which we have recently contracted to supply six additional units of identical design.

Air Brakes.—This department was organized about July 1, 1906, to exploit the sale of air brake equipments, pursuant to an arrangement made with N. A. Christensen, inventor, whereby your company possesses the exclusive patent rights to manufacture and sell the "Christensen" air brakes to urban and interurban electric railways. The "Christensen" brake has been extensively used for years, and its merits are widely recognized. A reasonable degree of success has already rewarded our efforts to establish ourselves in this line of business.

Electrical Apparatus.—During the past year we have completed the development and manufacture of large alternating-current and direct-current generators, rotary converters, induction and direct-current motors in all sizes and capacities, transformers for both power and lighting service, street railway motor equipments and electric hoists, all of which are in successful operation.

Steam Engines.—It is worthy of note that notwithstanding the large inroads made by the steam turbine and gas engine, our Corliss engine business continues in steady volume, particularly for the medium and smaller sizes.

Foreign Department.—Foreign orders booked show an increase of 45 per cent over the previous fiscal period. Arrangements have been concluded during the past year for a more systematic and energetic exploitation of our products in foreign countries, particularly Japan, China and South America. Great credit is due our engineering and manufacturing departments for their hearty co-operation and successful work, which has been faithfully performed under unusual and very trying circumstances. I desire also to express, with high commendation, my appreciation of the loyal and efficient services of all department and district managers and salesmen.

Following the established practice of the company, all expenditures during the year for repairs to and replacement of standard patterns, also for the general up-keep of the plants, amounting to \$854,503, together with \$253,987 for depreciation of property, a total of \$1,108,490, have been deducted in arriving at the net manufacturing profits. In addition to this substantial sum the company has also reserved in the accounts and charged against the operations during the year \$73,000 for bad and doubtful accounts, etc. Losses for the

year on account of bad debts amount to about one-twentieth of 1 per cent.

The most important transactions of the year reflected in the balance sheet relate to the bond issue. Of the \$15,000,000 bonds authorized, \$12,854,000 have been issued, \$854,000 of which were to reimburse the company for expenses incurred for additions to the West Allis extensions, being a part of the \$3,000,000 of bonds reserved for specific purposes. Of the \$12,854,000 bonds issued, \$2,398,000 are treasury bonds, leaving a net amount of \$10,456,000 taken by stockholders and the underwriting syndicate. The stockholders' subscriptions had been fully paid at the close of the fiscal year, but there were still outstanding on June 30 the last two instalments due from the syndicate, both of which have since been paid, thus fully discharging the obligations of the syndicate to the company.

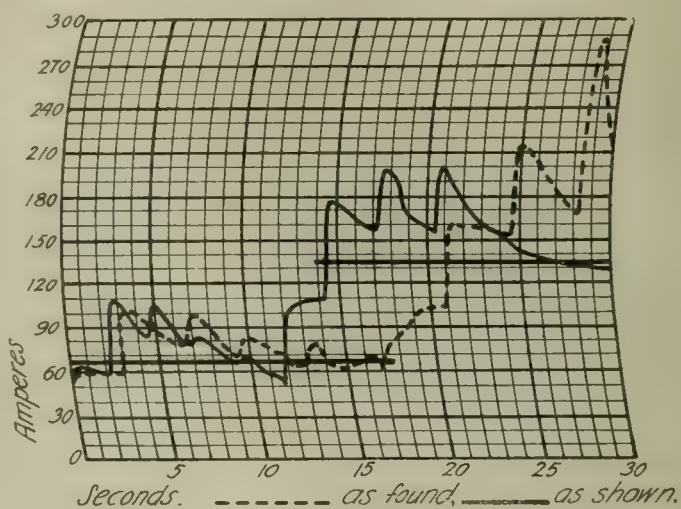
ADJUSTING CONTROLLER RESISTANCES IN BOSTON.

John W. Corning, electrical engineer Boston Elevated Railway, has carried on interesting work in connection with the adjustment of control resistances on some of the older surface cars in Boston. During the discussion of the subject of control before the Engineering association at Atlantic City Mr. Corning outlined the results that had been accomplished in Boston by a careful adjustment of the steps on accelerating rheostats. Through his courtesy we are able at this time to illustrate these results and describe the work in detail.

On one of the company's lines were operated some 25-foot box cars equipped with two GE-58 motors and K-10 controllers. The gear ratio of the motors was 3.42 and this equipment operated over some very steep grades. Trouble was experienced on this line and with this equipment, making itself known by motor flashing, fuse blowing and short-circuits in the controllers. It was also noted by the officials that there

stances the dotted line shows the amperes taken by the motors when the controller handle was advanced at the rate of one notch each four seconds and with the resistance connections as found on the car. Another illustration shows a diagram of the resistance grids with the original connections taken off at the points indicated by having circles drawn around them.

It will be noted from the current curve indicated by the dotted line that in some instances a very bad setting of the resistance connections was found, which resulted in high current peaks in the parallel steps during acceleration. After several trials and readjustments of the resistance steps a set of connections was found which gave very different re-



Adjusting Controller Resistances—Section of Chart from Curve Drawing Ammeter, Showing Curve Peaks with Resistance Taps as Found and as Adjusted.

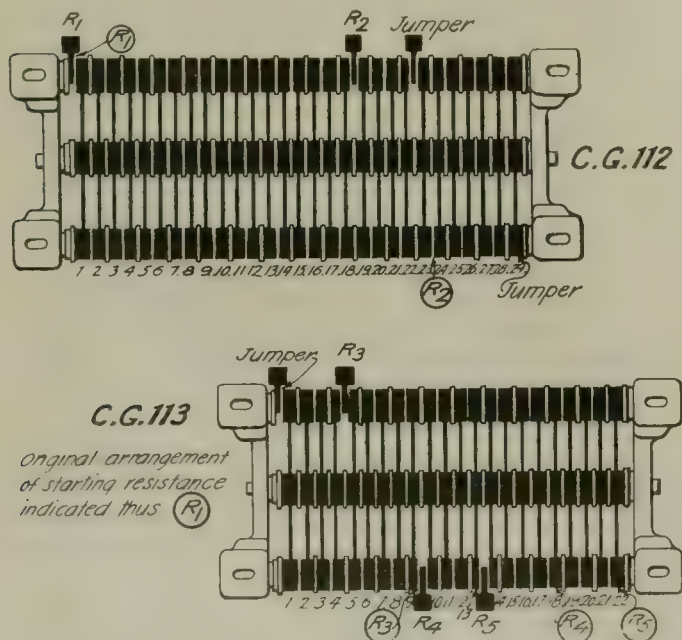
sults. The accelerating current required with the best arrangement of resistance taps was found. This is also indicated in the current diagram by a full line and the resistance connections for the curve are shown in the illustration of the grids.

The resistance offered by the grids, with the connections as originally found and as finally adjusted are indicated in the following table:

	Before.	After.
R1-R2.....	3.93	3.085
R2-R3.....	1.78	1.020
R3-R4.....	0.75	0.418
R4-R5.....	0.33	0.334
Total ohms	6.79	4.857

It should be noted in connection with these two curves that for the current consumption indicated by the full line with the resistance taps as finally placed the controller handle, through an oversight, was advanced at the rate of three seconds per notch instead of four. Had the same time been given for acceleration on each notch as was given when the curve indicated by the dotted line was taken, the current peaks would have been even flatter and therefore the contrast greater. It will be seen that the current peaks during acceleration on this grade of 5 per cent were reduced by the adjustment of the resistance steps from 285 amperes to between 180 and 200 amperes and through this change the motor flashing, fuse blowing and controller troubles practically have been eliminated.

An interesting point in this connection is that the motor-men, before the adjustment was made, in order to avoid blowing the fuse, would run their cars with the controller on the next to the last resistance point until they had gained sufficient headway to safely pass to the last point. This resulted in numerous cases of burned-out resistance boxes.



Adjusting Controller Resistances—Plan Views of Resistance Grids, Showing Standard Connections for C. G. Starting Resistance on 25-Foot Box Cars, with Taps Indicated as Originally Found and as Adjusted After Tests.

were cases of very uneven acceleration and for these reasons a thorough investigation was considered advisable.

One of the equipments of the type just mentioned was chosen for testing purposes. Current readings were taken during acceleration and the amperage continuously recorded by means of a General Electric recording ammeter, the observations being made on a 5 per cent grade. In the accompanying reproduction of curves made under these circum-

REDONDO POWER STATION OF THE PACIFIC LIGHT & POWER COMPANY.

There is nearing completion at Redondo, Cal., a large steam generating power station which will be used by the Pacific Light & Power Company, Los Angeles, to supplement its transmission network now largely fed by water power stations. This plant is of unusual interest not only because of its size but also because of the many unique features which it presents and the skill which has been shown throughout in the thoroughness of its design. Edward S. Cobb, Los Angeles, Cal., has acted as consulting engineer for the Pacific Light & Power Company and the construction of the generating station has been done by C. C. Moore & Co., San Francisco, Cal.

Station Building.

The station building is constructed entirely of reinforced concrete. It is built in two bays, one containing the engines,

By reference to the sectional elevation it will be noted that the difference in elevation between the two sections of the station is such that the tops of the boilers are on a level with the engine room floor. The boilers are arranged in three rows at right angles to the engine room. Two of the rows face each other, forming one of the firing aisles, and the other firing aisle is between the wall and the last row of boilers. This makes a very convenient arrangement.

Boilers and Piping.

The piping system has been designed with a view to keeping this necessarily complicated part of the plant as simple as possible and yet reduce to a minimum the number of units that might be disabled in case of a break in a steam line. The expansion and contraction of piping has been provided for by the use of large radius bends wherever practicable, and great care has been exercised in properly supporting and anchoring the piping to avoid creeping and the



Redondo Power Station—General View of Station When Nearing Completion.

generators and auxiliaries and the other the boilers, feed pumps, heaters, etc. The electric control apparatus and switchboards will be housed in a separate compartment above the roof of the boiler house and extending into the engine room. Particular attention is called to the general arrangement of the concrete structure, as shown in the illustrations presented herewith.

The engine room is served by a 50-ton motor-operated Niles electric crane. The girders for the crane runway are made of reinforced concrete, the span of the shortest girder being 7 feet and that of the longest 24 feet 6 inches. Though these were designed with an ample factor of safety, it has been estimated by the engineers that the reinforced concrete construction cost \$75 less per span than equivalent steel girders.

The general arrangement of the machinery is based on the unit system, thus reducing materially the possibility of shut-downs.

serious strains resulting therefrom. It will be noted that regardless of where a break in steam piping should occur, the greatest number of boilers which would be put out of commission would be three. The steam supply to the engines would not, however, be seriously affected, as a complete system of equalizer pipes connects the main steam lines from the batteries of boilers to the engines which they normally supply.

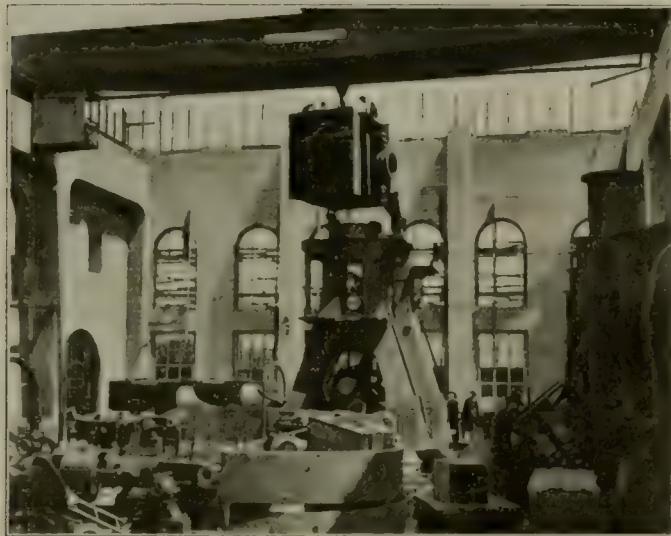
There are installed 18 Babcock & Wilcox horizontal water tube boilers, arranged in nine batteries of two each. Each boiler has a water heating surface of 6,042 square feet and is rated at 550 horsepower. The boilers are fitted with Babcock & Wilcox superheaters of a capacity sufficiently great to heat all the steam generated 100 degrees F.

The boilers will be fired with oil fuel to be stored in the two steel oil tanks, 95 feet in diameter and 35 feet high, and two concrete tanks 31 feet in diameter and 9 feet high. Oil will be pumped from these fuel oil tanks by Snow duplex oil

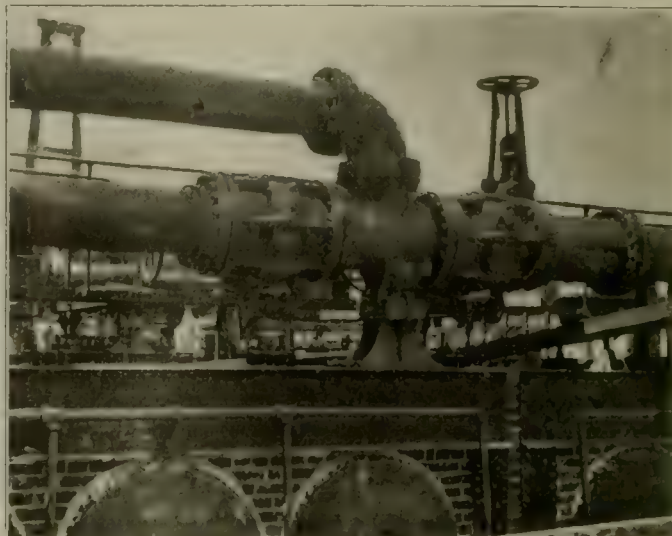
pumps and passed through Goubert fuel oil heaters before it is supplied to the burners. The products of combustion from the boilers will be discharged into two reinforced concrete stacks, 13 feet in internal diameter and 125 feet high. The

mately 180 degrees apart, thus giving eight impulses to the shaft during each revolution.

The cylinders are 34 and 70 inches with a common stroke of 56 inches. When running at 100 revolutions per minute,



Redondo Power Station—Placing Low-Pressure Cylinder During Erection.



Redondo Power Station—Detail of Main Steam Piping Supported on Boiler Walls.

arrangement of the boilers and the position of the stacks is such that the breechings are short and simple.

The McIntosh & Seymour double, combined horizontal and vertical compound condensing engines, known as the Manhattan type, were selected. The connecting rods of the high

with steam at 175 pounds pressure and 100 degrees superheat, they will develop 5,900 indicated horsepower at 0.23 cut-off; 8,800 indicated horsepower at 0.5 cut-off; and a maximum cut-off at 0.7 stroke.

The steam line to each high-pressure cylinder is 14 inches



Redondo Power Station—View from Above Boiler House During Construction, Showing Arrangement of Main Steam Piping.

and low pressure cylinders of each half of these complete units act on the same crankpin, giving the same torque as though the cylinders were parallel and the cranks quartered. The cranks on opposite ends of the shaft are placed approxi-

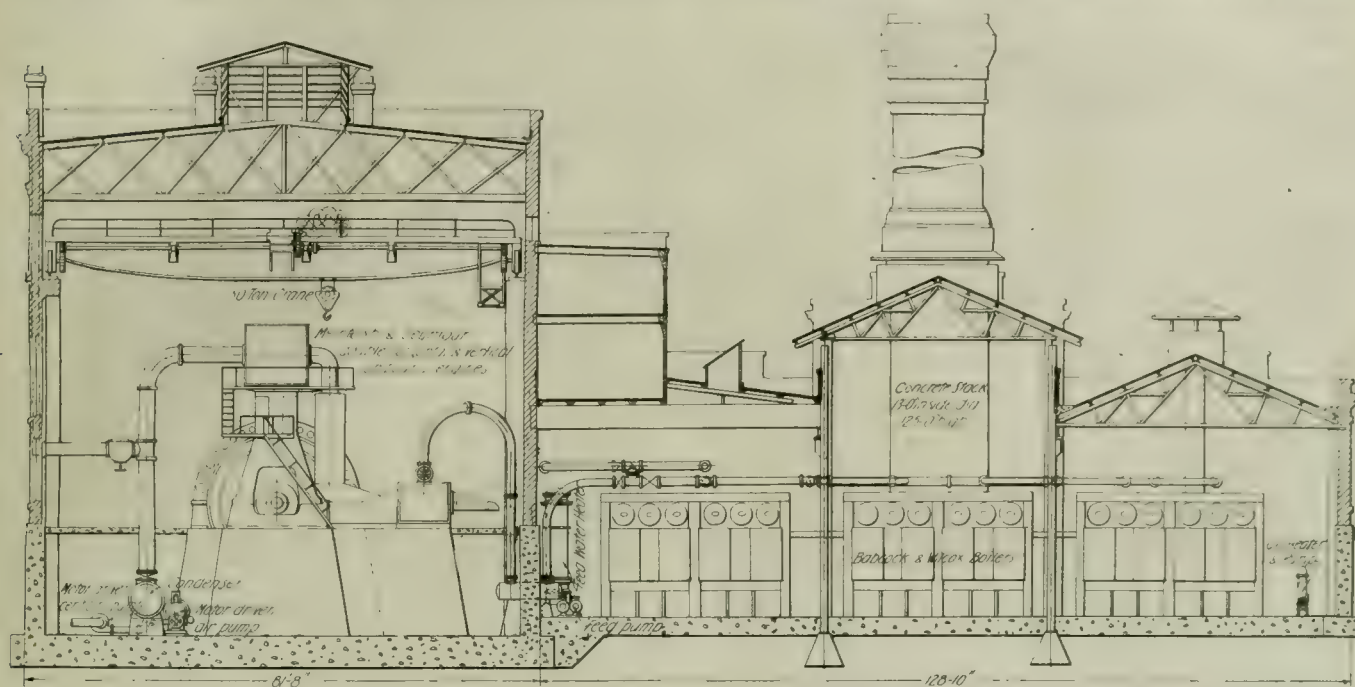
in diameter and the exhaust of each low-pressure cylinder to its independent condenser is 30 inches in diameter. The total weight of the engines has been estimated to be approximately 830,000 pounds each. These engines are fitted with the stand-

ard McIntosh & Seymour gridiron valves, the inlet valves being equipped with a riding cut-off.

In accordance with the engine builders' standard practice, tail rods and slippers have been fitted to the high-pressure

it would be possible to operate the engine under approximately half load.

On the center of the crank shaft of each unit is mounted a General Electric revolving field alternator of 5,000 kilowatts



Redondo Power Station—Sectional Elevation Through Engine Room and Boiler House.

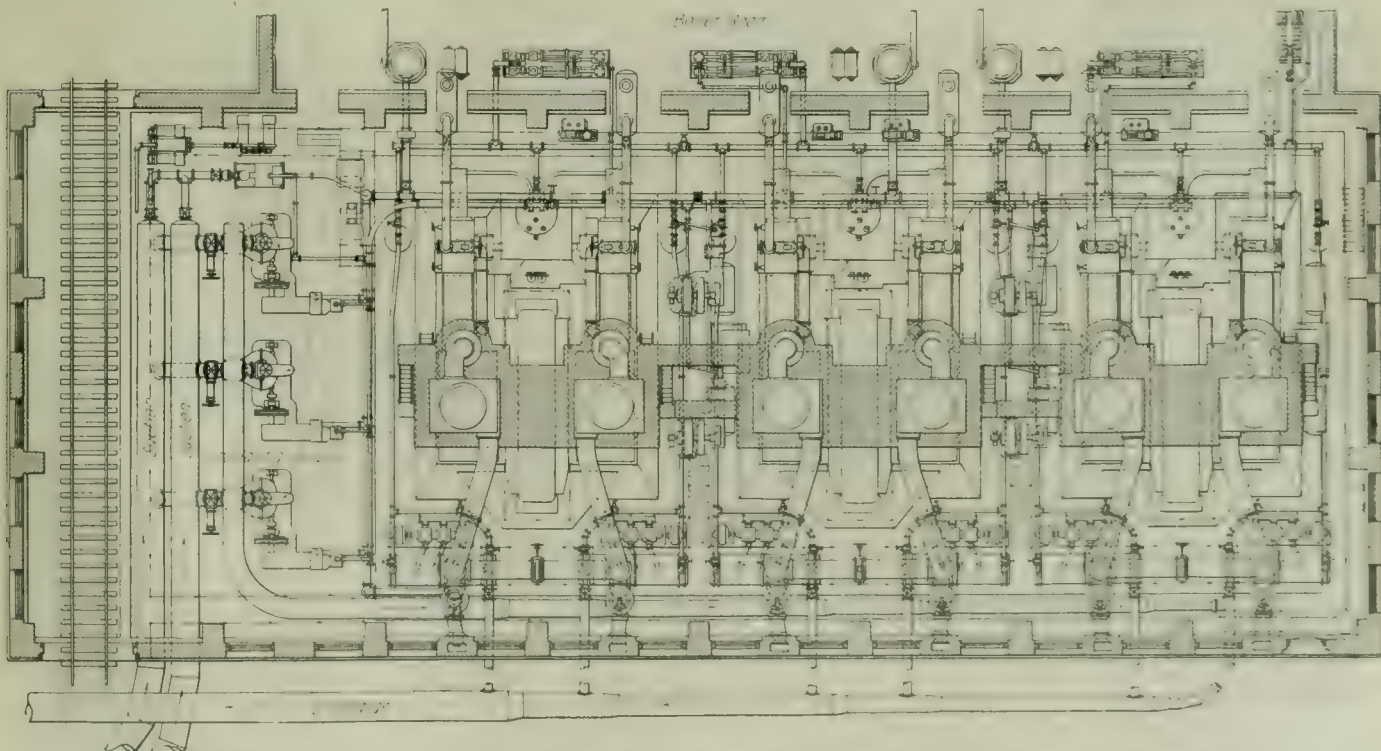
cylinders. This is a very commendable practice in such large engines running at a piston speed of over 930 feet per minute.

Steam is supplied to each engine through a long radius goose-neck, rising out of a receiver placed between the engine and boiler rooms below the engine room floor. It will be

normal capacity, generating three-phase current at 18,000 volts pressure.

Acceptance Duty Tests.

The specifications for the engines and machinery in the power house were unusually exacting, the acceptance of the



Redondo Power Station—Plan of Engine Room, Showing Arrangement of Units and Auxiliaries.

evident from the general arrangement that if one of the steam lines between the high-pressure cylinder and the receiver should break only one-half of one unit would be disabled, and

plant by the Pacific Light & Power Company being subject to a 90-day test of the engines and boilers. The terms of contract specified that the engine and boilers shall deliver

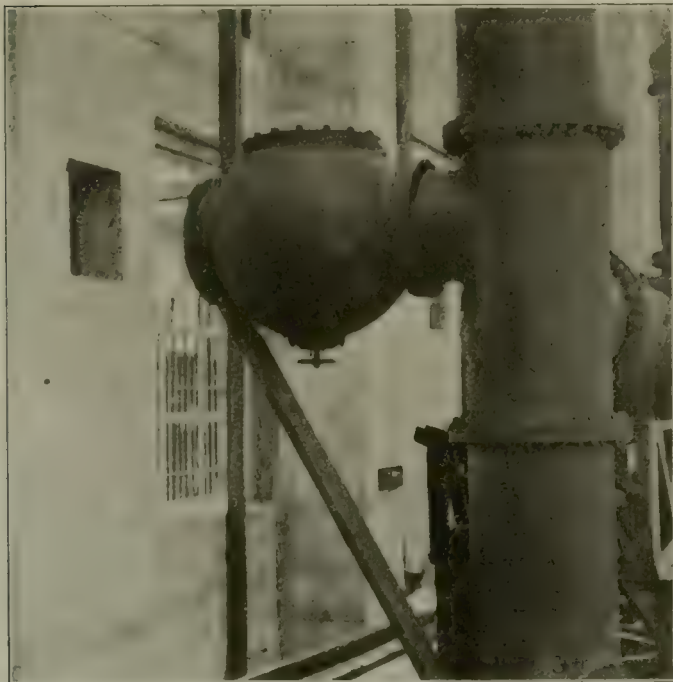
160 kilowatt-hours at switchboard per barrel of oil, assuming the oil to have a heating value of 18,850 British thermal units, proper allowances being made for the temperature of the feedwater and other factors which influence the operating conditions. The test is to be conducted continuously for 90 days and should less than 160 kilowatt-hours be generated per barrel of oil, the contractors must forfeit a penalty. Likewise if the duty shown by the engines exceeds 160 kilowatt-hours per barrel of oil the manufacturers will receive a bonus—the maximum bonus or forfeit being limited to \$50,000.

Auxiliary Machinery and Piping in Engine Room.

There are installed four exciter units of 75 kilowatts each, direct connected to 9 and 17 by 12 inch tandem compound Fleming engines, running 270 revolutions per minute.

An Admiralty type combined surface condenser and feedwater heater is installed for each half of each of the main generating engines. These condensers are served by Edwards 3-throw, single-acting suction valveless air pumps, driven by induction motors through reduction gearing. Each barrel of the air pumps is independently connected to the condenser by a 6-inch pipe. The discharge from the air pumps is delivered to the feedwater heater contained in the condenser in which the temperature of the water is raised to that of the incoming steam. The water from the exhaust heater passes through the suction pipe of the boiler feed pump. Three hot wells are connected with the feed pump suction main by short branches, as shown on the engine room plan.

The water from the feed pumps is passed through a duplex Worthington hot water meter with adjusting screws to permit calibration to correspond to the temperature of the water. From the meter the water passes through Goubert



Redondo Power Station—Back-Pressure Valve and Opening for Free Exhaust Through Stack and Building Wall.

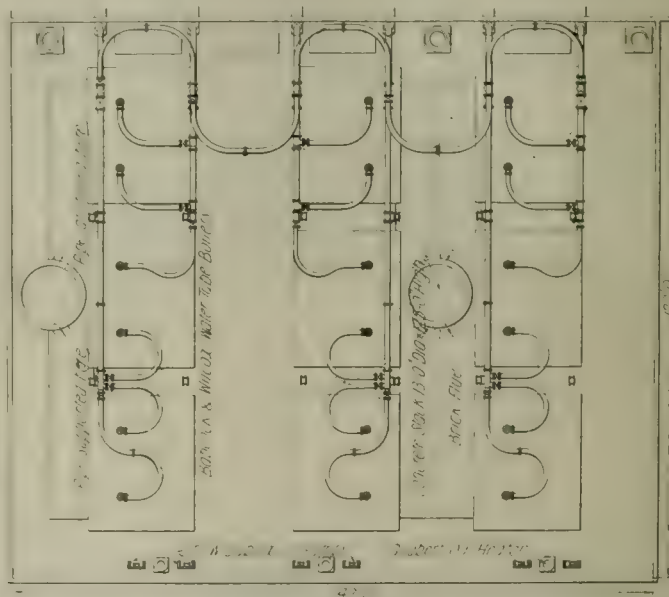
feedwater heaters and is heated by means of the exhaust steam from the auxiliaries.

The cooling water for the condensers is drawn through two 50-inch suction pipes by means of three 15-inch centrifugal pumps, direct connected to tandem compound Fleming engines. Each pump has a capacity of about 5,000 gallons per minute. The discharge from the condensers is carried to the ocean by a 50-inch pipe line. Owing to the dredging action of the suction pipes and because of the large amount of sand suspended in the shallow water of the beach, it was necessary

to fit a filter in each of the suction mains, suitably provided with manholes to permit their being readily cleaned.

As the condensers are about 17 or 18 feet above mean high water, special provision was made to prevent the accumulation of air in the condensers and circulating pipes, thus retaining the syphon action. This was accomplished by fitting high inverted U-tubes connecting the suction and discharge pipes. A pipe from the top of these U connections is attached to a small air pump which keeps the air exhausted from the pipes and thus as the water column in the discharge balances that in the suction the only head overcome by the circulating pump is simply due to that caused by the frictional resistance of the pipes and condensers.

In order to maintain a constant vacuum in both condensers



Redondo Power Station—Plan of Boiler House, Showing Main Steam Piping.

of each unit a 30-inch equalizer pipe fitted with a valve connects each pair of condensers. This not only permits maintaining the same vacuum and more constant vacuum on both sides of the unit but it also permits operating the unit condensing should one of the condensers have to be shut off for repairs. In this case, of course, it would be impossible to maintain a 28-inch vacuum on the unit unless the load were very light.

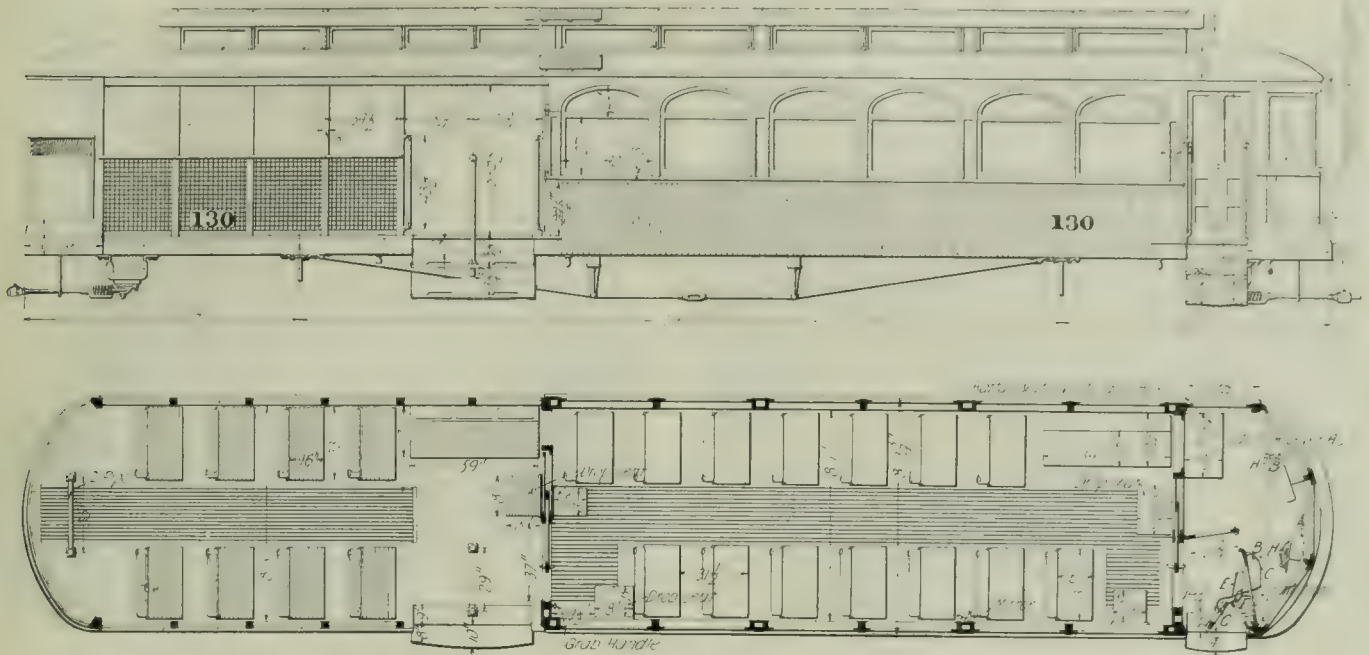
The steam for the auxiliary apparatus, such as the exciters, circulating pumps and feed pumps, etc., is taken from an auxiliary steam main extending the length of the engine room and connected to each of the main steam receivers, as shown on the engine room plan. An auxiliary exhaust main parallels the auxiliary live steam main, and three leads in the auxiliary main, each fitted with an oil separator, conduct the steam to three Goubert feedwater heaters.

The Georgia Railway & Electric Company, Atlanta, Ga., has practically completed its extension to Hapeville, Ga., and on November 10 will inaugurate regular service to that suburb. After considerable discussion between representatives of the company and the city it has been decided to issue universal transfers and lower the fare from any point in Atlanta to Hapeville by way of East Point from 10 cents to 5 cents. The company is making other improvements on its line, among which are the rebuilding, double tracking and extending of several of its city lines. Plans for the Brookwood extension have been decided upon and construction will be started soon. Work also is progressing satisfactorily on the Atlanta & Northern Railway between Atlanta and Marietta, Ga., and by January 1 it is expected that the new cars now being built will be ready for delivery.

TACOMA TYPE CARS.

W. S. Dimmock, manager of the Puget Sound Electric Railway and of the Tacoma Railway & Power Company of Tacoma, Wash., has recently designed and had built the im-

of operating conditions. One of the accompanying halftone illustrations shows the type of car designed by Mr. Dimmock for city use, which bears the sign "Spanaway" in front. It will be noted that this car is of the combination open and closed type built for single-end operation, having one entrance



Tacoma Type Cars—Floor Plan and Side Elevation.



Tacoma Type Cars—Three-Quarter View of City Service Car, Showing Arrangement of Entrances.

proved types of cars shown in the accompanying illustrations.

The type of combination open and closed car adopted for regular use on all the lines in Tacoma includes many new features which should be worthy of note by those interested in the design of a car that may best serve the requirements

on the side near the center of the body and another through the front vestibule.

Car builders have spoken of this general design as being of the "California" type car, but this nomenclature is thought to be inadvisely used because the Tacoma type of car is not

similar to those used in California. It will be remembered that the combination open and closed cars used in San Francisco until the Chicago type was adopted had each end open and a closed body in the middle or were open in the middle and closed at each end, while the type of car used in and about Los Angeles is arranged similar to the Tacoma type as

the accompanying plan, so that the motorman is entirely shut off from the public; and yet the front end of the car is so built that the doors over the front steps may be operated by the motorman and the public given free access to the front end of the car. The mechanism for opening and closing the door in the side of the front vestibule is indicated by the



Tacoma Type Cars—Observation End of Parlor Car.



Tacoma Type Cars—Interior of Parlor Car.

regards the open and closed portions, yet has the steps placed at the ends.

Some of the noteworthy features of Mr. Dimmock's new car are its large aisles, high dashboard in the rear to keep

letters A, B, C, D, etc., on the plan view of the car which is included in the accompanying illustrations. It will easily be recognized that by the use of a front vestibule so arranged the motorman can greatly assist the conductor in shorten-



Tacoma Type Cars—Parlor Car for City and Interurban Use.

passengers from falling off should the car jerk in starting, drop seats placed at the ends of the aisles and in heretofore unoccupied floor space, thereby increasing the seating capacity. The detail arrangements of the side entrances are also of interest.

The front vestibule is divided by a partition, as shown in

ing the time required at stops. Accommodations for smokers are provided at the rear of the open section and it will be noted that a pipe railing is placed where it will be of the greatest use in assisting standing passengers. The cars are equipped with push buttons, lights under the steps to facilitate loading and unloading at night, and provision has been

made so that in the near future they may be fitted with gates at the side entrances. The seating arrangement is shown in detail in the accompanying illustrations. The interiors of these cars are finished in mahogany and with the wide aisles and generous sized seats present an attractive appearance. They were built by the St. Louis Car Company.

Special Car.

Other illustrations than the ones earlier mentioned show a special car which has been fitted up partly for the handling of tourists and other visitors and partly for official purposes. The city of Tacoma entertains a large number of tourists during the year and for this reason the car constantly is in demand for special parties. On the other hand, the Stone & Webster properties on Puget Sound comprise more than 200 miles of track and the special car is valuable for official purposes. The interior of the car is luxuriously furnished, as will be evident by inspection of the accompanying halftone engravings; and being equipped with a larder, sleeping lounge and similar facilities it is very convenient for the officials whenever it becomes necessary to remain away from Tacoma on business for any length of time.

The body of the special car, it will be noted from the illustrations, is similar to that illustrated in the plan and elevation line engravings and described earlier in this article as standard for the Tacoma Railway & Power Company. The interior details were especially planned by Mr. Dimmock with a view to serving the needs of tourist and official parties.

The exterior of the car presents an attractive and substantial appearance. It is trimmed in green and gold and the sashes are glazed with plate glass. The interior is trimmed in mahogany and the gates and fittings are of bronze. An imported Wilton carpet in green harmonizes with the window shades, green wicker chairs, silk curtains and upholstery. Some of the detail fittings include arc lights, larder, ice chest, lavatory, a large davenport with a box cushion for storing clothing, five tables, tool box carried underneath and a lunch box also hung from the floor of the car. In case of inclement weather the open portion can be entirely closed with waterproof curtains, but as the climate in Tacoma is unusually mild the open rear end affords excellent observation facilities. The car is equipped with two trolley poles and third-rail shoes so that it may be run on any city or suburban line on the system.

Control of the Millbrook Company, which controls the New York Westchester & Boston Railroad and New York & Port Chester Company, is owned by the New York New Haven & Hartford Railroad. Announcement was made by Oakleigh Thorne and Marsden J. Perry in New York on October 29 of the transfer of control, which, according to an official statement from the New Haven company, has been held by the two men for a year on behalf of the New Haven. The Millbrook company owns all the stock of the New York & Port Chester Railroad and a substantial majority of the stock of the New York Westchester & Boston Company. This will give the New Haven road a connection for its electric lines with the New York subway at One Hundred and Seventy-seventh street. Control of the Westchester traction company was acquired in November, 1906. It was announced at the time that a 4-track electric road would be pushed through from One Hundred and Seventy-seventh street to Port Chester and the Connecticut line. The Westchester company had already spent \$1,500,000 in construction work in the Bronx and Mt. Vernon, its roadbed having practically been graded from One Hundred and Seventy-seventh street to the Mt. Vernon line, and many steel bridges over highways put in place. Altogether about \$4,000,000 had been expended on the two properties. It was proposed to combine the plans of both roads so that, without conflict, extensions could be completed which would be profitable.

THE TENTATIVE CLASSIFICATION OF OPERATING EXPENSE ACCOUNTS.

At the annual meeting of the American Street and Inter-urban Railway Accountants' Association at Atlantic City last month the committee on "Standard Classification of Accounts and Form of Report" presented a tentative classification of operating expenses. With some amendments adopted during the discussion that followed the presentation of the report the classification was referred back to the committee "for final revision with power to act." The primary accounts in the classification, as reported by the committee, with the changes recommended by the association shown in parentheses, follow:

Maintenance.

WAY AND STRUCTURES.

1. Track and roadway.
 - (Roadway and track.)
 - A. Ties.
 - B. Rails.
 - C. Rail fastenings and joints.
 - D. Special work.
 - E. Ballast.
 - F. Paving.
 - G. Bridges, trestles and culverts.
 - H. Fences, road crossings, cattle guards and signs.
 - I. Signal and interlocking system.
 - J. Track and roadway labor.
 - (Roadway and track labor.)
 - K. Miscellaneous track and roadway expenses.
 - (Miscellaneous roadway and track expenses.)
2. Electric line.
 - A. High-tension transmission lines.
 - B. Low-tension transmission lines.
 - C. Track bonding.
 - D. Telephone and telegraph system.
 - E. Miscellaneous electric line expenses.
3. Buildings, fixtures and grounds.
 - A. Power plants.
 - B. Substations.
 - C. Car houses and yards.
 - D. Shops.
 - E. General offices.
 - F. Stations, waiting rooms and platforms.
 - G. Docks and wharves.
 - H. Miscellaneous buildings.

MAINTENANCE OF EQUIPMENT.

4. Power plant equipment.
5. Substation equipment.
6. Passenger, mail, baggage and express cars.
 - (Passenger, mail, baggage and combination cars.)
7. Freight cars.
 - (Freight and express cars.)
8. Electrical car equipment.
9. Miscellaneous equipment.
 - A. Electric locomotives.
 - B. Work car equipment.
 - C. Snow equipment.
 - D. Horses, harness and vehicle equipment.
 - E. Automobiles.
 - F. Miscellaneous equipment.
10. Miscellaneous shop expenses.

Transportation.

OPERATION OF POWER PLANTS AND SUBSTATIONS.

11. Wages of power plant employes.
12. Fuel for power.
13. Water for power.
14. Lubricants for power plant.
15. Miscellaneous supplies and expenses of power plant.
16. Operation of substations.
17. Purchased power.

OPERATION OF CARS.

18. Superintendence of transportation.
19. Wages of passenger conductors.
 - (Wages of passenger motormen.)
20. Wages of freight conductors.
 - (Wages of passenger conductors.)
21. Wages of passenger motormen.
 - (Wages of freight and express motormen.)
22. Wages of freight motormen.
 - (Wages of freight and express conductors and trainmen.)

23. Wages of miscellaneous car service employes.
 24. Wages of car house employes.
 25. Car service supplies.
 26. Miscellaneous car house expenses.
 27. Tickets and transfers.
 28. Printing and stationery—car service.
 29. Miscellaneous car service expenses.
 30. Wages of station employes.
 31. Miscellaneous station expenses.
 32. Operation of signal and interlocking system.
 33. Operation of telephone and telegraph system.
 34. Dining, buffet, parlor and sleeping car service.
 35. Loss and damage.
 36. Injuries and damages.
 37. Law expenses—damages.
- (Accounts Nos. 36 and 37 to be consolidated under "Injuries and Damages." Accounts Nos. 38 to 51, inclusive, will therefore be renumbered 37 to 50, inclusive.)

MISCELLANEOUS.

38. Clearing roadway, cleaning and sanding tracks.
(Cleaning and sanding tracks.)
39. Removal of snow and ice from tracks.
40. Rent of equipment.
41. Rent of tracks and terminals.

Traffic.

42. Salaries of traffic staff.
43. Miscellaneous traffic expenses.
44. Advertising and attractions.

General.

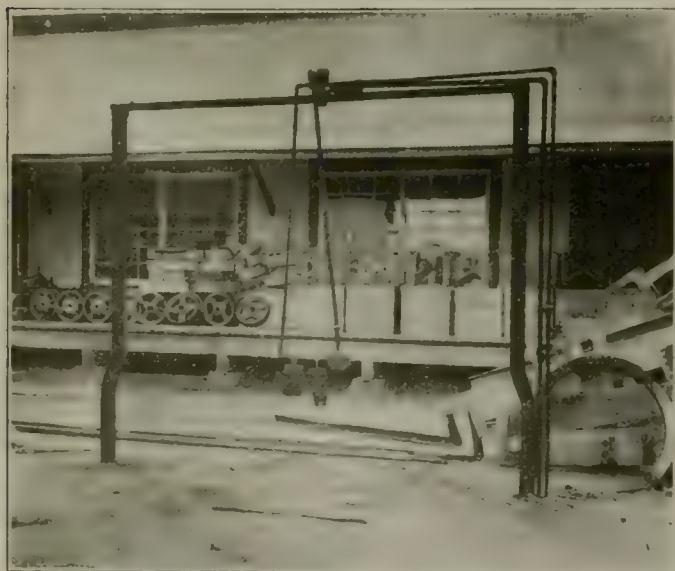
45. Salaries of general officers.
46. Salaries of clerks.
(Salaries of general office clerks.)
47. Printing and stationery—general.
48. General office expenses.
49. Miscellaneous general expenses.
50. Law expenses—general.
51. Insurance.

The classification contains also five apportionment accounts, as follows: Account No. 101, stores expenses; Account No. 102, stable expenses; Account No. 103, use of power plant steam (for other purposes than electric current); Account No. 104, use of electric current (for other purposes than operation of revenue cars); Account No. 105, operation of electric locomotives, work car equipment and automobiles.

It is understood that a further revision will be made of the classification before it is finally recommended for use.

FUEL OIL BURNER FOR HEATING TIRES.

At the Emeryville shops of the San Francisco Oakland & San Jose Railway (Key Route), the oil burner shown in the



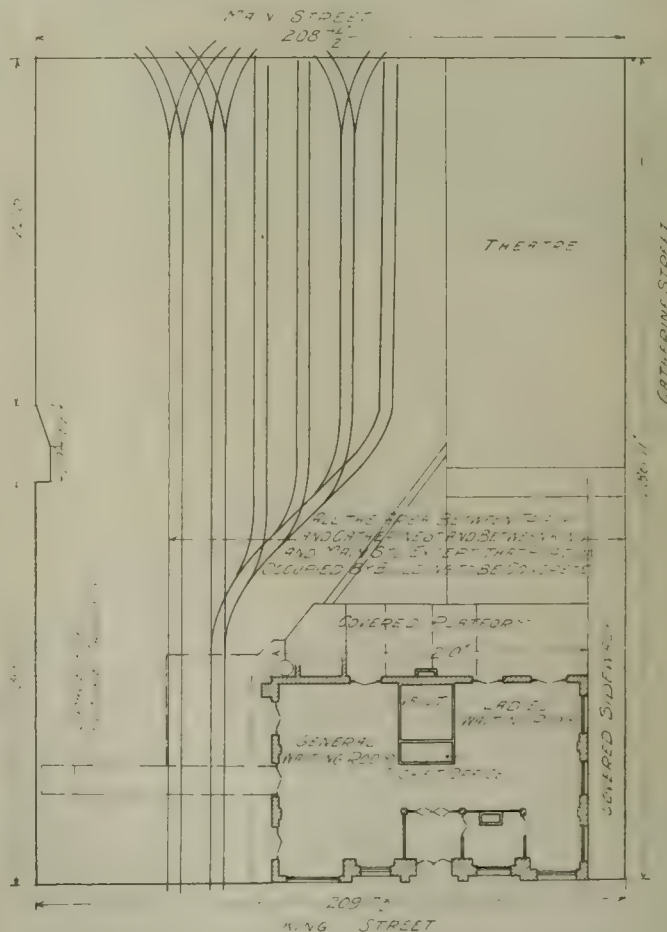
Oil Burner for Heating Tires.

accompanying illustration is effectively used for removing steel tires from wheel centers. The larger cars used on the

San Francisco ferry and interurban service of the Key Route have steel-tired wheels shrunk on to the centers. In these shops the fuel oil is made good use of in facilitating various phases of shop work. It will be noted that this burner is supported by the air and oil pipes from a steel framework standing over a brick platform in the shop yards. Valves are provided at the side for controlling the flame and the supply of oil and air is taken direct from the mains extending throughout the shop yards. The electric railways of California are especially fortunate in being able to obtain at a comparatively low cost fuel oil which may be utilized effectively in many processes of shop work. The oil burner described herewith is but one example of many applications to which fuel oil is put in the Key Route shops.

NEW TERMINAL BUILDING AT HAMILTON.

The large terminal building shown in the accompanying engraving was recently erected for the Hamilton Terminal Company on King street east, Hamilton, Ont., and furnishes



Hamilton Terminal Station—Plan and Track Layout.

terminal facilities for six electric railways which enter the city.

The building is one of the handsomest structures of the city and is thoroughly fireproof, being constructed of solid masonry and terra cotta on a steel frame. The outside of the building is of Indiana blue limestone for the first story and of pressed brick with trimmings of Perth-Amboy terra cotta above. The cornices and balustrades are all of terra cotta, richly ornamented. On the roof of the building is located a large clock with a dial six feet in diameter, surmounted by a flag pole. The interior columns and beams are reinforced concrete surrounded by terra cotta blocks. The floor is of concrete covered with hardwood for office rooms and Terrazzo for corridors and other public places. The main entrance presents a very handsome appearance. It is finished in

carved stone and at either side stand two bronze electroliers on stone pedestals. The entrance vestibule is 22 feet square. In the center of the floor is a large monogram, D. P. & T. Co., standing for Dominion Power & Transmission Company, which controls the various companies whose offices and terminals are in the station building.

The main floor consists of one large room 68 by 108 feet in area. The floor is laid with ceramic tile. The ceiling is 20 feet high. The walls are wainscoted to a height of 10 feet with English veined Italian marble. In the front part of the building is the ticket office, which is entered through the vestibule door. Immediately behind it is a large fire and burglar proof vault 16 feet square, which extends from the basement to the second floor. To the right of the main entrance is located an electric passenger elevator leading to the upper floors. The main floor is lighted throughout by Nernst glower lamps, placed in the ceiling and around the

covered with lights. The covered passageways at the right and the veranda in the rear are built of steel and copper and are brilliantly lighted by nearly 1,000 incandescent lamps.

A battery of three boilers, which is located under the tracks outside, heats the terminal building and also the Bennett theater, which is seen in the photograph in the rear and to the right of the station. The building was erected by contract on the cost plus a fixed sum basis, and its construction has been carefully supervised throughout by Charles Mills of Hamilton, architect.

NEW TERMINAL PLANS OF THE BOSTON & EASTERN.

The Boston & Eastern Electric Railroad has filed with the Massachusetts railroad commission plans for a revised route from Revere to the city of Boston, in connection with its proposed high-speed line to Lynn, Salem and Beverly, which



New Terminal Station at Hamilton, Ont.

columns. Five double doors from the main room lead to iron fenced inclosures leading to the tracks outside. The station room is very handsomely finished; the woodwork is of quarter-sawed oak, highly polished, and the metal work is of brush brass finish on bronze metal. In the basement are located the toilets.

The upper floors are devoted to the general offices of the company and its subsidiary companies. The offices are large and airy and are finished in quarter-sawed oak except the directors' room on the corner, which is finished in mahogany.

The entire wiring for the building is laid in conduit and is on the 3-wire system with 8-ampere outlets (1,000 circular-mils for each ampere). The main distributing panel, located on the station floor, and the subpanels on the upper floors are all controlled by main cut-out switches in the motor generator room in the basement. The entire wiring of the building is made especially heavy in order to provide for any future electrical development. The front of the station building is supplied with outlets for illuminating purposes so that when desired the entire front of the building may be

was described in the Electric Railway Review, July 20, 1907, page 73. The line will pass through Revere practically as before, except that it diverges from the original location near the town hall. After crossing the Chelsea river the line parallels the abandoned right of way of the East Boston branch of the Boston & Maine Railroad, and the present location of the Boston & Albany Railroad to a point between Porter and Maverick streets, East Boston. At this point it descends by a 3 per cent grade to a new tunnel, to be built beneath Boston harbor, to accommodate a double-track line from East Boston to Atlantic avenue in Boston, and a 2-track subway from that point to a terminal station under Postoffice square.

A striking feature of the change in route will be a double-track steel bridge one-third of a mile long across the Chelsea river to Breed's island, and 40 feet above the river. This bridge has been designed to carry the trains to be operated at 60 miles per hour. The new tunnel under the harbor will be so located that a physical connection can easily be made with the present East Boston tunnel, in case it should be

deemed advisable to carry the trains of the road into Boston through the existing tube. The Boston & Eastern plans include a new tunnel, however, in the belief of the company's engineers that it is doubtful whether the present tunnel could accommodate a fast electric train service interspersed with the present cars. The stations in the present tunnel are not constructed for trains, but for surface cars. The Boston & Eastern cannot be completed inside of three years; the East Boston tunnel will probably reach the limit of its capacity by that time unless its cars are operated in multiple-unit trains, and it is possible that still other tunnels will be demanded under Boston harbor in the future. For this reason the projected tunnel of the Boston & Eastern has been located 300 feet south of the present tube. Its length will be 5,400 feet.

The Postoffice square terminal is planned for a double-track stub station for the present, with two side platforms and one wide island platform, the arrangement being such that none of the passengers boarding the cars will come in contact with those leaving them. It is estimated that 140,000 persons a day can be handled at this terminal, which is a larger number than now pass through the South station. A foot passage is planned to connect with the Water street entrance of the Washington street tunnel. An alternative route is beneath Milk street to Postoffice square.

By the new route the distance from Lynn and other points on the proposed line to the center of Boston is 1.5 miles shorter than via Sullivan square, and no change of cars is involved. New surveys have been made in West Lynn for a route to avoid interference with the property of the General Electric Company, and to give accommodations to the River street district.

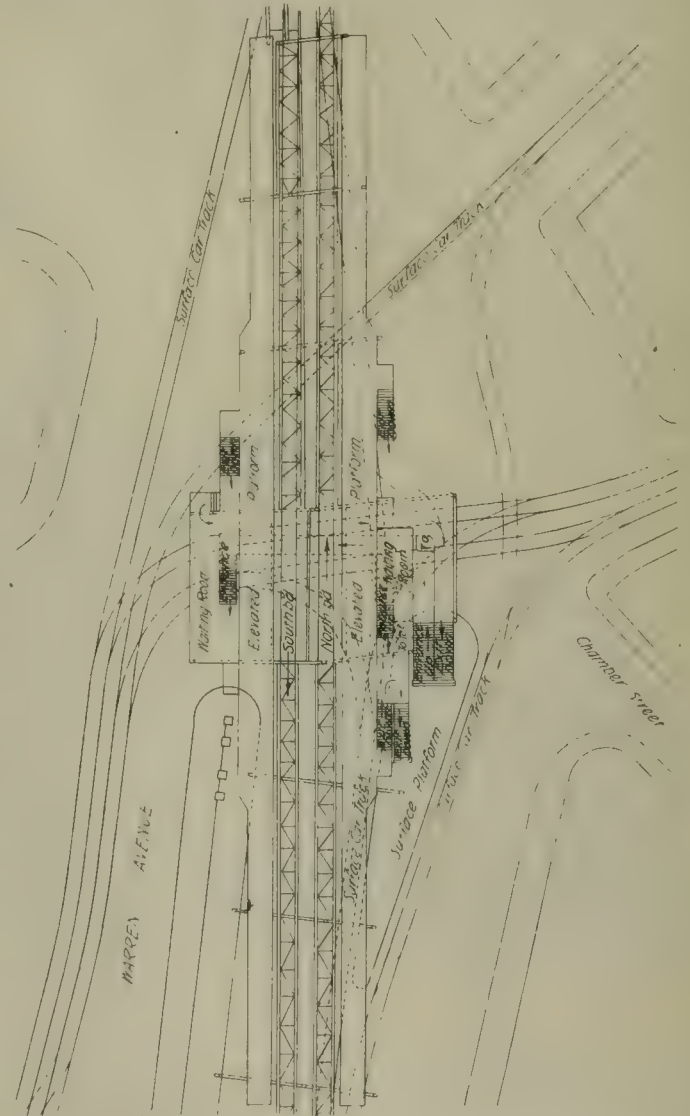
Running time by the new route will be about 14 minutes for express trains and 20 minutes for locals between Lynn and Boston. From Salem to Postoffice square the express time will be about 20 minutes, and from Beverly, about 23 minutes. Between Danvers and Boston the time is figured at about 28 minutes.

It is estimated that the construction of the new terminal in Boston proper will add about \$2,000,000 to the cost of the road. The new schedule of proposed fares shows a tariff of 15 cents between Lynn and Boston, with a commutation rate of 12 cents. The fare from Chelsea and Revere to Boston will be 6 cents by commutation ticket. During the beach season a round trip ticket will be sold from Boston to Revere Beach for 12 cents. The commutation rate from Salem and Peabody to Boston will be 17 cents, with 22 cents from Beverly and Danvers. Analysis of the fare schedule shows that the company plans to divide the 5 cents which would have been paid to the Boston Elevated Railway Company at Sullivan square with the public, retaining only enough to pay interest charges and operating expenses at the new terminal. The revised plans have been submitted to the commission as a result of its recent decision that the territory north of Boston needs different or additional facilities from those that exist today, and that no road from the north could successfully reach Boston over the present elevated structure in Charlestown.

The New York public service commission on October 25 issued an order directing the Brooklyn Rapid Transit Company to hold elevated trains at the Brooklyn terminal of the Brooklyn bridge on Saturday afternoons until they can be handled at the Manhattan end. The commission's inspectors have reported that it is the practice of the company, despite the larger terminal facilities at the Brooklyn end of the bridge, to send on the trains to Manhattan quicker than they can be handled at that terminal, thus adding to the congestion on the Manhattan side of the bridge. The commission also issued an order requiring the Richmond Light & Railway Company to stop all cars before reaching the curve opposite Ft. Wadsworth, where two fatal accidents have happened. A conspicuous sign is to be maintained day and night to indicate to the motorman just where he is to slow up.

BOSTON ELEVATED STATION CHANGES.

The prospective completion of the Washington street tunnel in Boston next year has necessitated a number of important changes in the plans of stations on the Boston Elevated system. The changes to be made at the Dudley street terminal in connection with the Forest Hills extension have already been described in the Electric Railway Review, February 2, 1907, page 164. The Massachusetts railroad commission has now approved the company's plans covering changes at Thompson square, City square, Battery street, State street, South station, Beach street and Northampton street. All these station improvements provide fundamentally for the



Boston Elevated Railway—Proposed Changes at City Square.

operation of 8-car trains by extension of existing platforms, with such modifications as are necessary in track spacing.

The company has not yet asked for authority to make the changes that will fit the Sullivan square terminal for 8-car trains for the reason that impending changes in the handling of traffic make further study necessary before it can be determined just what is necessary at this point. The legislature has authorized the extension of the elevated structure to Everett and Malden, and this will probably involve important changes at Sullivan square. Similarly the prospective connection of the proposed Cambridge elevated line with the present rapid transit system, modified as it will be when the Washington street tunnel is in operation, will necessitate undetermined changes at the North station.

The changes at City square station are the most far-reaching of those latest approved. The accompanying drawing illustrates the plan of the new City square station, which is to a large extent to be rebuilt on the site of the existing station. At this point the island form of platform is to be entirely abandoned. Instead the company will bring the north and south bound tracks close together as they pass through the square and construct outside platforms, a platform and waiting room for northbound trains and another platform and waiting room on the opposite side for southbound trains. Just below the elevated tracks will be secondary depressed platforms at right angles to the tracks, as shown by dotted lines on the plan drawing, for the purpose of allowing passengers to cross from one platform to the other without descending to the street. These depressed platforms form passages which also serve to give access to both the upper platforms from the street level. The train platforms will each be 349 feet long when completed.

Changes at City Square.

An important feature of the layout at City square is the receipt and delivery of passengers at the street level from and to an island surface platform beneath the elevated station. Passengers must enter the elevated station by this platform and they cannot leave the former except by passing over the latter. This avoids the objectionable feature of delivering passengers singly or in crowds in the middle of the square, where traffic is heavy, and the drawback of requiring persons to cross the center of the square in order to enter the station. The surface car loops at this point are planned to relieve congestion by providing flexible movements. The provision of exit stairways on both sides of the northbound platform will tend to relieve congestion. The ticket offices are to be located at the depressed platform level, which will add to the clear room overhead. The platforms at the car level vary in width from about eight feet at the ends to about 12 feet in the middle sections. The same entrance stairway will serve both train platforms; at the intermediate level the passenger can take his choice of a north or a south bound route. All passengers leaving either elevated platform will be delivered at the island surface platform close beside the surface tracks leading in both directions.

The changes at the South station will be second in extent to those at City square. The platform will be lengthened toward Dewey square to a total length of 387 feet, and an additional bridge and stairways will be provided on the north side of the station. The present head house in this station will be replaced by a canopy, the entire elevated platform, which is of the island type, being out of doors, with the exception of a small inclosed waiting booth about 10 by 30 feet in dimensions, located near the middle of the south end of the platform. An additional exit stairway to the South terminal station will be provided and also a new entrance stairway from the present intermediate platform to the train level. This will give a considerable increase in platform area and approaches without taking up much more room at the street level.

At other waystations of the Boston Elevated system with the exception of those in the subway, which will revert to surface car use, the platforms will be lengthened to the following totals: Northampton street, 358 feet; Beach street, 348 feet; State street, 362 feet; Battery street, 347 feet; and Thompson square, 351 feet. The addition at Northampton street will be at the north end, without changing the spread of the tracks. At Beach street a slight change in tracks will be necessary; at State street an extra stairway will be provided between the additional platform and the present secondary platform level, connecting with the bridge to the East Boston tunnel elevator station. Acknowledgment is due to George A. Kimball, chief engineer of elevated and subway construction, Boston Elevated Railway, for the above illustration.

PIPING AND POWER STATION SYSTEMS—LX.

BY W. L. MORRIS, M. E.

In laying out a system the drip line can vary in elevation if at all times there is sufficient steam carried to sufficiently reduce the weight of the total mass. Figure 337 (Q 13-1) shows a drip return with two risers, the difference in the pressure at the two ends being slight and depending upon the ability of the horizontal lines to condense the steam. The

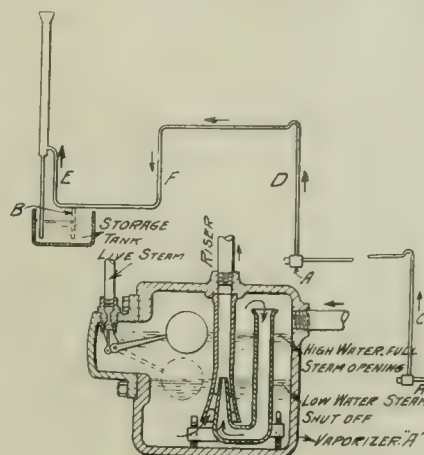


Figure 337 (Q 13-1).

vaporizer delivers steam only when an insufficient amount is passing through with the drips. The efficiency of this device is greater than that of the steam loop shown in Figure 332, as it rarely uses live steam, while the loop requires live steam at all times. When water rises in the vaporizer live steam is added, but as long as water is carried up from the riser with the steam, no live steam is necessary. If the drip system is delivering at about atmospheric pressure, one cubic foot of water will make about 1,600 cubic feet of steam. If the total height of risers, C, D and E, is 50 feet and the drop leg, F, is 20 feet, then 30 feet of the 50 feet in the riser must be steam and not require additional head to carry the water up the riser. Ordinarily, much more than one-half the volume of the drip is steam and live steam will not be required to lighten the riser columns. If live steam were required it would take but one pound of boiler water generated into steam to lighten 1,000 pounds of drip return water.

The riser should be sufficiently small to insure high velocity, and to suit variable conditions risers may be in pairs, each pair being of two sizes of pipe, say $\frac{3}{4}$ -inch and 1-inch, which will permit either being used separately or both in unison, giving capacity in the proportion of 9 to 16 to 25. If the drip system shown in Figure 337 is used to remove drips from pressure steam mains, these drips can be returned against boiler pressure even if the drips are at 10 pounds below the boiler pressure, in which event, however, it will be necessary that sufficient length of drop leg be used to overcome this difference in pressure. If the drips are solid water it will be necessary to use the vaporizer shown in Figure 337 to raise them to the high horizontal condenser pipe.

The greatest objection to the loop drip system is that the principle governing its operation is not well understood by those who usually have it in charge.

A simpler form, although possessing more parts, is that shown in Figure 338 (Q 13-2). On the score of simplicity, it is largely used in collecting drips from surrounding buildings. Each building has a drip tank provided with a vaporizer pipe. The water flows by gravity from these tanks to the main station. Such buildings as A, which have tanks located at a high elevation, may have a low level tank to catch all the building drains and a pump to raise these drips to an overhead tank. This would be strictly a gravity system, and if grease were removed from the exhaust drips they could be returned in this way. Another method is to use the drip tanks, as shown in Figure 338, with each tank located to suit the requirements. In a small float-controlled pump the discharge from the different buildings is taken from a low-pressure main to an elevated tank in the power house, then to

an open heater. The drip mains from building to building can be placed on different elevations, since the entire system is one of pressure return. The boiler room tank is of necessity higher than any of the drip lines. This system as well as that shown in Figure 338 would be free from water hammer and other difficulties arising from steam and water in drip lines. To avoid trouble from steam in drip pipes, it would be advisable to discharge traps, etc., into a large standpipe vented through the roof. This will give storage for trap discharge and

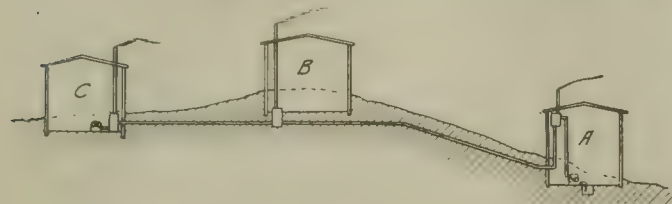


Figure 338 (Q 13-2).

at the same time permit vapors to escape or condense. The standpipe should have about twice the diameter of the trap discharge. The method shown in Figure 337 is good and modifications can be made that will permit its use in many places.

If live steam lines, water lines and electric wires also run between buildings, then some form of tunnel will be advisable. The pipe lines should be located over each other and at one side, while the wires should be placed at the top. If the expense of such a tunnel bars its use, the next best plan is to use a masonry trench, the sides and bottom having a cover that is a slow conductor of heat and waterproof. A concrete trench with a wooden top is shown in Figure 339 (Q 13-3). A top having single boards is a poor construction. With heat on

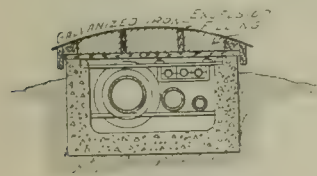


Figure 339 (Q 13-3).

filling improves the insulating properties, but this type of trench being double thickness with an air space makes a good non-conductor without the filling.

Class Q 14—Steam Drips—Miscellaneous.

The safety valve should have a drain to discharge such condensation as may be caused by steam leakage past the valve, this detail being shown in Figures 128 and 129. The drains from the heating system are shown in Figures 178, 179 and 180. Drains from surface condensers are shown in Figures 226 and 228. The drip main returning drips to boilers is shown in Figures 36, 37, 40, 41 and 44. The drips should not in any case be discharged into the feed main. High temperature drips have more or less vapor or steam carried in them and only when conditions are regularly maintained can these high temperature drips be delivered to a feed main without causing serious water hammer. The branches from drip mains to boiler should have stop valves next to the boiler, a check valve and another stop valve next to the drip main.

It is quite safe to state that in nearly every case it is a saving to return drips to the boiler in some manner. If but 1 per cent of the steam generated in a 1,000-horsepower plant is discharged in drips, then \$360 can be invested to save the heat units and show 10 per cent on the investment. The value of returning pure water is in many cases even greater than the gain in saving heat units.

Class R 1—Oil and Drip Mains.

There are three classes of oil mains to provide for: engine oil supply, cylinder oil supply and oil drip mains. The engine

oil mains, continually under pressure, are used in connection with a drip return system. The oil passing through will be light, and the cooler this oil can be kept the more suitable it is for reducing friction and the temperature of engine bearings. In making up the joints for the oiling system, a thread filler should not be used. The most perfect work is made by using clean oil and clean threads on iron pipe, the fittings being of rough brass. The use of brass pipe should be avoided, as it increases the cost of installation and all brass joints are difficult to make tight. Galvanized pipe is suitable, as this pipe must be of a good grade to be galvanized and in the process the pipe is pickled, which removes most of its scale. Malleable iron fittings should not be used, as they are not stiff enough ordinarily to make up oil-tight joints. Heavy cast-iron fittings and galvanized pipe or drawn steel tubing and brass fittings make the best combinations.

The joint shown in Figure 340 (R 1-1) permits the pipe being screwed up to the shoulder. The round joint nuts or rings of steel are screwed up when the pipes are all in place; this compresses the brass fitting, making the joint tight. A strong connection results, offering a smooth bore, free from shoulders and projections that collect sediment and block the pipe. The valves should be smooth-bore cocks, with ends made up the same as the fitting shown. The inside of the pipe should have its ends reamed concentric with the fittings. A sediment pocket with a plug at its bottom for cleaning should be provided. Crosses are often used for this purpose, but are objectionable, as the pockets are small.

The drip mains are the main sewer, with no head, and running part full, carrying all the impurities washed into

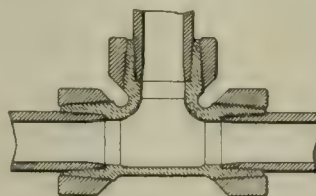


Figure 340 (R 1-1).

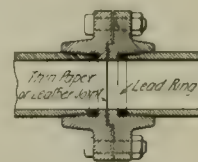


Figure 341 (R 1-2).

them. Much trouble is experienced with these drip lines if made with standard pipe and fittings. The details essential for sewer connections are clearly shown for the drip main:

1. The bottom of the drain must be a smooth, unbroken surface, free from pockets or projections.
2. In case it is necessary to make a drop, means should be provided for cleaning out the trap thus formed.
3. A gradual fall should be given the line.
4. A means for flushing the line should be available.

If the length of the drip main is not more than one length of pipe, then a large pipe of, say, $2\frac{1}{2}$ inches can be used. The drains are taken in at the top of the pipe, through drilled and tapped holes. Where more than one length of pipe is required the joint should be free from pockets or shoulders. About the only practical method of accomplishing this is as shown in Figure 341 (R 1-2). A lead ring is squeezed into the joint between the flange and pipe at the threads. The bore of the flange is machined the same for both flanges and if this varies slightly the lead ring is trimmed with a light bevel from the end of pipe to the flange. When this flange joint is made up the bore is smooth, leaving no projections to cause precipitation. Connections can be made by means of a T placed between the flanges shown in Figure 341, but this will be more expensive than to use a larger main, drilled and tapped on its upper side to receive the branch. The pipe main shuts out the dust from the basement and also permits steam being blown through to clean it out, as shown in Figure 114.

(To be continued.)

The Ft. Dodge Des Moines & Southern Railroad has begun operating between Des Moines and Ft. Dodge, Ia.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Interurban Railways Not Additional Burdens on City Streets, Though Abutters May Recover for Special Injuries Therefrom.

Kinsey v. Union Traction Company, 81 *Northeastern Reporter*, 922.—The supreme court of Indiana wrestled in this case with the questions of an interurban electric railway being an additional burden on a city street and the right of an abutting property owner to damages. It is a good case to refer to for authorities and arguments on both sides. It is, however, not worth while to attempt here to quote very much from the case, for the reason that there are five more or less different opinions published—one by each of the five members of the court. What is clear is that the majority of the court holds that the running of interurban cars upon city streets is not an additional burden, and that the plaintiff was not entitled to recover therefor. It also holds that there were allegations in the complaint which sufficiently charged a special injury to the plaintiff's real estate, caused by the defendant in operating its road, so that the lower court erred in sustaining a demurrer to the complaint. As it is stated in one place, an abutter may recover any special damage to his property that has resulted from an unauthorized and wrongful operation of the company's cars in front of his dwelling.

Power of Condemnation by Lessee for Transmission Line—Sufficient Description—Law Constitutional—No Nuisance—Damages.

Mull v. Indianapolis & Cincinnati Traction Company, 81 *Northeastern Reporter*, 657.—The supreme court of Indiana says that this action was brought by the traction company to condemn land for a proposed electrical transmission line. It was the other party's contention that, as the company was a mere lessee of the railroad to which the proposed transmission line was to be appurtenant, it could not exercise the power of eminent domain for the declared purpose. It was conceded on both sides that a lessee cannot condemn lands for a use appurtenant to a way of the lessor, unless expressly so authorized by statute.

By the Indiana act of 1903, any street railroad company organized under the laws of the state desiring to construct or acquire, or having constructed or acquired any street railroad, interurban street railroad, or suburban street railroad, shall possess the general powers to purchase, or by special proceedings receive, acquire and take, hold and use all such lands and other property as may be necessary for the construction, maintenance and operation of its railroads, lines for transmission of electricity for heat, light and power for such companies or the public, which transmission lines may be on the line of said railroad, or elsewhere, as such company may desire, etc. Taking the whole statute into consideration, the court is of the opinion that it was the intent of the legislature in passing the act to confer the power of eminent domain upon lessees of street and interurban railroads. The expediency of authorizing the taking of lands for a transmission line upon a route situated, as the proposed line would be, with reference to the railroad to be operated (that is disconnected therefrom), was for the legislature, and under the facts shown the court has no difficulty in holding the intended use to be public, within the meaning of the law.

The statute of 1905 provides that, where a right of way is sought, the complaint must state the location, general route, width and termini thereof, and a specific description of each piece of land to be taken. A description meets all the requirements of the statute, and is sufficient, which shows the strip to be appropriated to extend across a party's entire tract in an easterly and westerly direction, and to be 6½ feet in width, lying immediately north and adjoining the right of

way of a named railway, as located through said land.

Nor does the court think that the act of February 26, 1903, is in violation of either the state or federal constitution.

Lastly, it was contended that the transmission of electricity at a high voltage over such lines would be, per se (by itself), a nuisance. But the law authorizes the construction and the maintenance of lines for the transmission of electricity for the purposes stated in the company's complaint, and the rule is quite well settled, and abundantly supported by reason and authority, that a lawful business or erection is never a nuisance per se. The land owner may recover in this proceeding all damages which he will sustain on account of the lands taken, and resulting from the proper construction and operation of the transmission line thereon. If the line shall be improperly constructed or negligently operated, and from such causes become a nuisance in fact, or occasion unnecessarily any wrongful injuries in the future, full redress may be had through an appropriate action.

Books Admissible to Show Incompetency of Motormen.

Trend v. Detroit United Railway, 112 *Northwestern Reporter*, 977.—The supreme court of Michigan holds that in an action brought to recover for injuries sustained by a motorman in being struck by a car on an adjacent parallel track, books kept by the defendant containing the records of conductors and motormen, and which contained entries as to the motorman who operated the car which struck the plaintiff, were admissible in evidence. It says that the defendant was chargeable with notice of the entries contained in the books, and the record of the motorman was admissible, not only for the purpose of showing notice to the company of the record, but also as prima facie evidence of any facts stated therein, and the plaintiff was not limited in his use of the books to specific acts of incompetency otherwise shown, except as he may have limited himself by his declaration.

THE WESTINGHOUSE RECEIVERSHIPS.

From an authoritative source we have received the following statement relative to the conditions surrounding the appointment of receivers for the Westinghouse Electric & Manufacturing Company, the Westinghouse Machine Company and the Nernst Lamp Company:

Investigations made by the receivers show very clearly that the cause of the trouble was not a falling off in business, but was brought about by the state of the money market, making it expedient for those interested to ask for the appointment of receivers. The unusual number of orders requiring large outlays for material and the constant drain of the payroll, without any immediate returns because of the long time required before completion and payment, at a time of unusual financial stringency, anticipated the difficulty. Such orders for machinery covered work which must extend over a period of months and sometimes years before realization on investment, and therefore required borrowed capital. It was the great stringency of the money market which prevented the renewal of the customary sources of ready money, and therefore made necessary prompt action to conserve the interests of the stockholders, creditors and all concerned. That the action was wise and timely is the consensus of opinion of the most conservative financial men in the country. There is no question that the various properties will be returned to the stockholders unimpaired in value as soon as the money market regains its equilibrium.

The splendid organizations of the different companies will be preserved to receive and execute orders with the same satisfaction to the customer as heretofore. There has not been even a momentary pause in the operations, and orders are being filled with dispatch.

So much confidence is felt in the men appointed as receivers for the several companies affected that the future success of these interests promises to be as marked as in the past. It is the understanding that no change in the general policy for the conduct of the business is contemplated.

News of the Week

American Railway Association Considers Rail Sections.

At the semi-annual meeting of the American Railway Association, which was held in New York this week, the committee on "Standard Rail and Wheel Sections" made a progress report. The committee agreed on the advisability of an improvement in rail sections which would afford a definite distribution of metal between the head and base of the rail and develop a homogeneous condition of metal by cooling simultaneously. The association instructed the committee to continue its inquiry on disputed features and to employ experts for the purpose.

G. L. Peck of the Pennsylvania Lines, chairman of the committee, stated that the committee had conferred with the American Society of Civil Engineers, and had inspected the principal rail-making plants in the country. He said that on the question of discard from the ingot the committee had discovered a wide difference of opinion. Experts were consulted who advocated a discard of 25 per cent, which, it was claimed, would rid the ingot of all objectionable gases, which frequently rise in the cooling metal, and remove all foreign substances which were not desired in a perfect rail. The committee, however, learned that these views were not held by other steel rail experts, who declared that rails made from the top of the ingot, in which all deleterious substances were assumed to be found, were frequently better than rails made from other sections of the ingot.

The Cleveland Situation.

The principal interest in the Cleveland low-fare controversy for several weeks has been centered in the campaign for the mayoralty being conducted by Tom L. Johnson, the present incumbent, and Theodore E. Burton, the republican candidate. The street railway franchise question has been the principal issue and nightly addresses have been given by both candidates before large tent meetings. Mr. Burton has several times stated his plan for a settlement of the problem and on October 28 the Cleveland Electric Railway announced that it would accept his plan, which includes the following points: One street railway system and one fare for the city and the suburbs; seven tickets for a quarter to be given by the Cleveland Electric until October 1, 1908, during which time an auditing commission shall determine what rate of fare will yield 6 per cent on the actual value of the property; a 20-year franchise to be granted on these terms, with a provision that the company's books shall be always open to inspection and that the rate of fare may be adjusted after 10 years.

On October 29 Peter Witt, who owns one share of stock in the Cleveland Electric Railway, and who has for several weeks been examining the Cleveland Electric books with a force of accountants, was refused further access to the books on the ground that he was using the information for political purposes against the company. President Andrews said the company would, if desired, place its books in the hands of a court for legitimate public examination. Mr. Andrews denied that the company has made any political contributions.

On October 23 the circuit court granted a temporary injunction applied for by the Cleveland Electric Railway to restrain the Forest City Railway Company from using the Cleveland Electric tracks on the West Twenty-fifth street-Bridge avenue route. The court refused to decide on the merits of the case, stating that several of its members were prejudiced and that out-of-town judges would be secured to hear the case. On October 28 the out-of-town judges gave a decision sustaining the position of the Forest City attorneys and upholding the right of the low-fare company to a joint use of the tracks on West Twenty-fifth street and on Bridge avenue from West Forty-fourth street to West Sixty-fifth street. This case is in connection with the suit brought by the Cleveland Electric to declare invalid the curative franchise recently secured by the Forest City Railway, which will be finally heard on appeal in a few weeks.

The Forest City Railway immediately began connecting its tracks with those of the Cleveland Electric Railway. At a meeting of the city council that evening \$2,700 was recommended as the amount which the low-fare company should pay to the Cleveland Electric for the use of its tracks, and on October 29 the company began operating cars. At the council meeting, on Monday night, six ordinances were passed to second reading granting extensions to the Forest City Railway.

Recent Accidents.

A limited passenger car on the Indiana Union Traction Company's line ran into a slowly moving freight train on the

Pennsylvania line at the crossing in Kokomo, Ind., on October 26, and derailed two of the freight cars, two of them being overturned. The vestibule and smoking compartments of the passenger car were wrecked and one of the passengers was injured. The tracks were wet and the brakes failed to hold.

About 20 persons were injured in a collision between two cars of the Chicago Union Traction Company on October 23 at the intersection of Madison street and Western avenue. Both motormen tried to stop their cars, but the rails were wet and the wheels skidded.

Forty-eight persons are said to have been injured, eight of them seriously, as the result of a collision of two cars on the Pawtucket line of the Rhode Island Company at Providence, R. I., on October 27. The accident occurred at the junction of Livingston street, Branch avenue and North Main street and is said to have been due to the inability of the motorman of one of the cars to stop his car on approaching a switch on account of slippery rails. The car bound for Pawtucket jumped the switch and crashed into a car bound for Providence from Pawtucket, telescoping the vestibules. Both motormen saved themselves by jumping, but the passengers were unable to escape.

Three persons were killed and about 12 injured in London on October 26 in a rear-end collision at the West Hampstead station of the Metropolitan Underground Railroad. The rear train ran past the signals in a fog and struck a train standing at the station. This is said to be the first accident of the kind on the London tubes since they were electrified, when a system of electric signaling was installed, and the first accident resulting in the death of a passenger since the road was opened.

Four persons were seriously injured and about 30 are said to have been more or less injured on the line of the Indiana Union Traction Company at Muncie, Ind., on October 22. The car for Indianapolis had been delayed and the motorman was trying to make up time. While rounding a sharp curve at a high speed the car left the track and struck a telegraph pole and a tree, turning flat on its side.

An interurban car of the Indianapolis Crawfordsville & Western Traction Company and a city car of the Indianapolis Street Railway met in a collision in a fog on Bank street, Indianapolis, on October 29. The accident occurred on a single track and on account of the fog neither of the motormen was able to see the other car until too late. One of the motormen was fatally injured and three passengers were injured. The city car was badly wrecked.

A peculiar accident is reported on the Springfield (Mass.) Street Railway Company's lines in West Springfield on October 22 when a Holyoke car with the brakes set and power shut off ran into the car ahead. The accident is believed to have been due to slippery tracks caused by a heavy fall of leaves. The motorman of the Holyoke car was the only person injured. This company has experienced considerable trouble on account of tracks being made gummy and slippery by leaves.

Attacks Car Tax Ordinance.—The Pittsburg Railways Company on October 26 filed an answer in a suit brought by the city to recover \$94,200 car tax under the ordinance assessing the company \$100 for each car operated. The company claims that the act is unjust and unconstitutional.

Chicago Reorganization Plan.—The arbitrators under the Chicago Railways Company ordinance held on Thursday and Friday of this week what it was expected would prove to be the final hearings on the new plan of reorganization. As objections were raised, however, an adjournment was taken until 10 o'clock this morning.

Maumee Valley Increases Service.—The Maumee Valley Railways & Light Company of Toledo, O., has established a through service between Toledo and Waterville, O., with cars leaving Toledo every two hours from 7:12 a. m. to 11:12 p. m. The passengers for Waterville have heretofore been obliged to transfer at Maumee. The new service is said to be in anticipation of the competition of the Lima & Toledo Traction Company.

Refuses to Attack Philadelphia Company.—Attorney-General Todd of Pennsylvania has refused to bring quo warranto proceedings to annul the charter of the Philadelphia Company, which controls the Pittsburg Railways Company and several electric lighting companies in the vicinity of Pittsburg. The request to bring suit was made by Pittsburg city officials because of the high rates they claim are charged by the companies.

New Attack on Detroit United Railway Planned.—It is reported that Mayor Thompson of Detroit, who was elected to his office on a platform of opposition to the Detroit United Railway, in the effort to force the company to give 3-cent

fares, has purchased some of the company's stocks and bonds and is planning to begin suits applying for a receivership for the company. The mayor charges mismanagement of the property to the detriment of the stockholders and states that he has a number of private detectives securing evidence.

New Transfer Rule in Philadelphia.—The Philadelphia Rapid Transit Company has ordered a change in the method of giving out transfers which is designed to prevent many abuses of the privilege which have heretofore been prevalent. Passengers are now required to ask for transfers at the time the fare is paid instead of receiving them at the transfer points. The number of transfer points is also to be reduced if possible. The company has learned that large numbers of transfers have found their way into the hands of newsboys, saloons and barber shops.

Yonkers, N. Y., Car Strike.—After a strike of several days, which completely tied up the lines of the Yonkers Railroad Company, the company and its motormen and conductors came to an agreement on October 28. The trouble, which arose largely through a personal difference between the employes and the superintendent, resulted in a demand for recognition of the union, an increase in wages from the sliding scale of 20 to 22½ cents an hour to 25 cents an hour and the appointment of a local man as superintendent. The differences were settled by the company agreeing to take back all the employes without recognizing the union, to submit the wage differences to arbitration and by the appointment of a Yonkers man as assistant superintendent who should have direct charge over the motormen and conductors.

Public Service Commission Orders Increased Service.—The public service commission of New York on October 28 adopted a resolution providing for a final order for an increase of practically 20 per cent in the service on the Fourth and Madison avenue lines of the New York City Railway after November 1. Before the adoption of the resolution General Manager Oren Root, Jr., testified on behalf of the company, presenting evidence to show that the service in the main was satisfactory and objecting to the demand for an increase in service on the ground that the company was unable to obtain a sufficient number of efficient employes. The commission maintained that the service was not adequate and that all the conductors and motormen needed could be had if better wages were paid and working conditions were made more agreeable. In its resolution the commission incorporated a detailed schedule showing the cars which the company should run throughout the day and intimated that inspectors would be placed to see that the company obeyed the order of the commission.

Indicted on Account of Charleston Interurban Wreck.—The grand jury of Coles county, Illinois, which has spent several days investigating the accident which occurred on the line of the Central Illinois Traction Company near Charleston, Ill., on August 30, 1907, in which 15 persons were killed and a large number injured, has returned indictments against several of the directors and officers of the company on the charge of criminal negligence tending to produce manslaughter. Indictments were returned against E. A. Potter, president; A. W. Underwood, secretary; Judge Peter S. Grosscup, Marshall E. Sampson and Francis S. Peabody, directors, all of Chicago, and Frederick Moore, superintendent, and Charles Botts, motorman, of Mattoon. Bench warrants were issued by the city court at Charleston, and the Chicago men met by arrangement and accepted service together on October 31. They gave bonds of \$5,000 each to appear in the Coles county court on November 3. The case is then to be continued until the January term of court. Suits aggregating \$220,000 are said to have been filed against the company on account of the accident.

December Meeting of the American Society of Mechanical Engineers.—The fifty-fourth annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies building at 29 West Thirty-ninth street, New York City, December 3-6, 1907. Symposiums on foundry practice, giving the experiences of prominent men in that work, have been arranged. The specific heat of superheated steam will be taken up, and a very important and exhaustive work by a professor of engineering at Cornell will be presented. The utilization of low-grade fuels in gas producers, combustion control in gas engines, tests of producer gas engines, etc., will be given a session. Other live topics, such as industrial education, power transmission by friction driving, cylinder port velocities, etc., will be discussed. As all of these subjects have been treated by prominent engineers of Europe and America, professors of our universities, and men eminent in the particular work of which they write, the meeting should prove of unusual value. The committee has on hand an interesting excursion for Wednesday afternoon and an address in the evening which will be especially enjoyable.

Construction News

FRANCHISES.

Colusa, Cal.—The city council has granted an extension of time to the Northern Electric Railway Company in which to begin building its proposed interurban line from Red Bluff to Colusa. A. D. Schindler, general manager, states that the extension was asked for because of the tightness of the money market, and until this has been relieved no additional construction work will be attempted.

Huntingburg, Ind.—The Grand Central Traction Company, which proposes to build an interurban electric line from Indianapolis to Evansville, Ind., has applied for a franchise to operate its line through Huntingburg.

Houston, Tex.—The Houston Electric Company has been granted permission by the county commissioners to build an electric line along the Harrisburg county road from Houston to Harrisburg, Tex. The line is for passenger service only and must be completed within nine months from the date of the franchise. A certified check for \$2,500 must be deposited by the company with the city as a guarantee for carrying out its part of the contract. The life of the franchise is 28 years.

Lindenhurst, L. I.—A franchise has been granted to the South Shore Traction Company for a street railway through that village.

Los Angeles, Cal.—The two applications of F. W. Flint, Jr., representing the Los Angeles-Pacific Company, for a franchise to construct a third-rail electric line in Hill and West Sixteenth streets, has been granted by the city council and bonds to the extent of \$25,000 for each of the applications were approved.

New Orleans, La.—A 39-year franchise, beginning with June 30, 1912, for the construction of an electric railway through St. Bernard avenue, Broad and other streets of this city, is being advertised by Comptroller Charles R. Kennedy. Bids will be received until December 11.

RECENT INCORPORATIONS.

Belleville & Interurban Railway, Belleville, Ill.—Incorporated in Illinois to build an electric line from Belleville to Smithton, St. Clair county, Illinois. Capital stock, \$100,000. Incorporators: Jacob Gundlach, Jr., Benjamin H. Gundlach, R. W. Hofsommer, George Hippard and Thomas A. Bell.

Chicago Fox Lake & Lake Geneva Railroad, Chicago, Ill.—Incorporated in Illinois to build an electric interurban line from Chicago to Lake Geneva through Cook, Lake and McHenry counties. A branch line also will be built to Fox Lake and one to Woodstock. Capital stock, \$2,000,000. Incorporators: George M. Seward, Sidney F. Mallette, Lewis E. Starr, Stock Exchange building, Chicago; Maurice B. Louis, Harry Y. Yaryan. The offices will be in Chicago.

Millersburg & Eastern Railroad, Millersburg, O.—Incorporated in Ohio to build and operate an interurban line from Millersburg to Beach City, O., 26 miles. Work is to be started in the near future with the intention of having the road in operation by the end of next year. Capital stock, \$1,000, to be increased later to \$500,000. Incorporators: O. S. Olmstead, Dan M. Miller, W. W. Adams, Millersburg; Samuel P. Dunn, J. A. Burke, Cleveland.

Northwestern Interurban Railway, Moorhead, Minn.—Incorporated in Minnesota to build an electric line connecting Fargo, N. D., and Moorhead, Minn., with the summer resort at Detroit Lake, by way of Crookston, Minn. Capital stock, \$1,500,000. Incorporators: H. A. Coghlan, S. A. Anderson and J. R. Turner.

TRACK AND ROADWAY.

Argenta Light & Power Company, Argenta, Ark.—Eight carloads of trolley poles have been received for this line, which is under construction from Little Rock to Argenta, Ark. It is expected that the road will be in operation by February 1 next. George Brockman, superintendent of construction, Argenta, Ark.

Asheville & Hendersonville Railroad, Asheville, N. C.—The right of way for this proposed 20-mile electric line, which will connect Asheville and Hendersonville, N. C., has been secured and an early start on its construction is said to be assured. As surveyed the road will commence at the court-

house in Hendersonville, passing through Fletchers, Arden and Skyland, where it enters the Biltmore estate, then to Buena Vista, through South Biltmore and across the Swannoa river, where it will connect either with the present Asheville electric lines or continue into the city on private right of way. The estimated cost of construction, including equipment and water power, is \$300,000. C. F. White of Skyland, N. C., is interested.

Berkshire Street Railway, Pittsfield, Mass.—This company has awarded to the Fred T. Ely Construction Company, Springfield, Mass., the contract for a high-tension line in Adams, Mass., to cost about \$65,000. Henry Gough, chief engineer, Pittsfield, Mass.

British Columbia Electric Railway, New Westminster, B. C.—Bids for the construction of the first portion of the New Westminster-Chilliwack line, from New Westminster to Cloverdale, B. C., are to be received this week.

Cache, Okla.—An interurban electric line between Cache and the national reserve of the Wichita mountains is said to be under consideration by local business men, who are preparing to organize for this purpose. It is stated that the line will be directed toward Craterville, a pleasure resort under construction by St. Louis and Lawton capitalists, where a dam 40 feet high has been built to form a reservoir and near which will be erected a hotel. The names of the promoters of the new line are not made public.

Chambersburg Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—Work on the grading of this company's extension from Greencastle to Chambersburg is progressing satisfactorily, about a mile and a half now being completed. It is expected that the entire road will be completed and in operation by next summer.

Chicago City Railway.—This company has withdrawn its application to the Chicago city council for a permit to build a loop track in Thirty-eighth street and Langley avenue for the purpose of giving another entrance to the car house at Thirty-eighth street and Cottage Grove avenue.

Chicago Lake Shore & South Bend Railway, South Bend, Ind.—A large force of men is at work setting the poles for the 12 miles of track which has been laid from the west side of Michigan City to the Lake Shore steam railway crossing, three miles west of Porter.

Chicago South Bend & Northern Indiana Railway, South Bend, Ind.—It is stated that within two weeks grading on this line between Hudson Lake and Rolling Prairie, Ind., will have been completed, thus closing the gap from South Bend to Rolling Prairie. Subcontractors are at work on the remaining 3½ miles immediately east of Laporte and it is expected this work will be finished by December. This will complete all of the grading from South Bend to Laporte. Tracklaying has been completed from South Bend to Chain lakes and the rails are on the ground from the lakes to New Carlisle. In addition the supply of rails and ties for laying the track between Rolling Prairie and New Carlisle is also at hand in readiness for the continuation of this work through the winter.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—This company has filed acceptance of the franchise recently granted by the Milwaukee city council for the operation of its cars in Sixth street, St. Paul avenue, Clybourn, Fifth, Wells and Second streets and on Grand avenue, and it is now expected that the line will be completed within the near future. The work on Wells street is progressing and it is stated that by December 1 cars will be running on regular schedule between Chicago and Milwaukee. The franchise provides that the whole line shall be in operation within six months after the completion by the city of the Sixth street viaduct.

Consolidated Railway, New Haven, Conn.—This company has awarded the contract for the construction of its proposed electric line from Middletown to Middlefield, Conn., and work will be started immediately. It is announced officially that work on the extension of the line to Hartford will be undertaken early in the spring.

Corn Belt Traction Company, Champaign, Ill.—The directors of this company, which proposes to build from Bloomington to Champaign, Ill., have elected John Pitts of Bloomington president. H. C. Billingsley of Chicago is vice-president.

Corry & Columbus Street Railway, Corry, Pa.—According to reports this company, during the coming year, will build 15 miles of track and at some future date not yet decided upon will install and operate an electric light plant. C. P. Northrop, president, Corry, Pa.

Davenport, Ia.—It is stated that a syndicate headed by

G. L. Johnson, M. Mahoney and others of Maquoketa, Ia., has purchased a portion of the interest in the proposed Davenport-Maquoketa-Dubuque interurban line held by Mrs. Alice M. Butler of Davenport, who has been endeavoring to interest capitalists in the line for over a year. The company will soon incorporate, with a view to starting construction at once.

Denver & Greeley Railroad, Denver, Colo.—Work has been started on the first section of this proposed interurban railway, which eventually will connect Greeley with Denver. The portion to be built first will extend from Greeley to Evans, making a detour of five miles. Franchises have been secured in both cities for the operation of the line over the principal streets. The company was incorporated last summer, although negotiations for right of way and terminals have been under way for over two years. A portion of the line will traverse the old grade of the Union Pacific from Julesburg through Greeley to Golden. It is stated that until the road has been completed traffic will be sent to Denver over the line of the Chicago Burlington & Quincy. J. D. Houseman of Denver, general manager.

Des Moines (Ia.) Short Line.—With the exception of one mile, the entire right of way has been secured for this interurban line from Des Moines to Mason City, and grading has been completed to within three miles of the latter point. Twenty miles of tracklaying remain to be done before November 15, the date on which the contractors have agreed to have the line ready for operation into Mason City.

Eastern Pennsylvania Railways, Lansford, Pa.—J. G. White & Co., operating managers and purchasing agents for the Eastern Pennsylvania Railways, have just ordered \$200,000 worth of electric railway material for the Tamaqua and Middleport connecting link between Mauch Chunk and Pottsville, Pa. The order includes all the material required for the permanent way and overhead electrical work of a standard interurban railway. Considerable grading has already been done. When the line is finished Pottsville and neighboring towns will be nearer New York in actual time by trolley to Mauch Chunk and the Lehigh Valley Railroad than by the usual railroad detour through Philadelphia.

Evansville & Boonville Traction Company, Evansville, Ind.—C. C. Watts, Princeton, Ind., is making a preliminary survey for the extension of this company's line from Boonville to Cannelton, Ind., by way of Chrisney, Newtonville, Troy, and Tell City. It is stated that this is the first step toward a direct connection between Evansville, Ind., and Louisville, Ky., which will be gained by an extension from Cannelton to Leavenworth and Corydon. At the latter point it will connect with the Louisville & Northern Railway & Lighting Company's line, operating between Corydon and New Albany, Ind. The through line when completed will reach Louisville over the Kentucky & Indiana bridge.

Fairmont, Minn.—G. E. Doyle, Fairmont, Minn., together with other business men of this city, is interested in a proposed electric line to Ft. Dodge, Ia. It is intended to build the line north from Ft. Dodge on the east side of the Des Moines river to Humboldt, then north to Algona and from there to Fairmont. It is possible that arrangements may be made for the use of the tracks of the Ft. Dodge Emmetsburg & Spirit Lake Railway in Ft. Dodge when that company's proposed line is completed.

Grand Rapids (Mich.) Electric Railway.—Contracts for the construction of two extensions of this line probably will be let within the next 30 days. One extension is from Bay City to Grand Haven, Mich.; the other from Grand Rapids, Mich., to Montpelier, O. J. W. Boynton, general manager.

Illinois Traction System.—The cars of this system operating between Springfield and Lincoln, Ill., entered the business district of Lincoln for the first time on October 22. They formerly stopped just outside of the city, where a temporary station had been located. A new ticket office has been established in the business district for the convenience of patrons of the line.

Illinois Traction System.—Officials of this company are reported as saying that the new Lincoln-Mackinaw extension of its interurban system will be completed by January 1, 1908. The length of the road will be 27 miles. Eight miles of track has been laid north of Lincoln. An overhead crossing of the Chicago & Alton steam road and a subway under the Cleveland Cincinnati Chicago & St. Louis tracks are included in the plans.

Iowa State Union Railway.—J. A. Cox, Chicago, Ill., who is promoting this 158-mile interurban railway from Des Moines to Elkader, Ia., announces that eastern capitalists stand ready to finance the enterprise when the report of the probable cost and estimated earnings is in shape for them to pass upon the

feasibility of the project. Mr. Cox is now engaged in making this report and expects to be able to submit it within six weeks.

Lewiston Augusta & Waterville Street Railway, Lewiston, Me.—It is stated that the Lewiston-Mechanic Falls division of this line will be opened for traffic during the month of November.

Loyal Railway Company, Seattle, Wash.—A corps of engineers is at work surveying the route for the extension of this company's line in Ballard. By the withdrawal of the petition to improve Market street from Fourth avenue west, due to the objection of property owners, the company must now build its line over a trestle from Twenty-fourth avenue northwest to Thirty-sixth avenue northwest, from which point it will run north to Loyal Heights and the new summer resort, Golden Gardens, now building at Meadow Point. By the terms of the franchise work must be started within a few days.

Manitou, Colo.—It is reported that a scenic railway about one mile long will be built next year up the side of one of the nearby mountains. The railway will be double track its entire distance and passenger cars will be operated by means of heavy steel cables wound around drums, with electricity for the motive power. It is stated that the grade of the road will be 62½ per cent in some places. The cost will be approximately \$50,000. C. W. Stiff, Colorado Springs; C. E. Pond, Colorado City; Dr. Newton N. Burmbach of Denver, and others will form the new company, which will be capitalized at \$200,000.

Marshalltown (Ia.) Light Power & Railway Company.—Announcement is made that Hamilton Browne, 181 La Salle street, Chicago, together with other Chicago capitalists, is preparing to organize a company for the purpose of purchasing the property of the Marshalltown Light Power & Railway Company. If the negotiations terminate favorably it is stated that extensive improvements on the street railway line will be made and that Marshalltown will become the center of an interurban system touching Melbourne and other points, surveys for which already have been made. Fifty thousand dollars in stock of the new company is said to have been sold to local capitalists. The sale price is said to be \$350,000.

Marquette County Gas & Electric Company, Ishpeming, Mich.—It is announced that contracts for the construction of three miles of track will soon be placed by this company. W. J. McCorkindale, general manager and purchasing agent.

Milwaukee Northern Railway, Port Washington, Wis.—Regular service on this company's line between Milwaukee and Cedarburg, Wis., was started on October 28 from the new station at Fifth and Wells streets, Milwaukee. The distance is 19 miles and the run between the two points is made in one hour. In about 10 days the road will be in operation from Cedarburg to Port Washington, where the power house is located, and it is stated that by June of next year the entire line from Milwaukee to Sheboygan will have been completed. Local service between Cedarburg and Milwaukee will be inaugurated on November 1. One hundred-mile mileage books will be sold for \$1.50, 500 miles for \$7.00 and 1,000 miles for \$13. Single tickets will be sold at the rate of 1¼ cents per mile and round trip tickets at the rate of 2½ cents. Ernest Gonzenbach of Sheboygan is general manager.

Missouri Valley Traction Company, St. Joseph, Mo.—This company, which was recently incorporated in Missouri to build an electric interurban line from St. Joseph to Mirabile and Excelsior Springs, Mo., will soon place engineers in the field to make preliminary surveys. The line will be 65 miles long and will extend in an easterly direction from St. Joseph to a point where it can conveniently separate into two lines, one extending to Mirabile and the other to Excelsior Springs. The road will serve an exceedingly rich farming section of Missouri, its terminal points being favorably situated for handling the freight and passenger traffic to be developed. The officers of the company are as follows: Thomas B. Campbell, president; H. G. Krake, secretary; C. W. Campbell, chief engineer; all of St. Joseph, Mo., where the headquarters of the company will be located.

Olney, Ill.—Adam Grimes, who is promoting an interurban line between Olney and Fairfield, Ill., by way of Mt. Erie, Wyanoose and Enterprise, is offering bonds of the company for sale and it is believed that construction of the line is now assured. The grade between the two terminal points is very light and, as the line will provide transportation facilities for a district at present without such accommodation, it is believed there will be no difficulty in disposing of many of the bonds to local interests. It is planned eventually to extend the road to Terre Haute, Ind. An office has been opened in Olney.

Oregon, Ill.—Right of way for the proposed electric line which will connect Rockford, Oregon and Dixon, Ill., has been secured in Oregon and Byron, Ill., and the promoters are now endeavoring to secure right of way on the west side of the river west to Oregon and Rockford, Ill. Options already have been secured for right of way on the east side of the river, but since the preliminary surveys have been completed the west side is said to be the more feasible route. Fred Jones, Charles Etnyre and Arthur Herbert are promoting the line.

Pittsburg & Westmoreland Railway, Irwin, Pa.—This company is about to purchase material for a 4-mile extension. Manning Stires, president, McKeesport, Pa.

Southwest Missouri Electric Railroad, Webb City, Mo.—This company has completed the 7-mile extension of its interurban line from Joplin to Duenweg, Mo., and by the end of the month cars will be in operation between the two points, thus shortening the distance by about one-half. Other extensions also are contemplated on the city lines in Joplin within the near future, one of which will enter Joplin from Villa Heights, making a junction with the main interurban line which extends from Carthage, Mo., to Galena, Kan. These extensions, including a viaduct over the junction of the St. Louis & San Francisco and the Missouri Pacific tracks, will cost about \$200,000. A. H. Rogers, president and general manager, Webb City, Mo.

Suffolk Traction Company, Patchogue, N. Y.—Official advice from A. R. Applegarth, chief engineer of this company, states that one-half mile of track has been laid in Patchogue since the first of the year. Surveys have been completed from Patchogue to Port Jefferson, 14 miles, and engineers are now surveying from Sayville to Babylon, 18 miles. The line will be 40 miles long and will touch the following towns: Babylon, Bay Shore, Islip, Sayville, Bluepoint, Patchogue, Bellport, Port Jefferson and Brookhaven. A contract has been let to Rossiter, MacGovern & Co., 90 West street, New York City, for the construction of the line through Patchogue. Contracts for building the remainder of the line will not be let for several weeks. T. L. Hughes, president, Patchogue, N. Y.

Terre Haute & Western Railroad.—The new interurban line between Paris, Ill., and Terre Haute, Ind., about 20 miles, has been completed and was formally opened for traffic on October 26.

Wampum & New Castle Street Railway, New Castle, Pa.—A certificate of extension has been filed by Wylie McCaslin, attorney, for the purpose of allowing this company to cross the county bridge near Moravia with its interurban line and from there build to West Pittsburg and New Castle, which city it will enter by way of Pennsylvania avenue.

Washington Railway & Power Company, Vancouver, B. C.—It is announced that the work of completing the street railway lines in Vancouver will be started at once and pushed to an early completion in order that cars may be in operation within 60 days.

Waterloo Cedar Falls & Northern Railway, Waterloo, Ia.—Announcement is made that this company expects to lay about two miles of track in Waterloo during the coming year. C. D. Cass, general manager, Waterloo, Ia.

Windsor Essex & Lake Shore Radial Railway, Windsor, Ont.—Service on this interurban line was started this week between Windsor and Kingsville, Ont. The cars are equipped with the pantagraph trolley and are built to maintain a speed of from 40 to 60 miles an hour. As soon as arrangements have been completed for the crossing of the Michigan Central tracks by those of the trolley company, through service from Windsor to Essex will be afforded. W. S. Piggot, secretary, Windsor, Ont.

POWER HOUSES AND SUBSTATIONS.

Chattanooga (Tenn.) Railways Company.—The additions to the Ridgedale plant of this company are nearly completed. To provide for emergency, feeders will be run from the Chattanooga Electric Company to the Ridgedale plant.

Chicago Lake Shore & South Bend Railway, South Bend, Ind.—The power house of this company in Michigan City is well under way. It is expected that the roof will be placed early next month.

Richmond (Va.) Traction Company.—This company has secured a permit to erect a brick substation costing \$7,500.

Rhode Island Company, Providence, R. I.—This company is making plans for an increase in the capacity of its power house on Manchester street, Providence. This station was completed about a year ago, but the increase in traffic makes an increase in power capacity necessary.

Personal Mention

Mr. George Sengel, Jr., has been appointed manager of the Eureka Springs Light & Traction Company, Eureka Springs, Ark.

Mr. H. Hobart Porter of Sanderson & Porter, 52 William street, New York, has been appointed consulting engineer for the Interborough-Metropolitan Company of New York.

Mr. R. R. Smith, general manager and purchasing agent of the Evansville & Southern Indiana Traction Company, Evansville, Ind., has resigned to accept a similar position with the Louisville (Ky.) Railway.

Mr. William E. Haven, heretofore assistant superintendent of the Auburn & Syracuse Electric Railroad, has been appointed superintendent of the Oswego (N. Y.) Traction Company, succeeding Mr. George L. Wright, resigned.

Mr. F. A. Hewitt, heretofore superintendent of the Eastern Pennsylvania Railway, Pottsville, Pa., has been chosen to succeed Mr. George H. Church as superintendent of the Middletown, Conn., lines of the Consolidated Railway.

Mr. C. F. de Muralt, of the firm of Muralt & Co., consulting engineers, New York, has been appointed to fill the newly created chair of applied electrical engineering at the University of Michigan. He will, however, continue in active practice.

Mr. H. C. Barrow, formerly superintendent of the Lehigh Valley Transit Company, has resigned. He has been associated with this company since 1899, at that time coming from Brooklyn, where he was superintendent of the Nassau Railroad. He also was connected at one time with the Indianapolis Street Railway.

We are advised that the announcement of the appointment of Charles E. Fritts as chief engineer of the Kansas City Railway & Light Company, succeeding Mr. Charles N. Black, resigned, as published in the Electric Railway Review of October 5, was an error. Mr. Fritts' correct title is electrical engineer of the Metropolitan Street Railway, Kansas City, Mo.

Mr. Guy W. Talbot, vice-president and general manager of the Oregon Electric Railway Company, Portland, Ore., has announced the following appointments, effective on November 1: Mr. George F. Nevins, traffic manager and auditor; Mr. C. A. Coolidge, superintendent; Mr. C. D. Philipp, chief dispatcher; Carey & Kerr, counsel; Dr. E. F. Tucker, chief surgeon.

Mr. F. W. Coen, secretary and treasurer of the Lake Shore Electric Railway, has been appointed general manager, with headquarters at Cleveland, O., succeeding the late F. J. Stout. Mr. John P. Witt has been elected secretary and assistant treasurer, with office at Cleveland. Mr. Coen will retain the office of treasurer. He has been connected with the company since 1893. He was elected secretary in 1901 and in 1905 was made treasurer also.

Mr. D. G. Edwards has resigned as vice-president in charge of traffic of the Ohio Electric Railway and the Terre Haute Indianapolis & Eastern Traction Company, with headquarters at Cincinnati, O., and Indianapolis, Ind., and has been elected president of the Indiana Columbus & Eastern Traction Company and the Lima & Toledo Traction Company, which are operated by the Ohio Electric Railway, succeeding Mr. W. Kesley Schoepf. Mr. Edwards has held his present position since the fall of 1905, prior to which time he was traffic manager of the Cincinnati Hamilton & Dayton Railway.

Mr. D. W. Dozier, whose resignation as chief engineer and superintendent of power stations of the Twin City Rapid Transit Company, Minneapolis, was announced in last week's issue of the Electric Railway Review, has occupied this position for the past five years and as superintendent of the construction and installation of machinery for the new power station in Minneapolis, one of the largest and best equipped stations west of New York City, was instrumental in bringing the undertaking to a successful finish. Mr. Dozier came to the Twin City Rapid Transit Company from Kansas City, Mo., where for 16 years he was associated with the street railways of that city as chief engineer in the designing, building and operation of power stations. His street railway experience covers a period of 23 years, his first work in this line being in 1886, when he was sent by the E. P. Allis Company of Milwaukee to superintend the erection and initial operation of the first pair of engines to be installed for the Grand Avenue Cable Railway Company, then known as the

"Holmes Brothers" lines, of Kansas City. After completing this work he was retained by Holmes Brothers as chief engineer in charge of all power and cable machinery, where he remained for more than 16 years. With the consolidation of all the old cable lines and the rehabilitation of the whole system for electrical operation came the need for new power stations, many of which were designed by and built under the supervision of Mr. Dozier. One of these was the Kaw river station of the Metropolitan Street Railway, which at that time, it is said, had the best record for economy of any station of its size in the country. Previously to entering street railway work he was associated with prominent engine builders, among them being the E. P. Allis Company of Milwaukee, where he was employed for eight years as superintendent of erection. After more than 30 years of continuous service Mr. Dozier will now give up active engineering work and devote his time to farming pursuits near Springfield, Mo. Mr. George Caywood of the Allis-Chalmers Company, Milwaukee, Wis., will succeed Mr. Dozier as chief engineer of the Twin City Rapid Transit Company.

Mr. Frank R. Henry, whose portrait is presented herewith, was elected president for the ensuing year of the American Street and Interurban Railway Accountants' Association at its recent meeting at Atlantic City, succeeding Mr.



Frank R. Henry.

C. L. S. Tingley, second vice-president of the American Railways Company, Philadelphia, Pa. Mr. Henry is auditor of the United Railways Company of St. Louis, Mo., and previous to the organization of that company was auditor of the St. Louis Transit Company, which was absorbed by the United Railways. Mr. Henry has for several years taken an active interest in the work of the Accountants' association and its predecessor, the Street Railway Accountants' Association of America, and in October, 1904, was elected president of the latter association. During the past year he was editor of the question box of the Accountants' association, and in June, 1907, he was elected second vice-president, succeeding Mr. C. F. Bryant, resigned.

Mr. Richard T. Laffin, vice-president and general manager of the Manila Electric Railroad & Light Company, has resigned, having completed the task of establishing the operating organization of this property on a sound earning basis. The management is now assumed by Mr. C. B. Graves, who has been Mr. Laffin's right-hand man since the property was placed in operation three years ago, acting as manager of the lighting and power department.

Mr. George Caywood, whose appointment to succeed Mr. D. W. Dozier as superintendent of the Twin City Rapid Transit Company at Minneapolis was announced in the Electric Railway Review for October 26, was born and educated in Farmington, Ill., and is about 40 years old. He learned the machinist's trade at the Murry Iron Works in Burlington, Ia., later joining the erecting force of the Edward P. Allis Company, now the Allis-Chalmers Company of Milwaukee. During his connection with this company, which dates from 1898, he has installed some of the largest power plants in the west, including those of the Northwestern Elevated Railroad, Chicago; Cincinnati (O.) Gas & Electric Company; Toledo (O.) Railways & Light Company, and the Union Light & Power Company, St. Louis, Mo. Mr. Caywood severs his connection with the Allis-Chalmers Company to become superintendent of the Twin City Rapid Transit Company, as earlier stated.

Obituary.

William F. Van Pelt died of paralysis on October 22 at his home in Morristown, N. J., after an illness of three days. He was auditor of the Manhattan Elevated Railway, New York City, during the time of its construction, and at the time of his death was associated with the Equitable Life Assurance Company at Newark, N. J.

Financial News

Metropolitan Street Railway, New York.—Following the instructions of the court the receivers of the New York City Railway and the Metropolitan Street Railway made no attempt to pay the rental due on October 31 from the Metropolitan to the Third Avenue Railroad. Under the terms of the lease this will act as a default and divorce ultimately the two systems, as the stockholders of the Third Avenue system will undoubtedly proceed to take control of their property.

Ohio Electric Railway, Cincinnati, O.—The organization of the company has been completed by the election of the following directors: W. Kesley Schoepf, Norman McD. Crawford, F. A. Healy, D. G. Edwards, J. B. Foraker, Jr., and Dana Stevens of Cincinnati; J. Levering Jones of Philadelphia; and Hugh J. McGowan of Indianapolis. The following officers were elected: W. Kesley Schoepf, president; Norman McD. Crawford, vice-president; F. A. Healy, secretary-treasurer.

Oklahoma City Railway, Oklahoma City, Okla.—The authorized capital stock has been increased from \$1,000,000 to \$3,000,000.

West Penn Railways Company, Pittsburg, Pa.—Gross earnings in the year ended September 30, 1907, amounted to \$1,559,031, and operating expenses and taxes to \$848,876, leaving net earnings of \$710,155. Interest amounted to \$400,476 and the surplus to \$309,679, from which dividends on the preferred stock, amounting to \$137,500, were deducted, leaving a final surplus of \$172,179.

Winona Interurban Railway, Winona Lake, Ind.—The following officers have been re-elected: President, H. J. Heinz, Pittsburg; vice-president, J. F. Beyer, Warsaw; secretary and general manager, S. C. Dickey, Winona Lake; treasurer, William M. Camp, Bement, Ill. The directors issued a formal statement denying reports that the road would be sold.

ELECTRIC RAILWAY EARNINGS.

Illinois Traction Company, Champaign, Ill.

September—	1907.	1906.
Gross earnings	\$344,965.97	\$266,843.84
Expenses and taxes	187,938.00	140,069.68
Net earnings	157,027.97	126,774.16
January 1 to September 30—		
Gross earnings	\$2,722,482.83	\$2,163,308.13
Expenses and taxes	1,534,073.39	1,193,275.77
Net earnings	1,188,409.44	970,032.36

Kansas City Railway & Light Company.

September—	1907.	1906.
Gross earnings	\$534,923.15	\$476,755.91
Operating expenses	262,980.00	224,968.41
Net earnings	271,943.15	251,787.50
Taxes and interest	156,157.42	144,599.87
Net income	115,785.73	107,187.63
July 1 to September 30—		
Gross earnings	\$2,087,825.34	\$1,875,097.84
Operating expenses	1,072,997.20	934,208.79
Net earnings	1,014,828.14	940,889.05
Taxes and interest	619,891.07	573,950.03
Net income	394,937.07	366,939.02

New Orleans Railway & Light Company.

September—	1907.	1906.
Gross earnings	\$466,160.97	\$441,807.22
Operating expenses	268,142.02	239,823.29
Net earnings	198,018.95	201,983.93
Fixed charges	165,664.23	157,463.35
Net income	32,354.72	44,520.58
Other deductions	3,919.86	2,892.84
Surplus	28,434.86	41,627.74

Twin City Rapid Transit Company, Minneapolis, Minn.

September—	1907.	1906.
Total earnings	\$561,446.34	\$534,151.30
Total operating expense	251,275.99	236,926.07
Net earnings	310,170.35	297,225.23
Charges and taxes	115,141.69	114,758.32
Surplus	195,028.66	182,466.91
January 1 to September 30—		
Total earnings	\$4,540,272.79	\$4,217,437.55
Total operating expense	2,180,436.51	1,951,049.87
Net earnings	2,359,836.28	2,266,387.68
Charges and taxes	1,036,741.69	1,004,152.81
Surplus	1,323,094.59	1,262,234.87

Manufactures and Supplies

ROLLING STOCK.

Union Street Railway, New Bedford, Mass., is reported to have purchased eight new cars.

Corry & Columbus Street Railway, Corry, Pa., contemplates the purchase of one double-truck combination passenger and baggage car.

Marquette County Gas & Electric Company, Ishpeming, Mich., is reported to be in the market for one single-truck closed car and two closed trailers.

Louisville & Northern Railway & Lighting Company, New Albany, Ind., has placed an order with the American Car & Foundry Company for four double-truck cars. They are to be built at the Jeffersonville, Ind., plant.

East Liverpool Traction & Light Company, East Liverpool, O., which was reported in the Electric Railway Review of September 28 to be in the market for 24 double-truck cars, is said to have placed an order for nine cars with the G. C. Kuhlman Car Company.

Little Rock Railway & Electric Company, Little Rock, Ark., which was reported in the Electric Railway Review of August 10 to have placed an order for seven semi-convertible cars, officially advises us that the St. Louis Car Company was awarded the contract. The order was placed September 1 and delivery is to be made December 15, 1907. The specifications call for the following details:

Seating capacity.....	Width, inside
.....44 passengers	Over all
Wheel base	Height, track to trolley base
Length of body.....	.....12 ft. 6 in.
Over vestibule.....	Body
Length over all.....	Underframe.....

Special Equipment.

Bolsters	Open-hearth steel	Heating system	Consolidated Car-Heating Co.
Brake rigging....	Equalizing	Interior finish.....	Mahogany
Brakeshoes	Streeter	Journal bearings .....	.....
Center bearings...	Symington	.....	Brass and babbitt metal
Couplers.....	St. Louis Car Co.	Markers.....	Adams & Westlake
Curtain fixtures .....	.....	Motors	4 GE-80
.....	Curtain Supply Co.	Paint .....	.....
Curtain material....	Pantasote	.....	Pullman standard body color
Destination signs.....	.....	Safety tread .....	.....
.....	Hunter illuminated	.....	Stanwood steel step
Fenders	Co. standard	Sanders	Co. standard
Gears and pinions.....	.....	Seats	Heywood
.....	E. W. Bliss & Co.	Brothers & Wakefield Co.	.....
Gongs	Brill Dedenda	Trolley poles and attach-	.....
Hand brakes	Peacock	ments.....	General Electric Co.
Air brakes.....	.....	Varnish	Murphy
National Brake & Elec. Co.	.....	
Headlights	Mosher		

SHOPS AND BUILDINGS.

Birmingham (Ala.) Railway Light & Power Company.—The passenger and freight station which this company is building at Bessemer, Ala., as reported in the Electric Railway Review of October 19, will be 30 by 150 feet in size, and of brick construction. Ford, Bacon & Davis of New York are the architects.

Duluth (Minn.) Street Railway.—The new office building at Twenty-sixth avenue west and Superior street, the plans for which were described in the Electric Railway Review of April 27, will be ready for occupancy in a short time. As soon as the interior decorations are completed the office force will move from their present quarters in the power station on Eleventh avenue west.

Indiana County Railways, Indiana, Pa.—Work has been started on the construction of a brick building, 30 by 100 feet, which will be located on the company's property just south of Indiana. The building will be used as a machine shop. In the early spring the company intends to build a car house on property adjoining the structure now under construction.

Indianapolis & Northwestern Traction Company, Indianapolis, Ind.—Contracts have been awarded for remodeling the company's station on Third street, Lafayette, Ind., and work will begin in a few days. The waiting room of the building will be greatly enlarged.

Macon (Ga.) Railway & Light Company.—Within the next

two weeks work will be started on the construction of a steel frame transfer station at the corner of Fourth and Mulberry streets, Macon. The Electric Railway Review of October 19 reported that the officials of the company were contemplating the erection of this building.

Suffolk Traction Company, Patchogue, N. Y.—This company, which has just commenced construction of a line from Brookhaven to Babylon, via Patchogue, N. Y., and from Patchogue to Port Jefferson, all on Long Island, advises us that plans for its buildings have not yet been prepared, most of the company's time now being devoted to the detail work of construction. It is expected that during the next three months plans for the power house and substations, machine shops, car barns, and a machinery list will be prepared, so that bids can be asked about February 1. J. G. Brackenridge, president of Rossiter, MacGovern & Co., 90 West street, New York, is chief engineer for the road and A. R. Applegarth of Patchogue is the company's resident engineer.

TRADE NOTES.

Steel Car Forge Company, 1124 Frick building, Pittsburg, Pa., it is reported will establish a plant at Hammond, Ind.

Watson-Stillman Company, 26 Cortlandt street, New York, has appointed the Vandeyck-Turchill Company, 91 Arch street, Philadelphia, Pa., sole agents for its products in that territory.

Pressed Steel Car Company, Pittsburg, Pa., has declared the regular quarterly dividend of 1¼ per cent on its preferred stock, payable on November 27 to stockholders of record on November 6.

Helwig Manufacturing Company, St. Paul, Minn., manufacturer of pneumatic tools, has removed its offices from the German-American Bank building to the Scandinavian-American Bank building.

American Creosoting Company, 600 Ellsworth building, Chicago, which has eight new creosoting plants under construction, expects to have its Springfield, Mo., plant in operation by November 15.

Central Inspection Bureau, 17 State street, New York City, has received an order to inspect a large number of trucks for the Newburgh & South Shore, which are to be built by the Middletown Car Works.

McClintic-Marshall Construction Company, Pittsburg, has been awarded the contract for the erection of a fireproof foundry building, 299 by 326 feet, for the United States Radiator & Boiler Company, West Newton, Pa.

Pressed Steel Car Company, Pittsburg, Pa., and the Western Steel Car & Foundry Company, Chicago, Ill., have opened a joint office in St. Louis, occupying a suite of rooms, Nos. 503, 504 and 505, National Bank of Commerce building.

W. M. Hoke, Atlanta, Ga., for the past seven years secretary and purchasing agent of the Atlanta Steel Company, has resigned to open an office and yard for the sale of machinery, iron and steel, metals, new and relaying rails and supplies.

Nashville Bridge Company, Nashville, Tenn., has completed its new plant and will equip it with about \$20,000 worth of machinery. During the past year the business of this company has increased 50 per cent, it is said, and it now operates in every section of the south.

Keuffel & Esser Company, New York, has moved its main offices to Hoboken, N. J. The company's new building at 48-50 Second street, San Francisco, Cal., has been opened and a large and complete stock of scientific instruments, drawing materials, etc., will be carried.

John F. Allen, 370 Gerard avenue, New York, has received an order from the Hawley Down Draft Company, Chicago, for an Allen stack riveter of unusual size and capacity. It will reach 84 inches into a stack 8 inches in diameter, and drive 1-inch hot rivets or ½-inch cold rivets.

A. B. C. Corporation, American National Bank building, Richmond, Va., announces its recent acquisition from the Atlantic Brass Company of New York of all the patent rights and licenses of the A. B. C. journal bearing and wedge. Walter D. Thomas is president of the new company.

The J. G. Brill Company, Philadelphia, Pa., has declared the regular quarterly dividends of 1¼ per cent on the preferred stock, payable November 1 to stockholders of record October 28, and of 1 per cent on the common stock, payable on December 14 to stockholders of record on December 12.

United States Steel Corporation has declared a regular quarterly dividend of 1¼ per cent on the preferred stock, pay-

able on December 30 to stockholders of record November 6 and one-half of 1 per cent on the common stock payable on December 30 to stockholders of record December 9.

Atha Steel Casting Company, Newark, N. J., is temporarily embarrassed, as a result of the stringency in the money market, and Judge Cross of the United States circuit court has appointed Benjamin Atha and Ernest F. Horder of Newark and George A. Hebard of Brooklyn, N. Y., receivers. It is expected that the difficulties will be speedily adjusted.

Atlas Export & Trading Company, New York, has been incorporated with a capital stock of \$5,000 to manufacture machinery and appliances for building railroads. Incorporators: Robert T. Wood, Cold Spring, N. Y.; William L. Seyers, 218 West One Hundred and Twenty-first street, New York; Charles Stevenson, 114 West Forty-fourth street, New York.

Allis-Chalmers Company, Milwaukee, held its annual meeting at Jersey City, N. J., on October 24. Walter H. Whiteside of Milwaukee was re-elected president and Elbert H. Gary was elected chairman of the executive board. All the old directors were re-elected and Herman W. Falk, president of the Falk Manufacturing Company, Milwaukee, was added to the board.

Whitmore Manufacturing Company, Cleveland, O., will hereafter solely manufacture the Whitmore gear protective composition, and the secret formula for this product has been taken over by S. W. Whitmore. Mr. Whitmore has resigned as president and general manager of the Plomo Specialty Manufacturing Company of Cleveland, and will devote his time to the new company.

Southwestern Bridge Company, Joplin, Mo., has opened the following contracting offices: Dallas, Tex., 806 Wilson building, J. I. Boggs, contracting engineer; Oklahoma City, Okla., 317 Culbertson building, R. X. Basford, contracting engineer; Denver, Colo., 726 Symes building, George A. Sears, contracting engineer. The company has received contracts for all the bridges to be built on the line of the Joplin & Pittsburg Interurban Railway.

W. H. Hansell has been appointed sales agent of the Standard Roller Bearing Company, Philadelphia, Pa., and is in complete charge of the company's street railway work. Mr. Hansell, who is a graduate of the University of Pennsylvania, from 1893 to 1897 was president and manager of the Hansell Spring Company, Newark, N. J., and from 1902 until his recent resignation was superintendent of the spring department of The J. G. Brill Company.

Union Switch & Signal Company, Swissdale, Pa., states that its new buildings are rapidly approaching completion. They comprise a foundry, a forge shop and a power house, and will add about 40 per cent to the floor space of the Swissdale works. The machinery for the new shops has been purchased and is now being delivered. The shops have some novelties in design and construction, and the company believes they will be the finest in the Pittsburg district.

Dossert & Co., New York, have received an order from the Pennsylvania Railroad for 160 Dossert 2-way connectors for No. 0000 cable. These joints are to be made without using solder, and are to be installed on the cars equipped for the Paoli local service out of Philadelphia. The motive department of the Pennsylvania is preparing to equip a large number of additional cars with the Dossert solderless connectors, where the train line wires are below the floor of the car.

Northern Engineering Works, crane and hoist builder of Detroit, Mich., is adding a new power station to its plant. The boiler and coal storage station will be built at once and will be approximately 30 by 60 feet in size, one story, fireproof construction throughout, with reinforced cement roof, iron doors, etc. It will be equipped with Wickes boiler, Murphy stoker and Webster heater. Contracts have been let. The plans were made by Smith, Hinchman & Crylls, engineers and architects, Detroit.

Westinghouse, Church, Kerr & Co., New York, state that they have on hand about 40 contracts, representing some very important construction work. In this work are engaged upward of 100 engineers and about 7,000 operatives. One of the largest contracts the company is engaged in is the work of the Pennsylvania Railroad terminal in New York City. Other contracts are for the Erie, the New York New Haven & Hartford and the Wabash railroads. The amount of money involved in the completion of this work approximates from \$25,000,000 to \$50,000,000.

Green Engineering Company, Chicago, has sold a great many of its automatic traveling link grates to steam and electric railways in the middle west. Among the electric railways

which have installed them are: Columbus Railway & Light Company, Columbus, O., 2,800 horsepower; Chicago Union Traction Company, 10,000 horsepower; Omaha & Council Bluffs Street Railway, 3,000 horsepower; East St. Louis & Suburban Railway, 7,000 horsepower; Metropolitan Street Railway, Kansas City, Mo., 18,200 horsepower; St. Louis Transit Company, 16,000 horsepower; Illinois Traction System, 20,000 horsepower; Toledo Railways & Light Company, Toledo, O., 5,000 horsepower. The Green traveling link grate has proved especially adaptable to large power stations of electric railways, because of its automatic action and adaptability to the low grades of bituminous coal.

Westinghouse Machine Company has not been subjected to even a momentary pause in its operations because of the recent receivership, and the personnel remains unchanged. In a circular letter issued October 26 by the receivers, William McConway, W. H. Donner and E. E. Keller, it is said that there will be no departure from the general policy followed in the past and that the receivers will, during their incumbency, spare no pains to maintain the cordial relations which have always existed between the Westinghouse Machine Company and its customers.

H. V. De Hart and W. H. Stafford have formed a partnership to handle a general line of iron and steel products, including structural steel, billets, plates, bars, malleable and steel castings, light rails, etc. Mr. De Hart was formerly manager of sales for Milliken Brothers, Incorporated, and before that general sales agent of the Passaic Steel Company. Mr. Stafford was also connected with the Passaic Steel Company, but more recently with the Hay Foundry & Machine Company as contracting engineer. The headquarters of the new firm will be at 29 Broadway, New York.

J. G. White & Co., Incorporated, New York, has contracted with the Alliance Gas & Power Company of Alliance, O., to act as consulting engineer and supervise the purchase and installation of new machinery, consisting of a large turbine generator and a battery of 350 horsepower boilers, with complete auxiliaries for both electrical and steam ends. The new equipment will be installed in the old plant of the Alliance Gas & Power Company through the winter and will be transferred later to a new plant, the construction of which will be begun by the engineers early in the spring.

Electric Railway Improvement Company, Cleveland, O., recently demonstrated the traction qualities of one of its bond brazing and welding cars by running it with its own motor from Cleveland to Massillon, O., a distance of 72 miles. The car left Cleveland as a special on the Akron Bedford & Cleveland Railway and ran as such to its destination. The bonding cars made by this company are equipped with motors capable of driving the car 20 miles an hour. The car which made the journey has been leased to the Northern Ohio Traction Company and will be used in bonding the Greenville extension of that railway.

Chicago Pneumatic Tool Company, Chicago, has issued a statement of profits for the nine months ended September 30, 1907:

Profits for the nine months.....	\$727,284.75
Less—Depreciation of buildings, plant and machinery, including repairs and renewals of buildings and plant	\$131,508.15
Less—Written off for developing and perfecting new tools.....	16,200.00
	<hr/>
	\$147,708.15
Net profit	\$579,576.60
Interest and sinking funds.....	124,754.04
	<hr/>
Profit available for dividend.....	\$454,822.56
Dividends	190,063.49
	<hr/>
Balance carried to surplus.....	\$246,759.07

H. G. Kotten Company, 120 Liberty street, New York, manufacturer of pneumatic tools and appliances, has recently purchased a tract of land at Marion, N. J., upon which the company will soon begin the erection of a new factory. The building will have a frontage of about 75 feet and a length of 150 feet, construction to be of brick and stone with concrete foundation. The front part of the building will be two stories in height, the ground floor to be used for stockroom, hardening and forge room, testing room and engine and boiler room. The second floor will serve as drafting room and offices. The building will have a saw-tooth roof of the latest design. The factory will be fully equipped with modern machinery, which will be operated by large gas engines. The installation of a gas producer plant is now contemplated, as well as other

mechanical devices necessary to an up-to-date plant. The site of the plant extends 150 feet on West Side avenue and runs 200 feet alongside of the tracks of the Pennsylvania Railroad. Upon the completion of this plant the output capacity of the company will be greatly enlarged. The company will continue to manufacture the "Kotten" tools and appliances and a little later will take up other lines which are now in the course of development.

ADVERTISING LITERATURE.

The Arnold Company, Chicago.—This company is mailing a postcard showing the Pittsburg, Kan., shops of the Kansas City Southern, which were recently completed. These shops were designed and constructed by The Arnold Company.

General Electric Company, Schenectady, N. Y.—Motor starting rheostats are a very important feature in motor installations of all capacities. Bulletin No. 4532 describes some recently perfected lines of direct-current motor starting rheostats in capacities up to 50 horsepower and 550 volts. Type SA rheostats are made for 1-minute duty, with no-voltage release, and are suitable for use with shunt, compound or series wound motors. Type SO rheostats are similar to type SA, but have in addition to the no-voltage release attachment, an overload coil in series with the motor armature. Slight variations in design are made for rheostats of different capacities in order to more suitably meet required conditions, and the bulletin illustrates the various styles. An improved type of resistance unit, known as the form P, is used in the smaller capacities. This is an inclosed unit made of low temperature coefficient resistance wire wound on a strong tube. The tube is not brittle and is treated with a special compound, which forms a coating both inside and out, thus reinforcing it and making a very strong and solid construction. The unit is afterward thoroughly baked and when completed is claimed to withstand very rough usage. Types SA and SO rheostats have received the approval of the National Board of Fire Underwriters and comply with the service rules of the American Institute of Electrical Engineers, viz., 1-minute starting duty once every four minutes for one hour.

GASOLINE MOTOR INSPECTION CARS.

The use of inspection cars operated by gasoline engines has been favorably considered on many railroads, both steam and electric. Because of the fact that such cars can operate



Gasoline Inspection Car.

at comparatively high speeds, irrespective of power conditions, they are found to be of considerable use for inspection purposes and night work that must be done after the power is shut off. The accompanying illustration shows a type of car manufactured for Fairbanks, Morse & Co. On one of these cars an interesting record recently was made on the Michigan Central Railroad. It is stated that in a total mileage of 2,327 miles there were used 122.5 gallons of gasoline and 4.5 gallons of lubricating oil. Especially fast runs were, 66.4 miles in 1 hour and 40 minutes, and 39.6 miles in 45 minutes, or at rates of 40 and 52.94 miles per hour, respectively.

SHERWIN-WILLIAMS COMPANY CONVENTION.

"Practical Knowledge" is the keynote of the twenty-seventh annual convention of the Sherwin-Williams Company, which was held at the Chicago plant in Pullman this week.



H. A. Sherwin, President Sherwin-Williams Company.

These annual conventions, the delegates to which are the sales representatives of the Sherwin-Williams Company, have come to have a very important place in the widespread operations of this organization. There were about 250 men in attendance at this week's meeting and the outsider who was admitted to the session was profoundly impressed with the earnestness and the efficiency with which the proceedings were conducted. These gatherings serve a double purpose. They constitute a school of instruction and they form the basis on which to establish and develop the esprit de corps that results in enthusiastic teamwork

wherever the products of the company are offered for sale. Some idea of the character and scope of the convention may be gathered from the programme, which was as follows:

Monday Morning, October 28.—Reception from 8:45 to 9:15 a. m. Address of welcome by Walter H. Cottingham, vice-president and general manager. Address by the treasurer, S. P. Fenn, secretary and treasurer. Distribution of top-notch and other prizes. Inspection of Chicago plant.

Monday Afternoon, October 28.—"The Fundamental Principles Governing the Right Use of Paint," J. C. Beardslee, general superintendent. "The Fundamental Principles Governing the Right Use of Varnish," M. L. Sims, general superintendent of varnish manufacturing department.

Tuesday Morning, October 29.—"S. W. P.—Knowledge of the Goods and Their Proper Application," A. E. Schafer, manager general sales department.

Tuesday Afternoon, October 29.—"Floor Finishes, Painters' Goods, Sundry Shelf Lines—Knowledge of the Goods and Their Proper Application," A. E. Schafer, manager general sales department. "Dry Colors," H. M. Ashby, superintendent dry color works.

Tuesday Evening, October 29.—Smoker at Chicago Beach hotel.

Wednesday Morning, October 30.—"C. & M. Paint and Color Specialties," W. J. Sohlinger, manager C. & M. sales department.

Wednesday Afternoon, October 30.—"C. & M. Paint and Color Specialties" (concluded), W. J. Sohlinger, manager C. & M. sales department. "Credits," S. P. Fenn, secretary and treasurer.

Thursday Morning, October 31.—"C. & M. and Trade Sales Varnishes," W. W. Mountain, manager varnish sales department.

Thursday Afternoon, October 31.—"C. & M. and Trade Sales Varnishes" (concluded), W. W. Mountain, manager varnish sales department. "Railroad, Street Railway and Marine," E. M. Williams, manager street railway sales department.

Friday Morning, November 1.—"Salesmanship—Applica-

tion of Practical Knowledge to Salesmanship," W. H. Cottingham, vice-president and general manager, chairman; assisted by J. F. Hommel, general supervisor; A. D. Joyce, manager southwestern district.

Friday Afternoon, November 1.—"Advertising and Promoting," L. R. Greene, manager advertising department.

The annual banquet will be given at the Chicago Beach hotel on this (Friday) evening. The meetings were held in the large assembly room at the Pullman plant and immediately adjacent thereto were displayed a number of exhibits embracing the products of the company in their various forms and a full line of the literature and advertising matter which the department of publicity and promotion had prepared. Taken all in all the gathering, not only in the subject matter discussed, but in the environment in which it was placed, was a thorough-going, fully organized convention. It is easy for one who has seen these meetings in session to understand in a small degree at least the reasons for the efficiency of the sales organization of the Sherwin-Williams Company.

DAVIS CAST-STEEL WHEEL.

During the past four years James C. Davis, assistant first vice-president of the American Steel Foundries, has been experimenting with a process of improving the strength and wearing qualities of cast-steel wheels, and these experiments have been so successful that this company is now prepared to furnish cast-steel wheels having properties which admirably fit them for severe service under the heaviest cars, both steam and electric. The Davis wheel is made of basic open-hearth cast steel, which is poured into a revolving mold having a velocity of about 200 revolutions per minute. While the first portion of the metal is being poured manganese is introduced into the stream of metal from the ladle in sufficient quantities to fill up the flange and tread of the wheel. The centrifugal motion of the mold throws the metal out to these parts, while the balance of the wheel is filled with the ordinary soft steel, which leaves the hub so that it can be easily bored out. The flange and tread, however, are so hard that they can only be finished by grinding, and the wheels are finished on a Norton emery grinding machine, so that they are truly circular within 4-1,000 of an inch. The steel at the center is about 0.35 carbon and 0.60 manganese, while at the rim the carbon is 0.45 and the manganese 1.75. This large per cent of manganese results in a flange and tread which is unusually hard, exceeding the hardness of the chilled flange on a cast-iron wheel. In the process of manufacture the manganese is introduced in the form of powder fine enough to pass through No. 60 mesh, and it is blown into the stream of hot steel from the ladle by means of a combining tube, which is worked under pressure of air at 80 pounds per square inch. After the wheels are cast they are allowed to cool gradually to a normal temperature and are then heated up to 800 degrees C. and are placed in a hollow circular box, which has small perforations for the passage of streams of water, and the wheel is thus given a water tempering which also toughens the steel. Under the Davis process there is thus produced a cast-steel wheel which has a rim and flange which is at least as hard as that of a chilled cast wheel, but very much stronger, and the hub is soft enough to be easily bored. The wheels are delivered truly cylindric and accurately centered. They are expected to give a mileage more than double that of cast wheels and the margin of safety is materially greater. When the flanges are worn down to M. C. B. limits the wheels may be removed and they have a scrap value which makes the total cost of the mileage obtained not any greater than that of cast wheels.

H. W. Johns-Manville Company, 100 William Street, New York.—Two small folders come from this company. Pointers on pipe covering and the superiority of asbestos-sponge felted pipe covering form the text of one, while the other is devoted to a description of J-M molded mica weatherproof lamp sockets.

Gould Storage Battery Company, New York.—Recent bulletins are No. 8, descriptive of the storage battery plant of the Dayton & Western Railway, and Bulletin No. 9, describing the plant of the Rutland Railway Light & Power Company. The third edition of "Facts," a description of Gould plates, is also being distributed.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—General catalogue No. 20 is a leather-bound, 144-page volume of handy size, illustrating and describing a complete list of track tools and a line of general railway supplies, particularly those used by maintenance of way departments. Twenty pages of information useful to those having to do with maintenance of way are also included, making it quite valuable for this class of men.



W. H. Cottingham, Vice-President Sherwin-Williams Company.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 19

CHICAGO, NOVEMBER 9, 1907

WHOLE No. 237

TABLE OF CONTENTS.

Editorial:	Piping and Power Station Systems—LXL By W. L. Morris.	
—Fire Cars for Storage Yards.....	M. E. (Illustrated).....	767
—Effective Weed Elimination.....	News of the Week:	
—Trolley and Wire Maintenance.....	—Trade Extension Trip.....	770
—The Cleveland Election.....	—Recent Accidents.....	770
—Depreciation as a Factor in Rates.....	—Adjust Differences on Chicago Plan.....	770
—The Problem of Traffic Congestion on the Chicago Ele- vated Loop.....	—Elevated Changes Advocated in Chicago.....	770
Communications.....	Tom L. Johnson Re-elected Mayor of Cleveland.....	770
Recent Interurban Improvements at Terre Haute (Illustrated). 755	Construction News:	
Annual Reports:	—Franchises.....	771
—Montreal Street Railway.....	—Recent Incorporations.....	771
—Boston Elevated Railway.....	—Track and Roadway.....	772
Examination into Operating Results on the Chicago Elevated Loop.....	—Power Houses and Substations.....	774
New Form of Power Station Report Blank (Illustrated).....	Personal Mention.....	775
Progress on Uniform Accounting System in New York State....	Financial News:	
Book Table.....	—Electric Railway Earnings.....	775
Fire Car for the South Side Elevated Railroad (Illustrated)....	Manufactures and Supplies:	
Standard Location of Third Rail (Illustrated).....	—Rolling Stock.....	776
Report of Expert Accountants on the Municipal Traction Com- pany of Cleveland.....	—Shops and Buildings.....	776
	—Advertising Literature.....	777
	Westinghouse Test Locomotives (Illustrated).....	777
	Centrifugal and Turbine Pumps (Illustrated).....	778

The new fire car which has recently been placed in service by the South Side Elevated Railroad of Chicago, as described elsewhere in this issue, represents a most progressive and convenient means for the protection of electric railway property. Similar cars have been used by the Metropolitan West Side Elevated Railway with

success for some time. The car is simply a box body, built on an old flat car and made fireproof, equipped with a double chemical engine and other fire-fighting appliances. The car is kept at one of the storage yards on a clear track and is always ready for immediate use. This company's cars are stored at night in open yards where there is no provision for an overhead sprinkling system, and although the yards are provided with fire hose and a large number of hand chemical extinguishers the fire car was adopted as an additional precaution. The fire car can be run to any point in the yards in a very short time and on account of the extremely simple operation of the chemical engine no extra crew is required. One man could easily handle the car and the fire apparatus alone in case of a small fire and a comparatively large fire could be extinguished by two men, using both hose, before the city fire engines could arrive on the scene. The cost of maintenance of the car and apparatus is practically nothing and the saving in insurance premiums should pay for the first cost in a very short time. For companies having open storage yards such a car should prove an exceedingly valuable addition to the equipment.

On many interurban lines operating over a private right of way the accumulation of grass and weeds on the track between and at the outsides of the rails causes slippery track and makes operation dangerous, besides being unsightly and expensive to remove. In the case of one of the Stone & Webster companies operating on a rich black soil in which Johnson grass and Bermuda grass grow abundantly, the cost of removing weeds was last year about \$900 per month. This season it was determined to cut down

this expense if possible, and the apparatus developed made a saving of about \$700 a month in addition to solving the problem more effectively than before. There were mounted on a flat car three discarded storage air drums to be used as a crude oil reservoir, having a capacity of 10 barrels. Pipes led the oil to burners under an air pressure of 70 pounds. An independent air line was run direct to the burners in order to atomize the oil. Four burners were piped into a drum 8 by 8 by 10 inches in dimensions, with a 6-inch opening in front of the burners. The drum was found to confine sufficient heat around the burners to produce almost perfect combustion. An apron of sheet iron was riveted to the top of the drum and extended back 6 inches over the track to hold the flame down on the grass. In operation this sheeting becomes red hot and aids materially in drying and burning the grass. The entire burning outfit is suspended from two levers, one on each side of the car, and can be raised or lowered to meet any conditions. The air compressor in use has a capacity of 109 cubic feet of free air per minute. While the flame from these burners is intensely hot, but little trouble has been experienced from ties catching fire. Both sand and water are carried on the car to be used in preventing the spread of fire, and the burner is followed by a track walker who looks out for bridges and ties. Tests have shown that it requires 0.8 barrel of crude oil to clean a mile of track with the burners moving at 2.5 miles per hour. When the grass is high and wet it is necessary to go over the track twice to burn it completely.

The suggestion was recently made that in some cases it might be more economical to use trolley wheels of a hard metal, wearing out the wire rather than the wheel. The idea doubtless was the result of operating experience in which someone had suffered from short life in his trolley wheels, but a very little consideration shows that it is a far more expensive policy to throw excess wear upon the overhead wire than to pay the cost of replacing wheels. Exact figures of the cost of trolley wire mainte-

nance, per car-mile are rather difficult to secure, for the reason that most companies report the total cost of overhead maintenance, including feeders, insulators, poles and suspension. Again, the cost varies in different classes of service. A fair figure based on the total overhead maintenance cost of a large city company in a recent year would be 0.2 cent per car-mile, assuming that two-thirds of the up-keep expense was due to the trolley wire and the balance to the rest of the overhead system. Assuming that a 6-inch wheel were used at a net cost of \$1.00, allowing for its scrap value 50 cents, and that a life of 15,000 miles were obtained, the cost per mile would be about 0.007 cent. With a longer life the wheel would show a still greater economy, and even if the trolley maintenance fell as low as 0.1 cent per car-mile the replacement of wheels would be ten times as cheap on a life of but 10,000 miles. The cost of trolley maintenance in fast interurban service might approach this figure, and the wheel life might drop to 5,000 miles. Even so, the maintenance of trolley wire would be five times as costly per car-mile as the renewal of wheels. These questions of renewal seem small when the cost of a trolley wire breakdown on a busy line is compared with the cost of an interruption due to a broken trolley wheel. It is hard to express the former in figures, but even if a car has but one trolley and carries no spare wheel, it can generally make its way along the line on the harp contact alone or by being pushed or hauled by another car to the nearest car house. To increase the chances of a service interruption by trying to wear out the trolley wire at the expense of the wheel is clearly a mistaken policy.

THE CLEVELAND ELECTION.

The result of the election in Cleveland is disappointing. As the issues which were raised during the campaign rested squarely on the traction situation, but did not directly involve the broad question of municipal ownership the effect will be local. Although unsuccessful, the campaign conducted by Congressman T. E. Burton was dignified, unevasive and characterized by a public-spirited attitude toward the harassed Cleveland Electric Railway. The pre-election activity of Mayor Tom Johnson and the host of city employees that worked strenuously on his behalf was marked by the tricks and manners of tried and trained politicians. It may be set down, therefore, that the re-election of Mayor Johnson is an example of the skilful employment of political methods and that it does not represent either a certain public sentiment in favor of municipal ownership or operation or a public desire that the city authorities should continue to dog the Cleveland Electric Railway.

In the candidacy of Congressman Burton Cleveland had an opportunity which, in justice to itself, it should not have rejected. The present mayor deserved such inadequate rebuke as the election of his opponent would have been to him, because he has consistently misused the problems of the city, making them factors in his game of politics. All problems of transportation in large cities are sufficiently grave to merit the best and fairest efforts of municipal executives toward solution.

In another part of this issue we give some of the results of an analytical examination by expert accountants into the condition of the Municipal Traction Company which has been foisted on Cleveland by Mayor Johnson. These show that the 3-cent fare charged by this road resulted in a deficit, and that in the accounts of the company items which should properly have been set up as liabilities were not shown.

The paternal attitude of the city government and Mayor Johnson toward the company is brought out clearly. One illustration of the favor with which the company has been assisted by the city relates to licenses. In fairness the Municipal company should be treated in exactly the same way in which other corporations are used. The facts were that

the company purchased licenses from the city for the year ending January 31, 1908; but although cars were operated from November 1, 1906, to January 31, 1907, the accountants found no record of any payment for licenses covering this period. While the amount involved is insignificant the fact that it is so small makes especially notorious the attitude of the city officials.

There can be no dispute with the conclusion of the accountants that proper accounting requires that every liability incurred by the company in a given month be taken up before the books are closed for that month. They point out that the method of the Municipal company is to enter bills only as they are paid. This practice of course leaves statements incomplete. Various instances of the failure to set up liabilities as they accrue are presented, and these liabilities are set up by the accountants in an adjusted general balance sheet. They cover accrued liability for the purchase of power, for the rental of a viaduct, for the use of city water, for the payment to the state of a tax on gross earnings, for city and county taxes and corporation franchise taxes.

Among other deficiencies which are pointed out by the accountants are failures to set aside reserves for fire insurance, for damage claims and for depreciation of tangible property. The failure to provide insurance except on boilers and office furniture appears to be a direct violation of the lease from the Forest City Railway. To set aside a regular fund as a reserve against claims for damages would be in accord with the best practice of electric railways. In discussing the lack of a provision for depreciation the accountants show that the company made no charges whatever up to June 30, 1907, for maintenance of equipment or of way and structures.

Costly, and unnecessary tribulations were endured by voters of Chicago for many years before they learned the truth, long evident to a minority, that the traction question was employed and abused solely for the purpose of aiding political fortunes. How long will it be before the people of Cleveland discern that they have been imposed upon in the same way?

DEPRECIATION AS A FACTOR IN RATES.

The Wisconsin legislature of 1907 passed a comprehensive public utility law placing telephone, lighting, heat, water or power companies, or municipalities engaged in like business, under the control of the state railroad commission.

An important section of this law requires that "every public utility shall carry a proper and adequate depreciation account whenever the commission after investigation shall determine that such depreciation account can be reasonably required." The commission shall "determine what are the proper and adequate rates of depreciation of the several classes of property of each public utility. The rates shall be such as will provide the amounts required over and above the expense of maintenance, to keep such property in a state of efficiency corresponding to the progress of the industry." The commission shall prescribe forms of accounts regarding such depreciation and shall consider depreciation in fixing rates, tolls and charges to be paid by the public.

Under this law, which took effect on July 11, 1907, the La Crosse (Wis.) Gas & Electric Company filed a petition for authority to increase its rates. As the law imposed upon public utilities the lowest schedule in force on April 1, 1907, this company was obliged, until a change should be approved by the railroad commission, to continue competitive rates which had finally reduced its revenues below the cost of production.

The salient facts in the history of the company which bear on the point under discussion are that at different periods the properties of several competitive corporations had been absorbed, with the ultimate result that in the city there were several plants under one ownership, although they were de-

signed originally to be independent. Thus, notwithstanding several grants of franchise rights, the city had not only failed to secure permanent competition, but had been the means of causing excessive investments. Assuming that the charge upon these investments was, in effect, a charge upon the public served, the city had encouraged investments, and therefore plant capacity, beyond its needs. The result might have been anticipated.

In granting permission for an increase in rates, subject to revision after valuation of the property, the commission gives the main statistics concerning the production and capitalization of the company. The commission then takes up the question of depreciation, and states that there is a continual waste or depreciation in plants of industries of this character with the exception perhaps of the land on which they are located. It is held that, while a part of the wear and tear is offset by ordinary repairs, renewals which are provided for in maintenance and are necessary in the up-keep of the plant will offset an additional part of the depreciation. Other offsets, the commission continues, consist of replacements made when the property is worn out or useless, and the cost charged either directly to operating expenses or to a special depreciation account. The commission adds that "depreciation is an expense that must be met. If not charged to the operating expenses it would either have to be met directly by the owners or charged to the construction. To charge replacement to the cost of the plant or construction account is not uncommon. * * * Such practices are essentially bad."

The losses of depreciation may or may not be covered adequately by appropriations from the divisible income, although the burden of depreciation, so far as it is met, falls in such instances directly upon the owners. But the fact of the matter, which is recognized by the commission, is that depreciation is a just operating expense. One danger of relying upon special appropriations to cover the accrued depreciation is that the public may assume that such appropriations represent in reality excessive profits. Assuming the integrity of the management, it will be clear that, even when there is a profound desire to provide for depreciation through annual appropriations from income, the accounts, just prior to the time when charges for this purpose have been entered, fail to represent the accrued depreciation of the year.

The statements of earnings submitted by the La Crosse company showed an average gross revenue per kilowatt-hour in 1902, from current and heating sales, of 10.140 cents; in 1904 the average was 7.768 cents; from that time the gross revenue was lowered and in the first six months in 1907 the average price was 6.021 cents. In 1902 the average net revenue per kilowatt-hour amounted to 3.14 cents; in 1904 the average was 2.56 cents; in 1906 the return had dwindled to 0.334 cent, while in the first six months of the current calendar year the average was only 0.201 cent per kilowatt-hour. The operating expenses figured in arriving at these results include the cost of production and distribution of current and heat, necessary repairs, general expenses and taxes, and rental paid for one of the absorbed properties, but they do not include provision for depreciation or allowance for bond interest or dividends.

It appears from the decision of the commission that the company had not maintained formal depreciation accounts, but that it had made improvements each year, partly from earnings. From January 1, 1902, to June 1, 1907, about \$248,152 was expended in this way, but this amount is now carried as an asset under "additions to property."

From the abstract which we have given of the conclusions of the Wisconsin commission it is plain that the increase in rates thus approved is founded in large measure upon the recognition of depreciation as a proper operating expense. The lesson for electric railways in this decision is that the question of depreciation should be discussed fully and frankly

with the legislative and public regulating bodies. The embodiment of depreciation in operating expense accounts is necessary to a proper and complete showing of the cost of operation.

THE PROBLEM OF TRAFFIC CONGESTION ON THE CHICAGO ELEVATED LOOP.

The satisfactory handling of traffic on the Union elevated loop in Chicago constitutes a transportation problem which is different from any question of congestion that is pressing for answer in other cities. The Union loop comprises 20,900 feet of single track, laid in two loops—an inner and an outer track. The outer loop is used by the Northwestern Elevated Railroad, which owns the loop property, and by the Chicago & Oak Park Elevated Railroad; the inner loop is used by the Metropolitan West Side Elevated Railway and the South Side Elevated Railroad.

The four operating roads pay under their leases of loop privileges one-half cent for each passenger carried at any point on their lines. Under the terms of its franchise the loop is now required to pay to the city of Chicago as compensation 15 per cent of its income after deducting bond interest. The lessee roads agree to pay the entire cost of maintenance, including renewals and repairs, and of operation, but the payment to the city under the ordinance is regarded as a fixed charge against the loop, and not as an operating expense.

Without reference to the ownership, the management of the loop property is in the hands of a board of managers consisting of the presidents of the lessee roads. By the terms of the leases one of these executives acts as chairman of the board, and each six months the office rotates in regular order. The chairman at present is the president of the Metropolitan company. Once a month the superintendent of the loop prescribes the number of trains to which each of the four operating companies shall be entitled during the ensuing month. These numbers are based on the total traffic of the previous month.

Travel on the loop has increased from other causes than the normal growth of business. The Metropolitan Elevated road has made several extensions and has increased its traffic to a greater degree than any of the other roads. The South Side road, however, is completing important extensions which, in part, are in operation. The Northwestern Elevated has opened an extension recently and is preparing for further expansion. The Chicago & Oak Park road has enlarged its traffic by means of a surface extension.

The division of roads as between the two tracks on the loop has never been changed. In general the capacity of the outer loop is limited by crossing capacity, while that of the inner loop is limited by track capacity.

The data and diagram which are published in another part of this issue, relating to the more serious congestion which prevails on the inner loop, show that there has been marked betterment in the handling of the flood of traffic which comes in rush hours. The two examinations described necessarily required some months, but they were substantially two years apart. When the examination previous to that which is now under way was made, the switch and signal towers at the three corners of the loop at which trains enter were manually operated. With the introduction of electro-pneumatic apparatus there has been a material improvement in the average number of trains which can be introduced, as shown, in rush hours. The increase in the average number of trains on the loop in rush hours is to be attributed to the changes which this mechanical appliance has effected. The decrease in the time required to make the loop circuit represents sharper handling of the trains.

In the previous examination it was developed that at the entrance point the tower men required eight seconds to

train had crossed in one direction, to change the signals and switches so as to permit a crossing by another train. With the electro-pneumatic apparatus only $2\frac{1}{2}$ seconds is required. From observations taken at Fifth avenue and Van Buren street, where the Metropolitan trains enter the loop, it was shown in the course of the first investigation that from the time one entering train started to pass the signal until it cleared the crossing 41 seconds, on the average, elapsed. The average time now is $35\frac{1}{2}$ seconds, or a saving of 13.4 per cent on the movement.

In order to assure a proper understanding of the problem it should be remembered that the loop platforms are not long enough to accommodate more than one train at a time. With present traffic this is not a severe handicap during the ordinary travel of the day, but during the congested periods it is a serious drawback. At the loop crossings it is usually possible to pair trains so that the maximum use of the crossing facilities is obtained; and this operating advantage of pairing trains would be possible at station stops if the loop platforms were long enough to admit two trains on each track at once. The average station stop is in the neighborhood of 20 to 25 seconds; but about five minutes of the total running time on the loop is required for stops and delays which are necessary in addition to station stops, owing chiefly to the fact that in the rush hours substantially every train is delayed at each station because another train is at the station. By lengthening the platforms it is figured that the five minutes now spent in stops and delays could be reduced by one-half.

There can be no doubt that the Union loop sorely needs the additional facilities which lengthening of the platforms would provide. Under present conditions, a little unusual delay at any point jeopardizes the successful movement of trains. Large as the cost of constructing platform extensions might be in dollars and cents, the expense would be small in proportion to the increased facility of movement which this improvement would make possible.

COMMUNICATIONS.

Rail Corrugation.

To the Editors:

In your issue of October 19, page 651, you quote my remarks on "Rail Corrugations," before the American Street and Interurban Railway Association. It appears that they may leave a vague idea, and in some respects may cause an erroneous conclusion, therefore I thought it well to write this in order to establish the correct thought that it was desired to convey.

The idea advanced was that corrugations were caused by the elongation of the upper surface of the metal of the rail under traffic or rolling action of the wheels. That such elongation does take place is an established fact. This can be seen in all old tracks and appears in the streets in vertical and horizontal curves; the length of the curves being the length of the rail in both planes. The horizontal curves have their rise at the middle of the rail; the joints being outward of the track form a wide gauge at these joints. When an old track is taken up the loose rails are distinctly and permanently curved. How could these curves be explained otherwise than by the elongation of the upper surface under the rolling action of the tread of the wheel and the friction of the flanges against the gauge surface of the rail? The expansion of the exposed portion of the metal, due to the variation in temperature, could have very little, if any, influence upon this, for it works in both directions and therefore has a compensatory effect.

In order to understand this rolling action that causes the elongation, it can readily be assumed that the weight or pressure of the wheels produces an indentation in the surface of the rails. This indentation is moved along, causing the upper layer of the metal to flow in the direction of the traffic.

When the movement of the wheels is slow it permits the metal to assume its original position on account of its elasticity. But when this movement is rapid the stresses produced by this flow of the surface of the metal result either in curving of the rail (elongation of the surface) when the rail is on a loose foundation, or in case of a solid foundation which permits of no such distortion, it results in gradually pressing or rolling the surface metal until a maximum compression is reached, when the metal is formed into a hump over which the wheels roll over and begin their action again, thus forming elevations and depressions at regular intervals, i. e., corrugations.

In assuming a cause in explanation of a phenomenon, such an assumption may only be dignified as a theory, when, if not all, at least most of the known facts relative to such a phenomenon may be explained by this theory. And it appears to me that by careful analysis it will be found that, by assuming the above theory as the cause for corrugations, all the varying, peculiar and seemingly contradictory manifestations of corrugations can be readily explained.

From the quotation it may further appear that there was an advocacy of a dirt foundation for track construction, and this is entirely contrary to what it was desired to assert. In order to explain under what conditions corrugations cannot occur it was assumed, and this is quite evident, that cars run on two parallel lines of rails loosely placed on the surface of the earth, and without being held down in any way, will never cause any corrugations. But in a question of track construction there are so many important and paramount considerations which must govern the decision that the trouble of corrugations is but secondary. Economy in the permanency of roadbed and paving, to avoid the ruinous expense on the maintenance of track paving and rolling stock, the life of rail and joints, etc., is of so much vaster importance that the question of possible occurrence of corrugations (while the latter may be a contributing cause) can influence the decision but slightly; aside from the fact that in paved streets loose tracks of such construction as mentioned above and where corrugations cannot occur are out of the question, as they cannot be built. Therefore there can be but one conclusion, that a firm and permanent foundation, with the rail held on it as firmly as it is possible to attain in practice, or an ideal one, upon which rails may be renewed without the disturbance of the foundation, such as concrete, is the only practical and economical construction that can be advocated for paved streets, and especially so on busily traveled streets. Corrugations will or may occur, but after one or possibly two thorough filings they will never become a cause of annoyance again, for the upper and gauge surface textures will be compressed into such hardness that the wheel will not produce further indentations.

One other point is necessary of correction: For the words "systematic investigation" should be substituted "scientific investigation," which was stated. This is probably a transcription error. Systematic investigations have been made such as could be accomplished under conditions that already exist, but in order to make a scientific investigation conditions must be created especially for such an investigation, as was mentioned in the discussion. Of course the expense may be such that only a large association, such as the American Street and Interurban Railway Association, can afford to undertake it.

Yours truly,

C. B. VOYNOW,

Assistant Engineer Philadelphia Rapid Transit Company.
Philadelphia, October 30, 1907.

Recent tests on live steam feedwater heating in England, using a Lancashire boiler 30 feet by 8.5 feet at 135 pounds pressure and having economizers which heated the water to 238 degrees F., showed an increase in evaporative capacity of 12 per cent and in fuel economy of 11 per cent with use of live steam heating.

RECENT INTERURBAN IMPROVEMENTS AT TERRE HAUTE.

A number of important interurban railway improvements are now approaching completion in Terre Haute, Ind., and its vicinity, in connection with the power supply and service of the Terre Haute Indianapolis & Eastern Traction Company, and, incidentally, the local lighting and power service in Terre Haute. The engineering and construction work in connection with these improvements has been carried out by the Stone & Webster Engineering Corporation of Boston.

The improvements now under way or completed include the addition of 1,500 kilowatts in generating capacity at the Water street power plant in Terre Haute; the construction of a transmission line from Terre Haute to Brazil, with the building of substations at Brazil and Seelyville; the extension of the existing transmission line between Terre Haute and Farmersburg to Sullivan, with the erection of a substation at the latter point; and the extension of the St. Marys interurban line to Paris, Ill., with the building of a transmission line from Terre Haute to Vermilion, and installation of a substation at Vermilion. The routes of the interurban lines centering at

Two Goubert closed heaters are installed in the boiler room for feedwater work, one being rated at 1,000 and the other at 2,000 horsepower. The engine room proper is 81 feet long by 62 feet wide, and at the end farthest from the boiler room a space 45 feet long by 20 feet wide has been divided into three compartments, housing the step-up transformers. Office and lavatory facilities are also provided at this end of the station.

The smaller turbine set consists of a 500-kilowatt General



Power Improvements at Terre Haute—Map of Interurban Territory Tributary to Terre Haute.

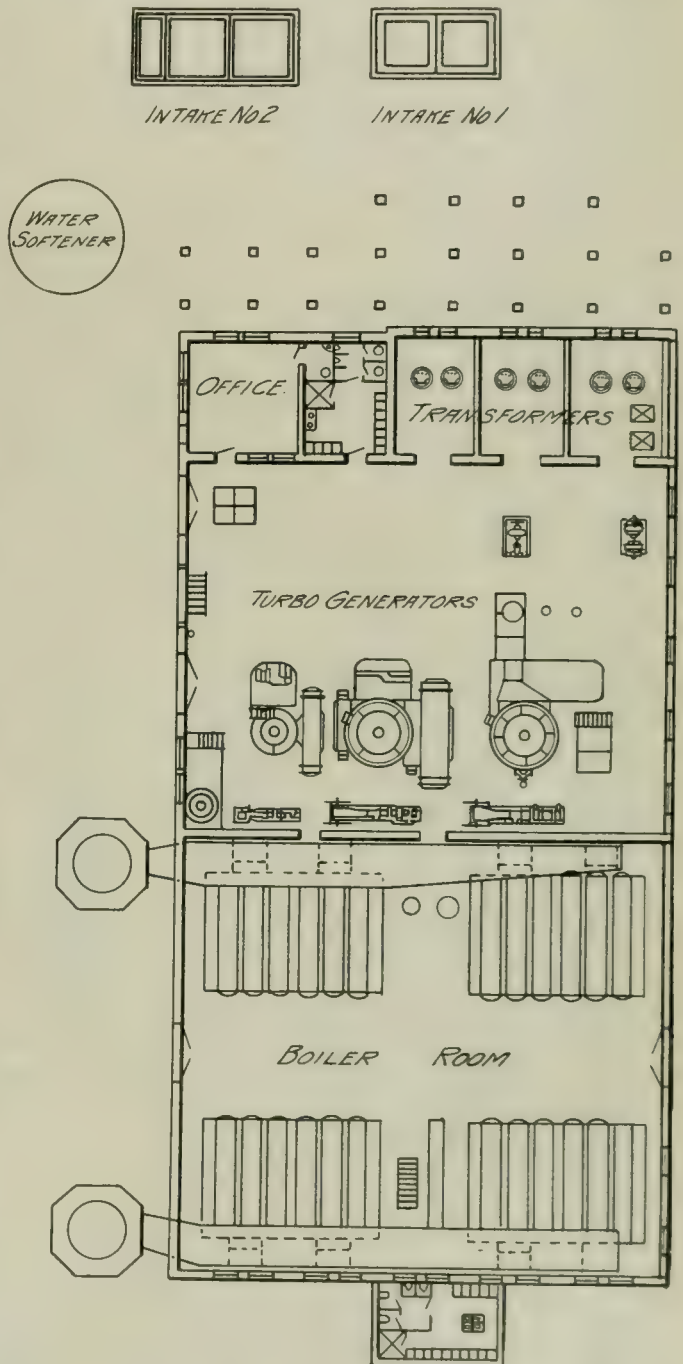
Terre Haute are shown in the accompanying map. Other than the lines indicated above an interurban route has been in operation between Terre Haute and Clinton for several years.

Water Street Station.

The addition of 1,500 kilowatts capacity at the Water street plant is a step in the development of a comprehensive enlargement of the station to an ultimate capacity of 12,500 kilowatts. A general floor plan of the generating room of the present station is shown. The station now comprises one 500-kilowatt and two 1,500-kilowatt Curtis turbo-alternators with auxiliaries, eight boilers, two stacks, and step-up transformers. A 2,200-volt tie line connects the Water street plant with the Terre Haute Traction & Light Company's old station at Ninth and Cherry streets, where the local street railway service is supplied with power through synchronous motor-generator sets.

Boiler and Generator Equipment.

The boiler equipment at Water street now consists of eight 500-horsepower Aultman & Taylor units, operating at 150 pounds steam pressure and 150 degrees F. superheat, installed in a room 81 by 72 feet in length and width. For each two batteries of boilers a separate flue is provided leading to a brick stack 165 feet high and 99 inches in inside diameter.



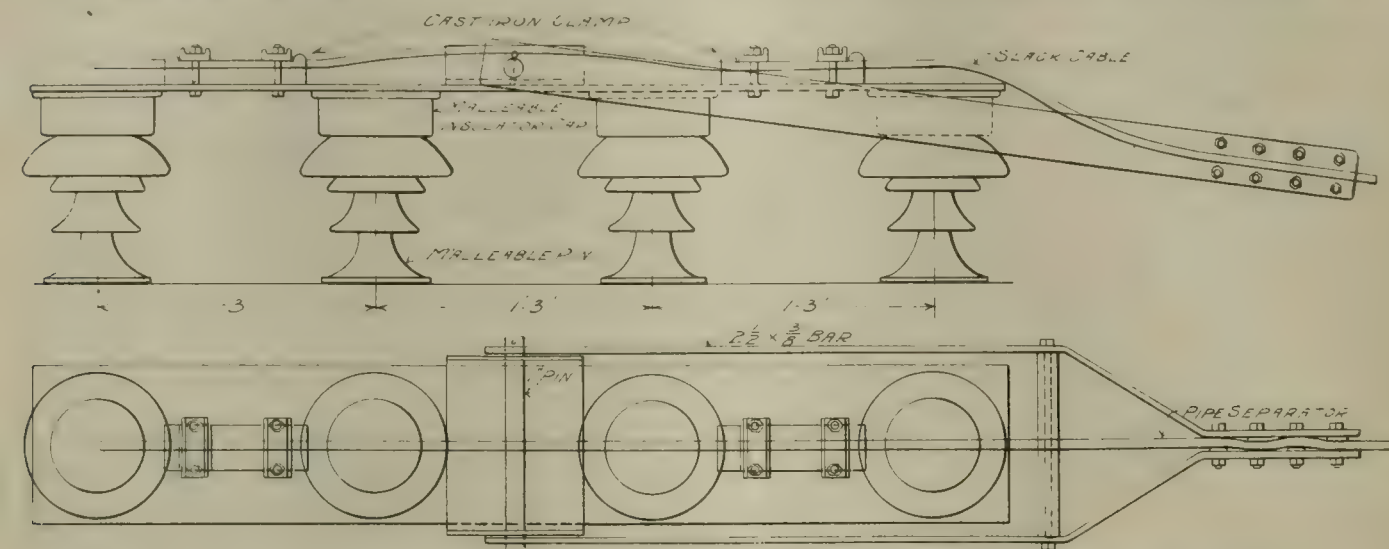
Power Improvements at Terre Haute—Floor Plan of Water Street Power Station.

Electric generator, making 1,800 revolutions per minute, and wound for 2,200-volt two-phase current, direct connected to a 2-stage Curtis turbine. The two larger units are each rated at 1,500 kilowatts, the generators being wound for 2,200 volts and the normal speed being 900 revolutions per minute. Two 125-volt exciters are installed in the engine room, each being rated at 30 kilowatts. One is driven at 900 revolutions per minute by a 2,300-volt two-phase induction motor.

other at 305 revolutions per minute by an 11 by 8 inch vertical engine. Most of the auxiliaries are located in a basement 80 feet square, directly beneath the turbine room.

The small turbine exhausts into a counter current surface

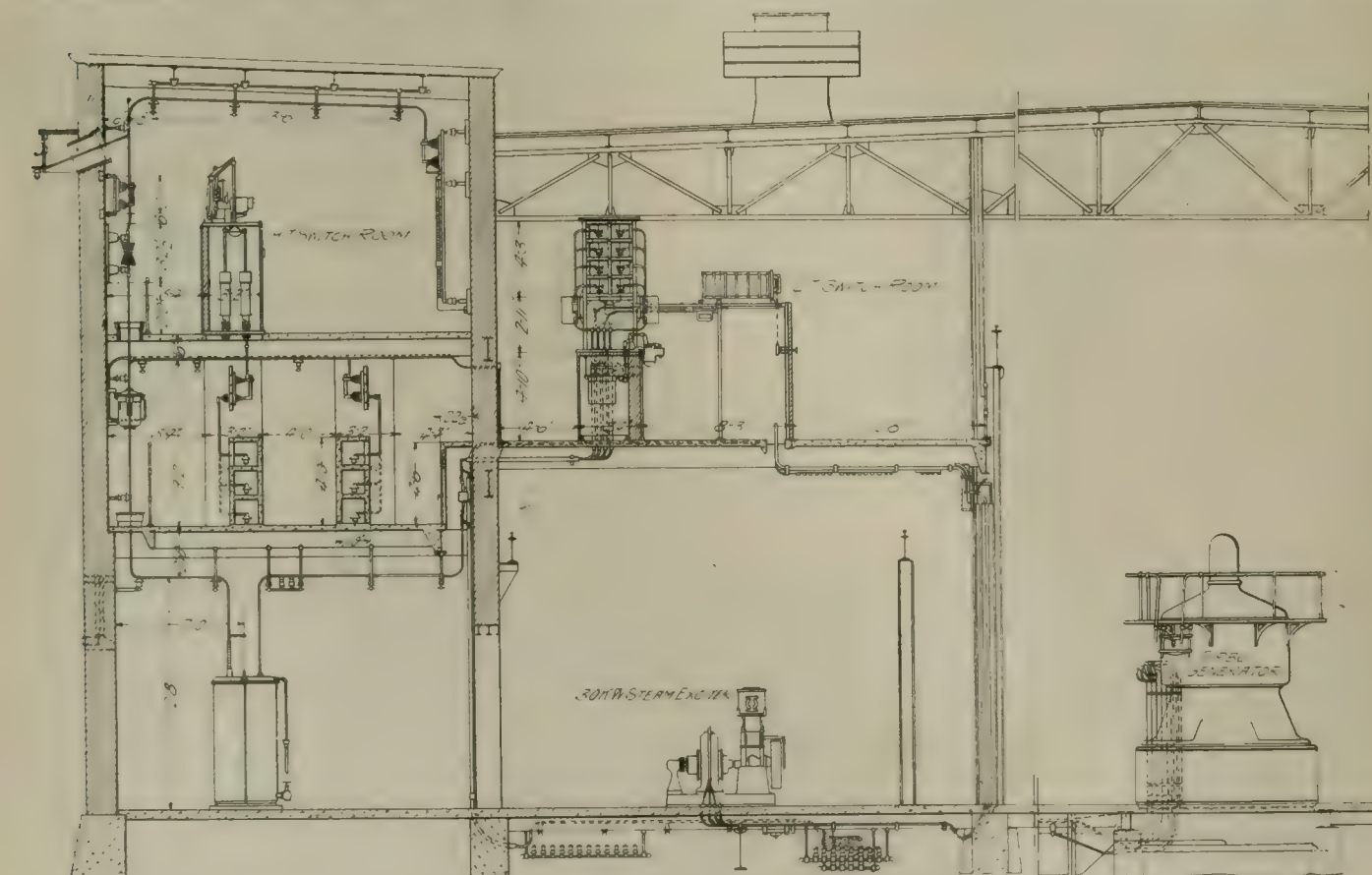
1,500-kilowatt turbines are as follows: One of the Alberger surface type, with 6,000 square feet of cooling surface, and one of the Alberger barometric type, 36-inch size. The dry vacuum pumps for these outfits are of the 2-stage type.



Power Improvements at Terre Haute—Clamping Scheme for Dead Ending Cables at Wabash River Crossing.

condenser of the Alberger type, having 2,000 square feet of cooling surface. A 6 by 14 by 14 by 10 inch Alberger dry vacuum pump, an 8-inch centrifugal circulating pump, driven

10 by 18 by 18 by 18 inches, and 12 by 22 by 22 by 18 inches in cylinder dimensions, respectively. The balance of the auxiliary equipment consists of a 16-inch centrifugal pump, driven



Power Improvements at Terre Haute—General Cross Section of Water Street Power Station, Showing Wiring Scheme.

by a 9 by 9 inch vertical engine, and a 4½ by 3¾ by 4 inch duplex hot-well pump, complete the condensing apparatus for this turbine. The hot-well pump is automatically controlled by a float in the well. Circulating water is obtained from the Wabash river, near the plant. The condensers of the two

by a 10 by 10 inch vertical engine and a 12-inch centrifugal pump of the 2-stage type, driven by a 13½ by 12 inch Westinghouse engine, and a 7½ by 7½ by 6 inch hot-well pump, with various smaller pressure and oil pumps. The boiler feed pumps are located in the basement, near the other auxiliary

pumps. A special oil room, 19 by 13 feet, is located at one end of the basement, and this is served by a barrel runway leading from the outside of the building to facilitate handling lubricants and supplies. A 10 by 12 by 12 inch Knowles duplex air compressor for general cleaning uses is also located in the basement.

Six 500-kilowatt and two 150-kilowatt Westinghouse transformers are provided for the delivery of high-tension power to the outgoing transmission circuits. The Brazil, Farmersburg and Vermilion lines are supplied with power at 23,000 volts, 11,000 volts being the transmission potential on the Clinton route.

Wiring.

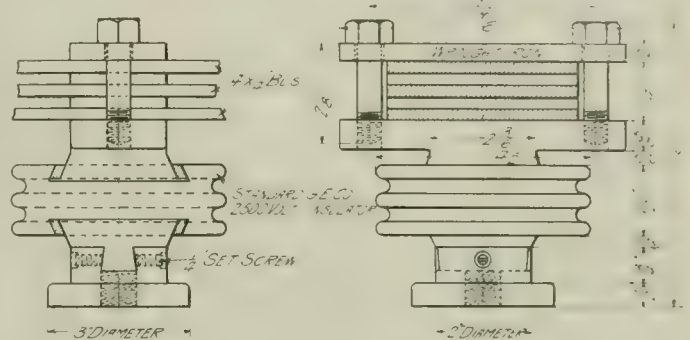
In the wiring arrangement in the Water street power station special care has been taken to keep both high and moderate tension circuits out of the way of station attendants. The upper portion of the turbine room on the transformer side is divided into two parts, separated by a fire wall and with galleries devoted to moderate-tension and high-tension switching circuits and control apparatus. Nearer the turbines is the operating gallery, which overlooks the station floor, with a clear space of 10 feet 8 inches between the switchboard and the railing. Field regulators are mounted on an angle-iron framework behind and above the switchboard panels. When the station is finally completed to its ultimate capacity these panels will take care of eight 1,500-kilowatt turbo-units, one 500-kilowatt turbine, one 75-kilowatt steam-driven exciter, one 30-kilowatt steam exciter, one 35-kilowatt and one 75-kilowatt motor-driven exciter.

For direct-current railway power supply space is included for six 500-kilowatt 600-volt motor generators, with the necessary controlling panels, and the final plans include also a

series, and from thence to the 2,300-volt busbars and oil switches via selector switches. The cables then go to the transformers, whence the 22,000-volt lines pass upward to the high-tension switch room and busbar compartments and out of the building through 20-inch vitrified tile ducts set in the walls.

Water Softening Plant.

An interesting feature of the Water street plant is the use there of a water-softening plant. The make-up water is obtained from the city mains. The installation has a treating capacity of 15,000 gallons per hour and was put in by the Kennicott Water Softener Company of Chicago, Ill. In this system the chemicals which produce the scale-forming solids are introduced in two separate tanks. The mixtures are stirred by paddles operated by a water wheel, the latter being



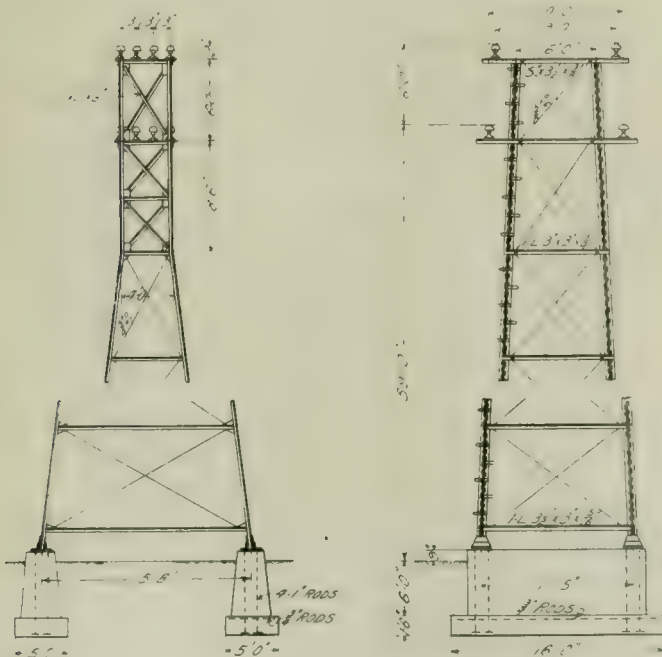
Power Improvements at Terre Haute—Details of Insulating Support for 2,300-Volt Bus.

turned by the water entering from the city mains. Large settling tanks receive the mixture and from these the treated water is pumped to a receiving tank by a motor-driven triplex pump, located in the turbine room. From the receiving tank the water flows by gravity to the feed pumps.

Transmission Lines.

In order to build the high-tension line to supply power at 22,000 volts to the Vermilion substation on the new interurban route to Paris it was necessary to design a crossing over the Wabash river at the Water street power house. Steel towers and special attachments for this span were designed and erected by the Archbold-Brady Company of Syracuse, N. Y. The tower details are illustrated. The length of the span is 900 feet. On the power house side of the river a tower 30 feet high was built on top of an existing wire arbor, the tower being 12 feet square at the bottom and 5 by 4 feet at the top, with steel channel braces. The transmission wires are carried up inside the tower frame parallel to the vertical axis of the tower and given the proper change in direction by attachment to horizontal leads at the top. On the west bank of the river the tower is 65 feet high above the ground, and it is mounted upon reinforced concrete foundations extending 9 inches above the ground and 6 feet below it, the whole structure being anchored into two concrete base courses, 18 inches deep, 5 feet wide and 16 feet long. Nine sets of horizontal braces are provided on this tower, with eight diagonal braces between each level. The concrete pedestals and bases are all reinforced with straight rods varying in diameter from $\frac{3}{4}$ inch to 1 inch.

The transmission circuit across the river consists of a three-phase line with a fourth wire as a spare, the wires being of $\frac{7}{16}$ -inch plow steel, carried two above and two below and brought to the top of the tower 9 feet apart on centers and 10 feet apart on the second tier. Each wire was figured for a pull of 4,325 pounds, the calculations being for a wind velocity of 90 miles per hour, a weight with $\frac{1}{2}$ inch coating of ice of 1.03 pounds per foot, and with ice and wind 2.25 pounds per foot, the minimum temperature being -20° F.



Power Improvements at Terre Haute—Dead-End Transmission Towers for Wabash River Crossing.

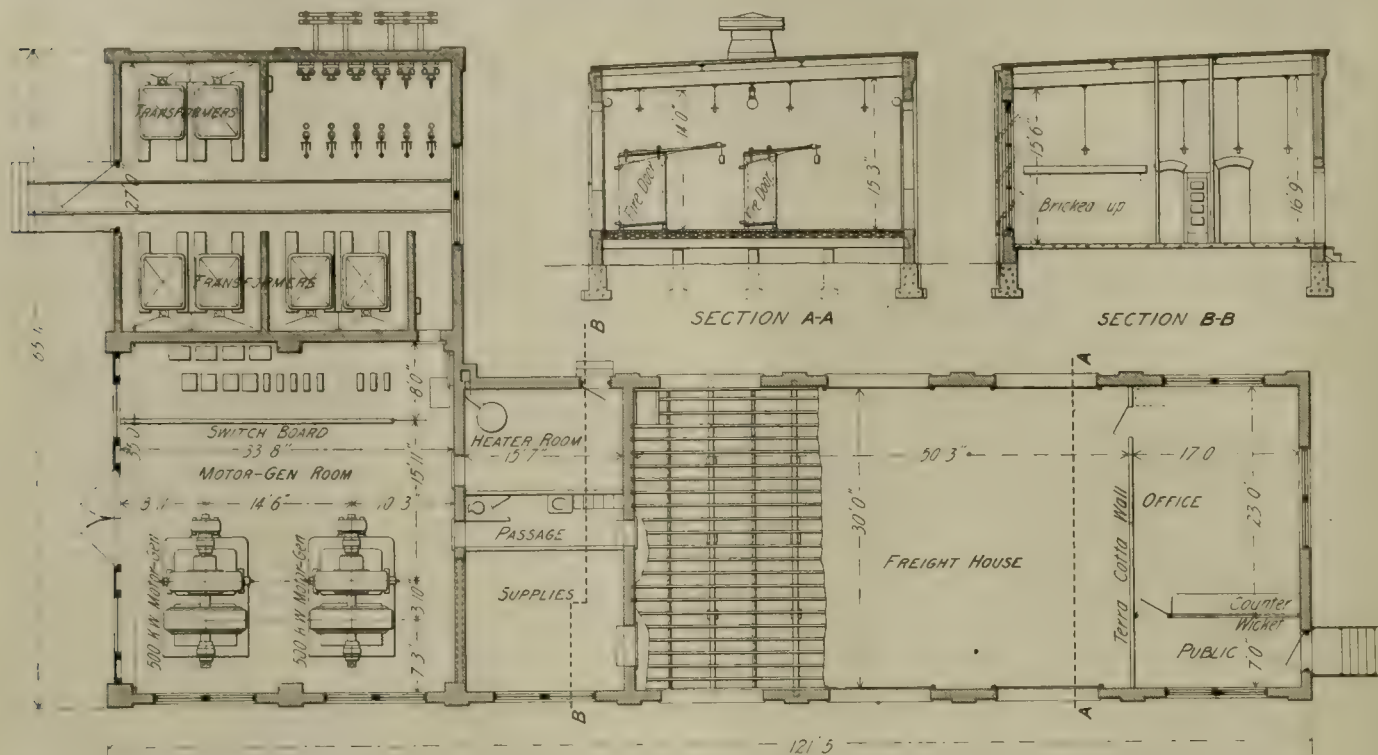
maximum of eight step-up transformers and 10 constant current transformers, the latter being for arc lighting service. All these motor generators are to be operated at 2,200 volts two-phase current to avoid the use of transformers between them and the turbo-units.

The 2,200-volt cables are carried downward from the generators to floor ducts leading to the transformer compartments. They are carried upward along the inner wall through a special current transformer compartment located beneath the stairway connecting the high and medium tension gal-

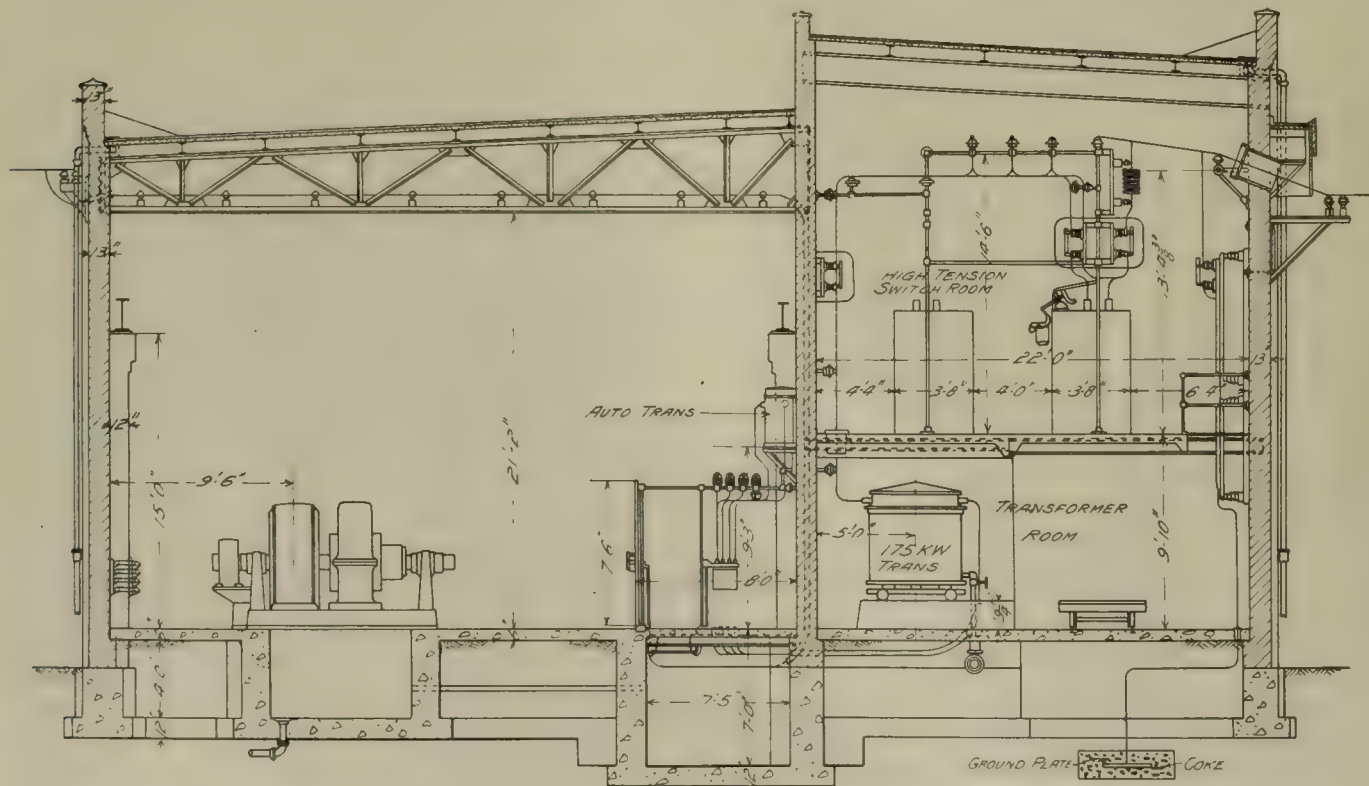
degrees F. below zero and the maximum 110 degrees above zero. The maximum estimated variation in vertical height at the center of the span is 4 feet, the height above mean high

the cable on the land side as slack wire. The clamps are adjustable for different temperature conditions.

Between the Wabash crossing and St. Marys the line is



Power Improvements at Terre Haute—Floor Plan and Sections of Substation and Freight House at Brazil.



Power Improvements at Terre Haute—Section Through Seelyville Substation.

water being 28.61 feet. In the clamping used at the ends of the span the strain of the cable weight is taken by a 4-bolt clamp with $2\frac{1}{2}$ by $\frac{3}{8}$ inch side bars fastened in the center of a row of four insulators with malleable caps which carry

carried across country on poles of Idaho cedar, the circuit being No. 4 B. & S. medium hard-drawn copper, three-phase. From St. Marys to Vermillion it is carried on the trolley poles.

The Vermillion substation contains two 300-kilowatt West-

inghouse motor generators and a bank of two 175-kilowatt transformers. No oil switches are installed except at Terre Haute. Motor generators were used in the substations on account of the combined railway, power and lighting load on the system.

Substations.

The transmission line from Terre Haute to Brazil is also a No. 4 circuit. At the Seelyville substation two 300-kilowatt motor generator sets are installed, and at Brazil two 500-kilowatt sets. The motors in these substations are of the synchronous type, and the exciters of the motors are operated in multiple, with overload circuit-breakers in their lines to prevent a general burnout in case one should tend to drive the other as a motor, direct connected to the synchronous rotor, and possibly out of circuit temporarily. The Sullivan substation contains one 300-kilowatt rotary converter and two transformers. The building is 78 feet long and 32 feet wide over all, slightly more than half being used as a freight house.

In bringing the 22,000-volt circuits into the Seelyville substation, which is a through rather than a terminal substation, like Brazil, the incoming line is tapped inside a separate high-tension switch room located above the transformers and the outgoing line is provided with a high-tension oil switch so that the circuit beyond Seelyville can be shut down when necessary. The transformers are mounted on small trucks and additional tracks are provided in the floor at right angles to the direction of truck movement, to facilitate moving out any unit which becomes disturbing through fire or other cause. The oil can also be drawn off rapidly if necessary through a system of drain pipes. The 2,300-volt switchboard and motor generators are in the same room, and these circuits are carried in floor ducts. So far as possible backward movements of the 23,000-volt lines were avoided in the design. A 13-inch fire wall separates the generator and switchboard room from the high-tension switching section of the substation. The 23,000-volt lines are not allowed nearer the wall than 12 inches. Disconnecting knife switches are provided for both the incoming and outgoing lines and the transformer primaries.

The Brazil substation joins a freight house. In general design the substation resembles the arrangement of transformers and motor generators at Seelyville. The load being partly power and lighting, however, requires two additional 300-kilowatt units in the transformer room, and a central emergency track is provided here as before, the gauge being three feet. The course of the current through the substation is direct and well spaced. The lighting, power and railway switchboard plans cover 16 panels. Medium-tension circuits are carried in cable ducts and high-tension lines supported in the clear.

A busbar insulator for 2,300-volt work is illustrated. This detail was designed by the Stone & Webster engineers with special reference to the Terre Haute improvements. On this insulator the bus is clamped in at the top by cap screws, the whole casting being supported on a standard General Electric 2,500-volt insulator. The latter rests on a casting which is bolted to the bus compartment. By loosening the cap screws and removing the upper bolts, the bus can be slipped out sideways, or it can be supported by blocking while the lower set screws are loosened and an insulator replaced by lateral withdrawal.

An express service is soon to be established between Pittsburg and McKeesport by the Pittsburg Railways Company. New cars have been ordered and it is expected to reduce the running time between Pittsburg and McKeesport from 55 to 45 or possibly 40 minutes.

There are said to be 85 miles of electric railway, on which 20 electric locomotives are operated, in one mine at California, Pa.

ANNUAL REPORTS.

Montreal Street Railway.

Operating expenses of the Montreal Street Railway in the fiscal year ended September 30 required 60.1 per cent of gross earnings, comparing with 59.7 per cent in the previous year and 61 per cent in the 12 months ended September 30, 1905. The earnings for three years compare as follows:

Year ended September 30—	1907.	1906.	1905.
Gross earnings	\$3,503,643	\$3,100,487	\$2,797,474
Expenses	2,104,653	1,850,720	1,650,566
Net earnings	\$1,398,990	\$1,249,767	\$1,056,908
Received from Park & Island Railway	55,101		
Total net income.....	\$1,454,091	\$1,249,767	\$1,056,908
Charges	585,250	546,064	363,739
Surplus	\$ 868,841	\$ 703,703	\$ 693,169
Dividends and insurance fund	793,100	700,000	691,667
Surplus	\$ 75,741	\$ 3,703	\$ 1,502

In his statement to shareholders L. J. Forget, the president, says:

In the city proper few extensions have been made, as the city has not seen fit to grant any new routes, notwithstanding that this company has persistently urged the council to consider the question of granting new routes in order to meet the growing requirements of the public. This attitude is to be regretted, as the company has been, and is, anxious to keep well ahead of the requirements, in order that the public may get the best possible satisfaction from its car service. The directors intend to continue to press this matter upon the council, in the hope that they will soon realize the importance of considering and dealing with a question of such public importance.

The Montreal Park & Island Railway Company has during the past year shown satisfactory results. In the past years the Montreal Park & Island Railway has been a charge on the Montreal Street Railway; but this year the company has shown improved earnings and was enabled to pay to the street railway company the sum of \$55,101, on account of interest, and the directors believe that the returns from this investment will continue to increase.

The company has entered into a franchise with the Notre Dame de Grace for the extension of its system through the municipality, extending over a period of 50 years.

The company has secured a right of way from the present terminus of the Back river route to a point outside the village of St. Vincent de Paul on the south shore of the river.

During the past year additional right of way was purchased on the Cartierville line, in order to permit the continuing of the double-tracking in this division.

The Montreal Terminal Railway purchase was completed on July 1, and the directors anticipate that this property will become a valuable asset to the shareholders in the future.

Boston Elevated Railway.

In the fiscal year ended September 30, 1907, gross earnings of the Boston Elevated Railway Company aggregated \$13,952,966, an increase of \$425,781 over the preceding year. The figures compare with the previous years as follows:

Year ended September 30—	1907.	1906.	1905.
Gross earnings	\$13,952,966	\$13,527,185	\$12,689,676
Expenses	9,647,145	9,306,950	8,617,652
Net earnings	\$ 4,305,821	\$ 4,220,235	\$ 4,072,023
Other income	58,201	107,426	51,893
Total income	\$ 4,364,022	\$ 4,327,661	\$ 4,123,916
Charges	*3,532,744	3,475,882	3,288,831
Surplus	\$ 831,278	\$ 851,779	\$ 835,085
Dividends	798,000	798,000	798,000
Surplus	\$ 33,278	\$ 53,779	\$ 37,085

*Includes \$100,000 for depreciation fund.

The percentage of gross earnings required for operating expenses in the last year was 69.1, as compared with 68.8 in the preceding year and 67.9 in the 12 months ended September

30, 1905. For the last two years the charges, in detail, compare as follows:

Year ended September 30—	1905.	1906.
Interest	\$ 956,708	\$ 953,680
Taxes	966,975	1,034,014
Rentals	1,250,417	1,237,210
Subway rentals	258,644	250,978
Depreciation fund	100,000	.....

Total\$3,532,744 \$3,475,882

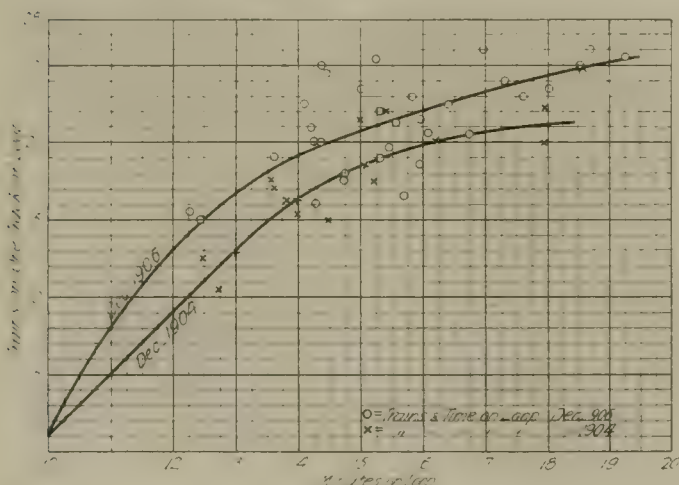
Mileage and passenger statistics make the following comparison:

	1905.	1906.
Revenue miles	51,834,649	50,056,608
Passengers	271,084,815	262,267,240

EXAMINATION INTO OPERATING RESULTS ON THE CHICAGO ELEVATED LOOP.

We have been furnished certain operating figures and conclusions reached by Ford, Bacon & Davis of New York in the course of a lengthy, detailed examination into conditions existing on the Union elevated loop of Chicago. The examination, which is now in progress, is to be thorough. It will embrace all the causes of congestion and therefore a detailed study into the variation of traffic and of the movement of trains. The expense of an examination of so wide a scope as is planned will necessarily be great.

While the examination will continue for some time, data



Operating Results in Chicago—Variation of Running Time on Loop with Number of Trains on Loop.

have been obtained, and are presented herewith, to show the improvement which has been effected in handling trains on the loop in rush hours. Two years prior to the beginning of the present examination Ford, Bacon & Davis made a report on lines so similar to those which were followed in securing some of the results desired now that the operation of trains in the two periods can be compared fairly.

It will be recalled that the Union loop of Chicago accommodates four elevated railways, which gather passengers in various parts of the more closely settled districts of the city. The Union loop structure comprises two tracks and therefore two loops—an inner and an outer. The outer loop is used by the Northwestern Elevated Railroad and the Chicago & Oak Park Elevated Railroad. The congestion on the outer loop is not now the most serious part of the situation against which the loop management is striving. The severe congestion prevails on the inner loop, which is used by the Metropolitan West Side Elevated Railway and the South Side Elevated Railroad. In the accompanying figures and diagram, therefore, the average time of trains on the inner loop and the number of trains on the inner loop were considered.

The results presented are based on the winter schedule

when substantially the heaviest traffic conditions of the year prevailed. The readings in 1904 were taken on December 19, 20 and 22. They show the average number of trains on the inner loop and the average time of these trains on the loop at intervals during the rush morning and evening hours. The later conclusions, with which the earlier results are compared, were based on readings taken on December 24, 26, 27, 28 and 31, 1906. In the latter observations an exact record corresponding to the intervals shown in the 1904 figures is not available, but the averages are based on readings taken as in the earlier year, every 15 minutes, although the division of time cannot be shown, and the total interval reported was longer.

It will be noted that the maximum average number of trains in 1904 was 22.3, while the maximum number in 1906 was 26; and that the maximum average time required in the earlier period under review to move the largest average number of trains around the loop was 17.9 minutes, while the average time required with the larger maximum number of trains two years later was 18.73 minutes. In the following tables the figures for the morning and for the evening rush trains and time are shown separately, but in the diagram the curves represent the averages of both of the rush periods of the day:

Morning Rush Trains.

December, 1906.	December, 1904.
Average number trains.	Average number trains.
Average time on loop.	Average time on loop.
16	13.83
18	14.75
19	15.27
19.5	15.37
20	14.33
20.5	16.77
21	15.46
22	15.29
22.5	14.13
23	15.79
23.5	14.96
24.5	14.41
25	14.38
25.5	15.25
26	16.94

Evening Rush Trains.

December, 1906.	December, 1904.
Average number trains.	Average number trains.
Average time on loop.	Average time on loop.
15	12.42
15.5	12.26
16	14.27
16.5	15.71
17	13.67
17.5	14.75
18.5	15.90
19	13.67
19.5	17.27
20	14.25
20.5	16.17
21	14.21
21.5	15.92
22	15.36
22.5	16.41
23	17.66
23.5	18.03
24	17.28
24.5	18.62
25	18.58
25.5	19.25
26	18.73

Under the guidance of President B. S. Josselyn the employes of the Portland (Ore.) Railway Light & Power Company have organized the Brotherhood of Street Railway Employes with an initial membership of 200. Monthly meetings at which prominent citizens will deliver addresses on live topics, will be held regularly and in the near future two new clubhouses will be built by the company for the benefit of the employes.

The desirability of having a power station report in a simple form and yet so complete that a record of all the

each is given a characteristic number. An adjoining column affords space for the operating engineer to record the total number of hours which each unit has been run during the day beginning at 4 a. m. The larger portion of the report is ruled in cross sections about $\frac{1}{4}$ inch square. The abscissæ, from left to right, it will be noted, represent time, divided into the 24 hours of the day, with a heavy black line indicating that part of the day between 12 o'clock noon and midnight. The ordinates represent kilowatts and have their scale printed at the right-hand side of the cross sectioned part of the report.

At the bottom of the report ruled spaces are provided for totals and for unit quantities, together with load factors.

all of which should afford not only a valuable permanent record, but an inspiration to the operating forces to make each day's work better than before. It will be noted that curves are plotted showing the output of the plant for various services, including railway, lighting, arc lamp and power motor loads. The total output curve for the day's run of the plant is also shown.

The method of graphically showing what part of the day particular units have been in operation is interesting. It will be noted that opposite the names of the various units horizontal lines are extended across the cross sectioned part of the sheet. The total length of these lines represents that portion of the day which the various units have been in service, and the beginning and the end of each line indicates at what hour the unit was started up or shut down. The short breaks in the horizontal lines serve to show the time at which the shifts in the power station force changed.

As earlier noted, the sheets on which this record is kept are of thin paper arranged for loose-leaf binding. The pads as furnished the chief engineer of each station are accurately bound so that by the use of a carbon he may make a second impression of the record, using an ordinary lead pencil for drawing the lines. The top copy, which ordinarily gets soiled from its use during the day, is kept at the power station and a clean carbon duplicate sent to the general manager's office.

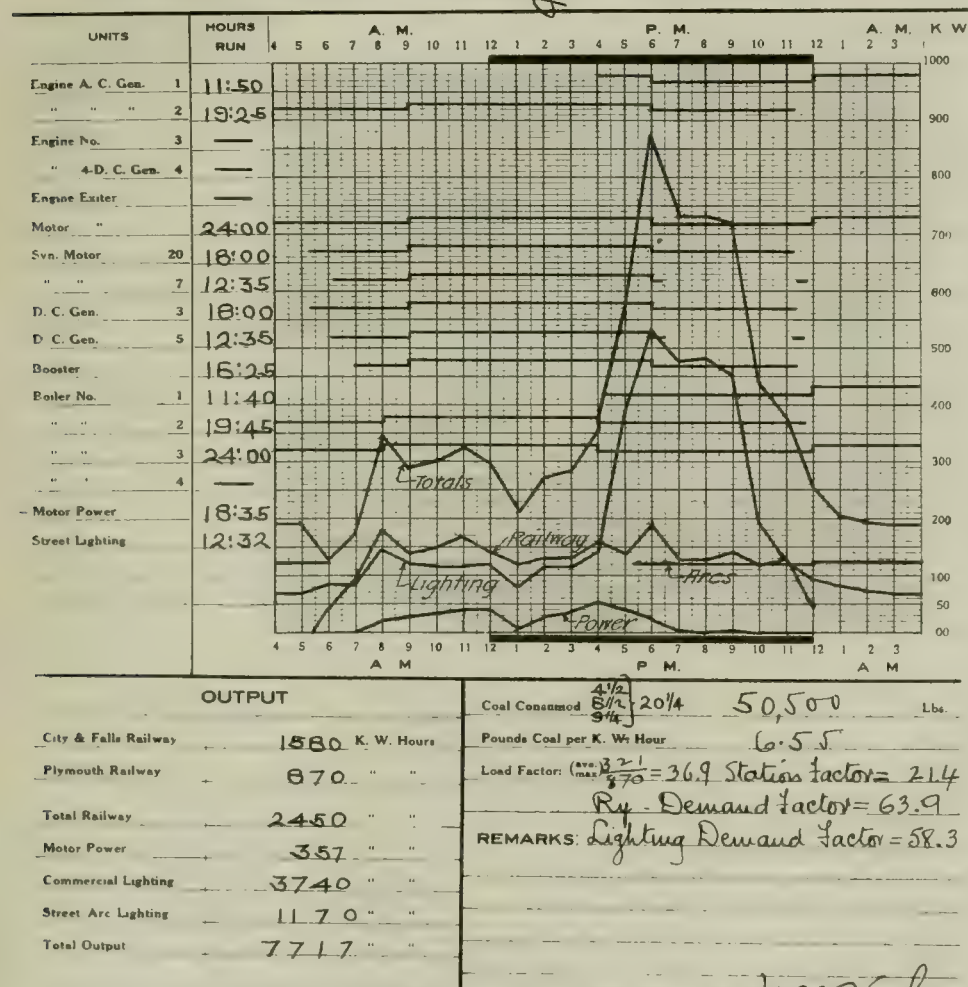
The adoption of this improved report blank is one of a number of interesting novel operating ideas

that have been introduced by Mr. Gonzenbach, some of which already have been described in these columns.

George M. Little, Pittsburg, Pa., has recently patented a device for preventing the collection of sleet upon the windows of car vestibules. The method calls into play deflectors, which receive the impact of the air as the car moves ahead and cause currents of air to draw warm air from within the car body or vestibule, spreading it over the outer surface of the windows, and thus, by means of the thin layer of air, substantially parallel to the outer surface of the glass, keep it free from snow and sleet.

DAY BEGINNING AT 4:00 A. M.

WEDNESDAY DAY OF Oct. 30 1907

Power Station Report Blank (Original 10³/₈ by 10⁵/₈ Inches).

details that may at any future time be required, is too well known to be worthy of discussion. A careful inspection of Mr. Gonzenbach's form of report will serve to convey its complete yet simple characteristics. The original form of the report is printed on thin white paper so that carbon copies may be made by the operating engineer. Each sheet is 10 3/4 inches wide by 10 1/2 inches long, perforated at the left for loose-leaf binding. The printing is in black with the exception of the cross sectioned part, which is ruled in brown ink.

By reference to the accompanying illustration, which is a reproduction of one of these forms, the following will be noted: The various units in the plant are listed at the left and

PROGRESS ON UNIFORM ACCOUNTING SYSTEM IN NEW YORK STATE.

In response to requests from the New York public service commission, second district, accounting officers of steam railways, electric railways and electric lighting and gas companies under the jurisdiction of the commission attended informal conferences at the state capitol, Albany, N. Y., for the purpose of considering and formulating uniform accounting systems. On October 21 steam railway accountants participated in conferences; on October 22 electric railway accountants; and on October 23 accountants of electric lighting and gas companies. W. J. Meyers, in charge of the division of statistics and accounts of the commission, presided at the meeting on October 22, and Martin S. Decker, commissioner, was present during part of the time.

The following were in attendance:

W. J. Clark, assistant to the president, representing Rochester Syracuse & Eastern Railroad, Auburn & Syracuse Electric Railroad, Syracuse Lake Shore & Northern Railroad, Syracuse & South Bay Electric Railroad and Auburn & Northern Electric Railroad.

T. B. Dixey, assistant to second vice-president the Delaware & Hudson Company.

A. L. Linn, Jr., general auditor Mohawk Valley Company and representing Utica & Mohawk Valley Company, Oneida Railway, Syracuse Rapid Transit Railway, Rochester Railway, Rochester & Eastern Rapid Transit Railway and Rochester & Sodus Bay Railway.

J. M. Joel, auditor Syracuse Rapid Transit Railway, Utica & Mohawk Valley Railway and Oneida Railway.

J. C. Collins, secretary and auditor Rochester Railway.

William Ingle, assistant auditor Rochester Railway.

C. F. Balch, special examiner interstate commerce commission, representing Henry C. Adams, in charge of statistics and accounts.

D. O. Dibbell, auditor United Traction Company, Albany, N. Y.

Frank R. Henry, auditor United Railways of St. Louis, representing American Street and Interurban Railway Accountants' Association.

C. N. Duffy, comptroller Milwaukee Electric Railway & Light Company, representing American Street and Interurban Railway Accountants' Association.

D. M. Deininger, auditor International Railway, Buffalo.

William F. Ham, comptroller Washington Railway & Electric Company, representing American Street and Interurban Railway Accountants' Association.

P. F. Wickham, operating auditor, representing J. G. White & Co., Incorporated, New York, N. Y.

Edgar S. Fassett, general manager United Traction Company, Albany, N. Y.

F. P. Deeds, auditor Albany & Hudson Railroad.

E. H. Stichel, general auditor Buffalo & Lake Erie Traction Company.

Axel Ekstrom, electrical engineer the Delaware & Hudson Company.

J. H. Pardee, secretary Street Railway Association of the State of New York.

W. H. Williams, third vice-president Delaware & Hudson Company.

W. H. Davies, comptroller United Traction Company, Albany, N. Y.

Upon the motion of Edgar S. Fassett that a committee representing the Street Railway Association of the State of New York be appointed to take up the question in detail with the representatives of the commission, the following committee was appointed and met at the Hotel Ten Eyck, Albany, on October 23:

H. M. Beardsley, treasurer Elmira Water Light & Railroad Company, Elmira, N. Y.; J. C. Collins, auditor Rochester Railway, Rochester, N. Y.; W. H. Williams, third vice-president Delaware & Hudson Company; T. W. Wilson, general manager International Railway, Buffalo, N. Y.; C. Loomis Allen, vice-president and general manager Syracuse Rapid Transit Railway, Syracuse, N. Y.; Edgar S. Fassett, general manager United Traction Company, Albany, N. Y.; A. L. Linn, Jr., general auditor Mohawk Valley Company, New York.

W. F. Ham, C. N. Duffy and F. R. Henry, representing the American Street and Interurban Railway Accountants' Association, met in joint session with this committee. After a discussion lasting all day the question was referred to a

subcommittee, consisting of A. L. Linn, Jr., chairman, H. M. Beardsley and J. C. Collins. This subcommittee has subsequently held meetings and will report to the state association committee in the near future.

The various companies represented were given copies of circulars issued by the commission bearing on the question of uniform accounting systems. These circulars, Nos. 22 to 25 inclusive, are addressed to common carriers, gas companies and electric companies. In Circular No. 22 the commission stated that one of the fundamental purposes which should be borne in mind is to shape the accounts in such wise that they will show clearly the effectiveness of the various operating departments and the economy with which each department accomplishes its results. The commission requested information concerning the various statistical units used and the accounts underlying each unit.

Accounting for Depreciation.

Circular No. 23 states that a true showing of cost of operation must take into account, in addition to labor and current supplies of materials, the gradual consumption of capital. The circular continues:

Such gradual consumption of capital is what is meant by depreciation, and inasmuch as the fundamental purpose of all commercial operation is the production of value, depreciation is a question of value and not merely of physical change in capital. The integrity of capital is maintained by maintenance of its value, and the mere fact of change in the physical identity of capital is not significant in the present connection.

In order to secure a correct statement of depreciation, there must be a classification of property, detailed to such extent that all of that of any one class is subject to the same rate of depreciation. In order to secure a correct statement of cost of operation, it is necessary that depreciation be charged to cost of operation as it accrues. As capital is consumed, the diminution in value thereof must, by gradual and reasonable degrees, be credited to the capital account and charged to cost of operation in such wise that by the time the property goes out of service the total diminution in value occurring in connection with its life in service shall have been charged into cost of operation.

Owing to the impossibility of estimating depreciation with entire accuracy on any property while it remains in service, provision must be made for an account through which may be adjusted at the time property goes out of service any inaccuracy then disclosed in the depreciation charges made in respect of such property. Such account may appropriately be called a retirement account, and is substantially equivalent to what in railway accounting is called a renewals account.

The commission desires that the companies within its jurisdiction shall file statements showing in detail:

Various classes of property operated, the same being classified according to expectancy of life in service, showing for each class: (a) The number of years of life in service to be reasonably expected of new property of the particular kind; it being understood that property should go out of service when it becomes antiquated and can economically be replaced by improved types, even though not yet fully worn out. (b) The proportion of original cost that may reasonably be expected to be recovered in salvage when the property goes out of service. (c) The frequency with which detailed inventories and appraisals are made, it being understood that such appraisals are made only after a careful view and examination of the property.

A detailed statement of the rules followed in making appraisals, and the various elements considered in determining values in such appraisals.

The present practice of the reporting company in maintaining the integrity of its accounts of capital assets and treating in its accounts the matter of depreciation, it being understood that the account of capital assets should provide for a true statement of values as well as for an identification of the actual physical property included among such assets.

The Treatment of Repairs.

Closely allied with the text of the foregoing is Circular No. 24, which takes up the matter of repairs. The following statement of principles is presented:

Repairable wear and tear of physical property may be

defined to be that portion which may economically be neutralized by physical modification of the property without material alteration of its identity. Such wear and tear is largely dependent upon use, and accrues during all the time when the property is in use; in some cases it also accrues, although to a lesser extent, while the property is idle. Because of the greater demands made upon the operating property at some times than at others, it frequently is economical to make repairs at those times when the demand upon the property for service is lightest, and in other cases repairs must await suitable seasons of the year. It is thus apparent that there is necessarily some give and take in the matter of repairs. They cannot be exactly kept up.

Many companies, desiring to have their operating expense accounts show approximately the cost of operation from month to month, make it their practice to charge monthly to such accounts approximately equal portions of the total estimated at the beginning of the year to be necessary to cover repairs. In such case, the amounts thus charged are necessarily credited to an appropriate fund or reserve account, which account is charged with the repairs when actually made.

Companies are therefore asked to furnish the following information:

Amounts actually expended for repairs for each such class of property during each of the last five fiscal years of the respondent, and during each of the several months since the close of the last fiscal year, showing if possible for each such amount the portion thereof expended for labor and the portion expended for materials.

Service rendered by each such class of property during each of the above specified periods. In case this cannot be stated, show the service rendered by the property with as much detail as is possible.

The accounting practice of the respondent with regard to hand tools and portable machine tools, showing in particular whether, and if so, to what extent, it is attempted to apportion the cost of such tools among the various jobs on which they are used.

The accounting practice of the respondent with regard to materials consumed in making repairs, showing in particular whether, and if so, with what detail, these are treated through a system of store accounts; also, in case such store accounts are used, in what manner, if at all, general store expenses are apportioned upon materials issued and distributed over the various jobs in which such materials are used.

The accounting practice of the respondent with regard to shop expense in connection with such repairs as are made in respondent's shops, showing in particular whether, and if so, to what extent and through what accounts, the general shop expenses are apportioned upon the jobs partially or wholly completed in such shops.

The accounting practice of the respondent with regard to materials furnished and labor expended by the respondent in making repairs for other companies and persons.

Losses from Casualties.

The last circular in the series, No. 25, relates to losses through casualties. It is considered by the commission necessary to determine under what circumstances and to what extent casualties shall be considered as component parts of the cost of operation, and under what circumstances they cannot reasonably be so considered. It is tentatively laid down that loss resulting from any casualty the occurrence of which could have been prevented by ordinary and reasonable prudence, cannot be considered a component of cost of operation. Conversely, loss resulting from casualties, the occurrence of which could not have been prevented by ordinary and reasonable prudence, may be admitted to be a component of cost of operation. The circular adds:

Of casualties, loss from which may thus be admitted into cost of operation, some occur with a sufficient degree of regularity to admit of treatment according to the principles of insurance, while others are apparently so far beyond the power of prevision that each case must be disposed of as it arises. The world of practice has so long recognized the wisdom embodied in the principles of insurance that it must now be considered inexcusable on the part of any company or corporation to omit to charge currently as a part of its cost of operation an amount adequate to the risk sustained of loss from any class of casualty where such loss may properly be considered a part of cost of operation, whether such amount be credited to a reserve fund or actually paid as an insurance premium to some other concern contracting to indemnify

against loss from such casualty. With regard to classes of casualties which occur with such irregularity as not to permit a substantially exact application of the principles of insurance, the case is not so clear. It is the practice of certain companies to provide for these only as they arise, while other companies seek to provide for such classes, with such approximation as is possible, through substantially uniform monthly charges, crediting to appropriate reserves the amounts thus charged to cost of operation, charging such reserves to cover the loss from the particular class of casualties when they occur, and adjusting from time to time any discrepancies that may be found between the credits and charges to such reserves.

In their replies to this circular the companies are asked to give the following information:

The opinion of the respondent with respect to the advisability of providing among the "cost of operation" accounts a main account to be called "uninsurable casualties" (or other appropriate name), to which shall be charged losses arising from casualties properly chargeable to operation; but occurring with such irregularity as to make impracticable any application thereto of the principles of insurance.

The opinion of the respondent with regard to the proper disposition of such losses resulting from uninsurable casualties as are properly chargeable to cost of operation. As examples of such losses may be instanced those caused by the San Francisco earthquake in 1906, and those caused by the tidal wave at Galveston in 1900.

BOOK TABLE.

Electric Railways Theoretically and Practically Treated, Vol. 2.—Engineering Preliminaries and Direct-Current Substations. By Sidney W. Ashe, B. S., E. E., New York, 1907. Published by the D. Van Nostrand Company, New York, and Archibald Constable & Co., Ltd., London. Cloth, 282 pp., 5¼ by 7½ in. Price, \$2.50, net.

Each new electric railway in its preliminary engineering work requires a careful study of motive power conditions. The preliminaries considered include such matters as population, probable growth, riding habit, etc. From these are deducted the operating quantities, such as the number of cars, number of trips per car-mile, and size, type and seating capacity of cars. Upon these data the engineer is wholly dependent for his design of the electrical features which include the choice of motors, location of power houses and substations, operation of main and substations, feeder calculations and the actual construction data. Mr. Ashe, in writing this, his latest work, has drawn upon a fund of knowledge gained from actual construction work, papers presented before engineering societies and the technical press, with the result that there is presented a clear and concise study of how to choose motors for given services and how best to supply the direct current.

The first part of the book considers under the headings "Preliminary Considerations" and "Electrical Features" a study of motor curves and the services to which motors having various characteristics are best adapted. The choice of power house and substation locations is next discussed with the inclusion of cost data and their bearing on the problem of properly locating the generating and converting apparatus. The latter part of the book and, in fact, more than one-half of the book, comprises a study of various rotary converter substations now in operation, including the reasons for the existing details of design and instructions for operating. In this section rotary converter, transformer and auxiliary substation apparatus of the various types are described and the fundamental theories of their operation outlined. A subject index of six pages forms a useful part of the book. The pages are plentifully illustrated with halftones and zinc etchings, 145 in number, and 21 tables of cost and operating data supplement the reading matter.

The method of treatment throughout is similar to that followed in "Electric Railways—Rolling Stock," by Ashe and Keiley, with the exception that in this new book the value has been increased by the insertion of problems, tables and operating data. It will be found of value to both designing and operating engineers.

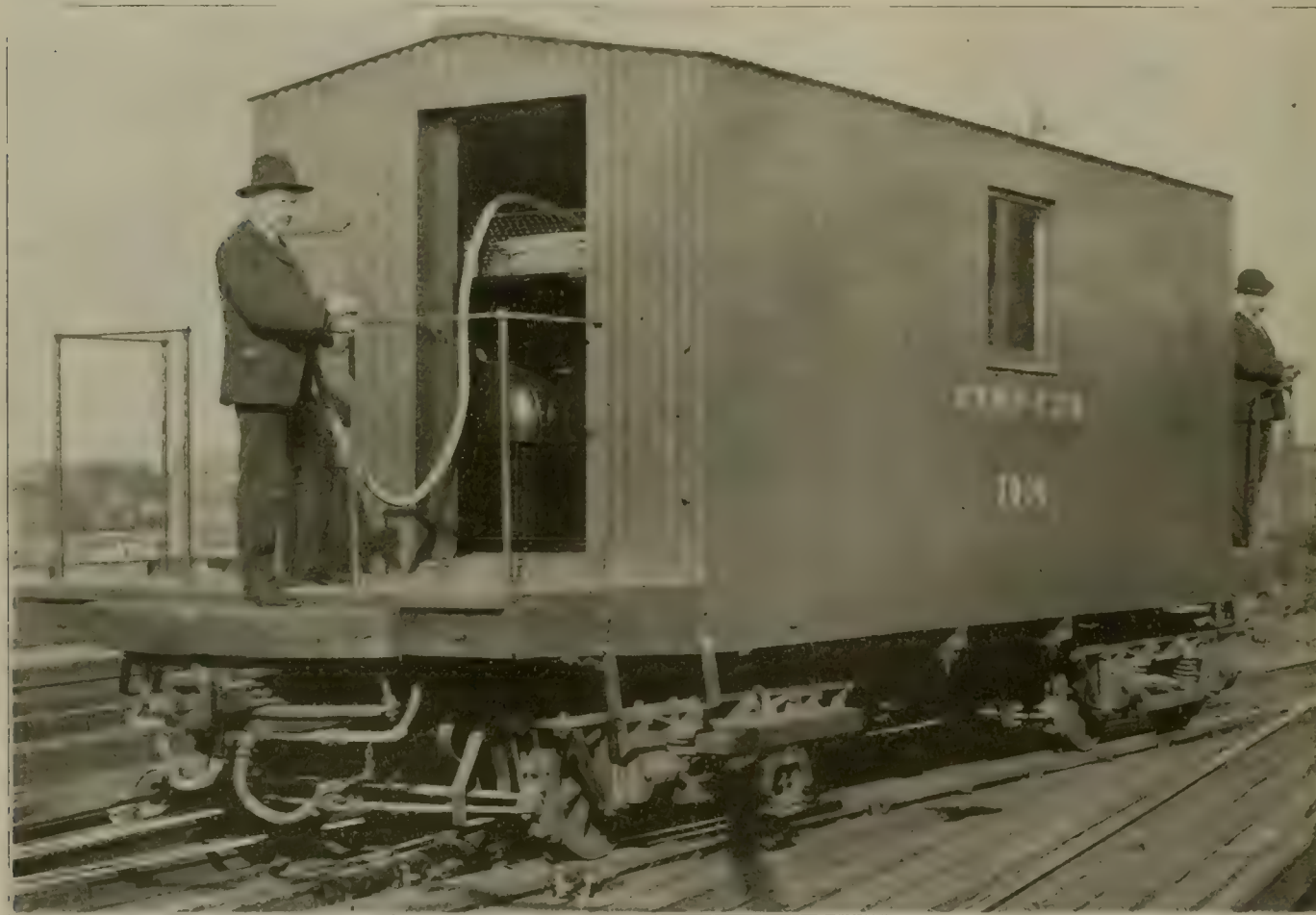
FIRE CAR FOR THE SOUTH SIDE ELEVATED RAILROAD.

The South Side Elevated Railroad of Chicago has recently equipped and put into service the fire car, shown in the accompanying illustrations, for the purpose of protecting the cars in the storage yards. This car was made ready for service early this summer and, while there has as yet been no occasion requiring its use, the results of its operation experimentally have been so successful that the company has built a second car which is now ready for installing the fire apparatus.

The car was built up from an old flat car at the company's shops at Sixty-first street and Calumet avenue and is equipped with a chemical engine and other necessary fire-fighting apparatus by the American-La France Fire Engine Company of Elmira, N. Y. The car platform is 20 feet long

flows into the tank, forming carbonic acid gas at a pressure sufficient to discharge the alkaline water impregnated with the gas through a pipe at the bottom of the tank which leads through the hollow trunnion to the hose. One charge is sufficient for a flow of about 40 minutes, and will throw a stream from 60 to 75 feet. One hundred and fifty feet of 1-inch hose is attached to each tank and while not in use is coiled in a basket above the tanks. The hose is provided with $\frac{3}{8}$ -inch shut-off nozzles for regulating the flow and preventing the unnecessary waste of the fluid. Both tanks may be operated at once if desired or they may be operated successively, one being recharged while the other is in use. The tank can be recharged in from $1\frac{1}{2}$ to 3 minutes. One charge of soda and acid costs approximately \$2.50.

A 750-gallon reserve tank of water is located in one corner of the car and is connected with the tanks. As a large part



South Side Elevated Fire Car—Exterior View.

and 7 feet 10 inches wide. The roof sides and ends were made fireproof by covering them with corrugated asbestos fiber. The windows are of special fireproof wire glass $\frac{5}{8}$ inch thick. The car is mounted on an old pair of trailer trucks.

The chemical engine is a double 115-gallon "Champion." It consists essentially of two cylindrical steel tanks, which are filled with water in which a suitable quantity of bicarbonate of soda is dissolved. For the 115-gallon size the charge of soda is 46 pounds. Inside the tank is placed a lead receptacle for sulphuric acid, which may be removed by unscrewing a cap. The receptacle is provided with a loose stopper and is so placed that when the tank is in a normal position the stopper is above the alkaline fluid. The tank is mounted on hollow trunnions located at opposite ends, the forward one being provided with a crank. The chemical action is secured by revolving the tank by means of the crank; the loose stopper drops into a receiver and the acid gradually

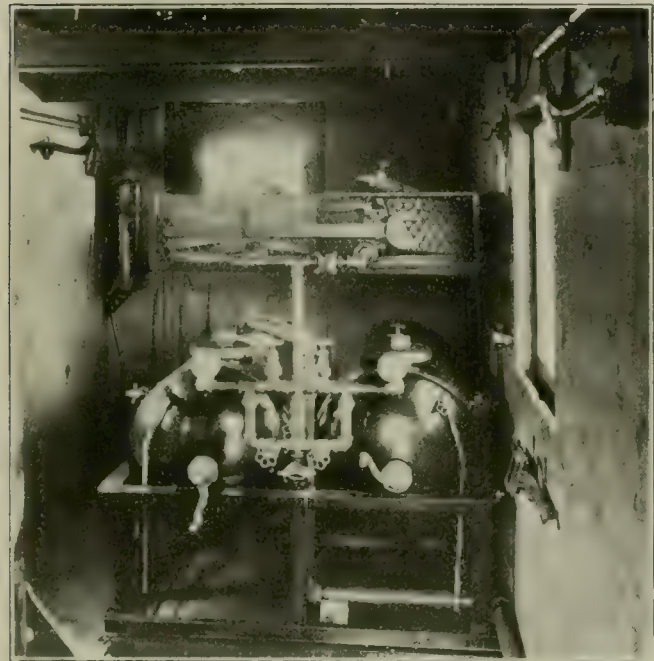
of the water in this tank is below the level in the chemical tanks and as the flow produced by gravity is not sufficiently rapid the reserve tank is connected with an air reservoir containing air at 90 pounds pressure. This pressure is reduced to 15 pounds by a reducing feed valve in the pipe.

The car is equipped with two fire axes, two pike poles, two 5-gallon Babcock extinguishers, with three extra charges, and two extra charges for the chemical engine. The car is lighted by incandescent lamps and two electric heaters, made by the Gold Car Heating & Lighting Company, are provided to keep the water from freezing in cold weather.

The fire car illustrated herewith is kept at the yards at Sixty-third street and Loomis avenue, the terminus of the new Englewood extension. The second car, which is somewhat larger than the first, being 26 feet long by 8 feet wide, will be kept at the yards at Forty-second street and Lake avenue. The main yards and shops at Sixty-first street are already

adequately protected by a fire pump and piping system. The car is always coupled to a motor car in readiness for instant use, and is always kept on a clear track. At night it is hauled on to the lead track in the center of the yards. No crew is assigned to the car, but every employe at the yard is instructed in the operation of the engine and there are always several men about who can handle the motor car. In case of a small fire at any place in the yard one man could easily run the car to the place desired and get the engine into action at once. In case of a larger fire the fire car could be run in among the burning cars and the motor car withdrawn.

With one of these cars always ready for use it is believed



South Side Elevated Fire Car—Interior View, Showing Chemical Apparatus.

that any small fire can be speedily quenched before it has an opportunity to spread. It is also understood that a saving in insurance rates will be obtained.

Mont Cenis Tunnel to be Electrified.

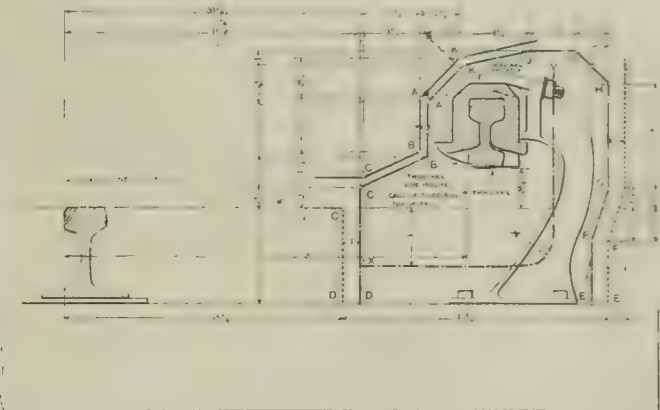
The opening of the Simplon tunnel has had its expected effect in decreased traffic through the older Alpine tunnels. In order to put the Mont Cenis tunnel in a condition to maintain more effective competition with the other tunnels it has been decided to equip it for electric traction. After communications with the Italian government the president of the council of the Mont Cenis tunnel has announced that the line will be electrified between Bussoleno and Mordane and that a second track will be laid between Turin and Mont Cenis. The cost of the work will be covered by the \$180,000,000 voted for public works last year. The French government has recently spent \$7,000,000 on building a double line approach from the French side, and intends to spend \$5,000,000 in improvements at Mordane station.—Electrical Review.

It is reported that the Siemens-Halske Company, after consultation with the German government officials, has submitted plans for a new underground electric railway through Berlin. It is to connect the Potsdam station with the Stettin station, thus furnishing communication between the southwest and the north of the city. The road is to be double track and standard gauge, and of such construction that it can be used by the standard rolling stock of the steam railroads.

STANDARD LOCATION OF THIRD RAIL.

Circular No. 754a of the American Railway Association, which is a supplement to the report of the committee on "Standard Location for Third Rail Working Conductors," dated September 23, 1907, comprises diagrams of suggested limiting permanent way and rolling equipment clearances to permit of standard third-rail location. These diagrams show the interrelation of the near track rail and the third rail as now installed on the Long Island, the New York Central & Hudson River and the West Jersey & Seashore railroads.

The accompanying illustration from this circular shows the location of the clearance contours for the New York Central third rail, which, it will be remembered, is of the Wilgus under-running type, while those of the Long Island and West Jersey & Seashore roads are of the top-contact type. The clearance contours as illustrated for the New York Central third rail are of such dimensions and so located that the top-



Suggested Clearances for Permanent Third-Rail Location—Under-Contact Type Third Rail of the New York Central.

contact third-rail structures fall within the same space.

Referring to the accompanying illustration the line C D E F G represents the desirable clearance for permanent way structures, and the broken line X Y the desirable clearances for non-continuous permanent way structures between brackets. To the 1/2-inch clearance shown should be added an allowance for curved track, the maximum offset to be considered as that on a 20-degree curve. Allowance also should be made for the side throw due to the horizontal movement of the truck bolsters. It is suggested that this allowance be 2 5/8 inches for passenger cars and 3/8 inch for freight cars.

Horizontal variations in rolling equipment should be considered as follows:

Wear of axle collars and boxes.....	3/8 inch
End play of brasses.....	1/8 "
End wear of brasses.....	1/4 "
Wear on wheel flange.....	3/8 "
Clearance between new flange and rail.....	5/8 "
Constructional variations	1

Total 2 1/2

With regard to vertical variation in rolling equipment the following allowances should be made:

	Passenger	Freight
Wear on journal and brasses.....	3/4	3/4
Radial wear on wheels—Passenger (steel), freight (cast iron).....	1 1/4	1
Compression of springs.....	1 1/4	1
Sagging at center of car.....	1	1
Constructional variations	1	1

Total vertical allowance 8 1/4

In the report of the committee definitions were suggested of terms for various parts of the third-rail structure. These definitions agree closely with those in common use. It should be understood that this report has only been discussed by the association and that these clearances have not yet been adopted.

REPORT OF EXPERT ACCOUNTANTS ON THE MUNICIPAL TRACTION COMPANY OF CLEVELAND.

In an analysis of the condition of the Municipal Traction Company of Cleveland, prepared for Charles A. Otis of the Cleveland News, Haskins & Sells state that the books do not reflect "the company's true financial condition. Only such accounts as have been paid have been charged on the books, no liability having been set up for accounts due and unpaid, nor proper reserves created, except for fuel."

As the books were not posted after June 30, it was necessary to make up statements as of June 30. Balance sheets, income accounts and operating expense accounts were compiled by the accountants, both according to the books and as they believe the accounts should be shown.

An abstract of the report of Haskins & Sells follows:

Unpaid Subscriptions to Capital Stock.

The minutes show that the entire capital stock, \$10,000, was subscribed for on July 2, 1906, but none of the company's books records any payment on account of these subscriptions. We were informed by the officers of the company that payments had been received and the money deposited with the United Banking & Savings Company, which informed us that \$1,000 had been deposited on July 24, 1906, to the credit of the Municipal Traction Company. The treasurer of the latter company stated that this was the total amount received on account of stock subscriptions. The amount of \$10,000 having been subscribed, and only \$1,000 paid on account, there is still due to the company \$9,000, which amount is set up as an asset on the adjusted balance sheet. The company's books do not show this asset.

Stock of the Forest City Railway.

On January 31, 1907, the company purchased 10 shares of the capital stock of the Forest City Railway for \$900, this being a part of the stock sold by popular subscription. The certificate for this stock was not exhibited to us, but we were informed by the secretary of the company that he held it as trustee.

Rent of Land and Buildings, Payable in Advance.

Under the lease from the city of Cleveland, the company uses as a power house the property known as the Division street pumping station, the yearly rental of which is \$2,700, or \$675 per quarter, payable in advance. The instalment due on May 27 was not paid until August 1, 1907, but we have included among the accounts payable, in the adjusted balance sheet, the sum of \$675, and have shown the proportion unexpired at June 30, 1907, as an asset. The company's books do not show this asset.

Accounts Payable.

The amount of \$10,366.54 shown by the adjusted balance sheet is made up as follows: City of Cleveland—water, \$574; city of Cleveland—rent of pumping station, \$675; city of Cleveland—use of sprinkling wagon, \$9.75; coal—estimated amount of bills not recorded, \$3,463.52; Eclipse Railway Supply Company—fender parts, \$36.60; Timothy Ingram—waste, \$166.06; Lintern Car Signal Company—batteries, \$17.50; McWatters Dolan Company—uniforms, \$497.89; Macbeth Iron Company—boiler repairs, \$437.24; National Carbon Company—electric supplies, \$14.98; petty cash—sundry expenditures, \$88.30; Standard Car Wheel Company—wheels, \$874.10; salaries of officers—proportion for June, \$312.50; wages payable—to June 30, \$3,199.10; total, \$10,366.54. None of the liabilities shown above appears on the books of the company at June 30, 1907, except the following: Coal—estimated amount of bills not recorded, \$3,463.52; McWatters Dolan Company, \$497.89; wages payable—to June 30, \$3,199.10; total, \$7,160.51.

Forest City Railway—Current Account.

Under the lease between the Forest City Railway and the Municipal company, the latter agreed to take over the property of the Forest City company and complete the construction of its lines, paying for the cost of such construction out of funds derived from the sale of capital stock of the Forest City company. The books of the Municipal company do not show that this provision has been carried out. Instead it appears to have been the purpose to have the books of the Municipal company record items relating to operation, and those of the Forest City company the items relating to construction. We find items on the books of the company which are chargeable to construction, and on the books of the Forest City company

we find expenses chargeable to operation, the latter having been paid out of construction funds.

A summary of the account of the Forest City company, as it would appear on the books of the Municipal company after adjustment, shows a balance due the Forest City company of \$8,766.45. This liability does not appear on the books of the Municipal company.

Tickets, Power and Rent.

To June 30, 1907, tickets were sold amounting to \$1,684.52 and, with the exception of some which were in the hands of a car house superintendent, were held by the public.

Under ordinances granting to the Forest City Railway the right to occupy certain territory jointly with other street railways, the Forest City company is to pay such other company for the use of the electric current three cents per car-mile. In the adjusted statement of income and profit and loss we have charged operating expenses with \$2,524.17 to cover the cost of such power from January 12 to June 30, 1907, and have set up this amount in the adjusted balance sheet under "Hired Power—Accrued." This liability does not appear on the books of the company.

The ordinance granting to the Forest City Railway the right to use the Superior street viaduct fixed the rental to be paid to the city at \$376 per year. The amount of \$172.33 is the proportion of this rental from January 12 to June 30, 1907, inclusive. No payment has been made to the city on this account, and the company's books do not show this liability.

The city's charge for water for the six months to April 1, 1907, less \$10 advance deposit, was \$574 and the advance deposit required by the city water department for the six months beginning April 1, 1907, was \$500, making a total of \$1,074 which was paid on August 27, 1907. On the same date the water department refunded \$300 as the company claimed that it had discontinued the use of city water at its power house some time before that date, and was getting its supply from the two old tunnels extending from the lake to a point under the power house. City water is being used at the car barn, but in the absence of more definite information than we were able to secure, we have figured the entire cost of water from April 1 to June 30 at only \$200, and have set up the liability for this amount in the adjusted balance sheet. The company's books do not show this liability.

Taxes.

No provision had been made for the state tax on earnings, which had accrued to the amount of \$661.14 on June 30, 1907.

No allowance had been made for city and county taxes or for the annual corporation franchise tax on stock of the Forest City company, assumed by the Municipal company.

Reserve for Fire Insurance.

We were advised by the company that no insurance, except that on boilers and office furniture, is, or has been, in effect. A lease from the Forest City Railway requires the Municipal company, at its own expense, to keep insured all the buildings, cars, equipment and other property and appliances of the Forest City company. As a conservative estimate of the amount of insurance applicable to the period from January 12 to June 30, 1907, we have set up \$1,100, charging operating expenses with this amount, and showing the liability in the adjusted balance sheet. The company's books do not show this liability.

Reserve for Damage Claims.

The treasurer of the Forest City Railway informed us that claims for damages from November 1, 1906, to August 1, 1907, would amount to approximately \$3,300, and on a pro rata basis we have reserved \$2,016.63 as chargeable to the cost of operation during the period from January 12 to June 30, 1907.

Reserve for Depreciation of Track, Electric Line and Buildings.

The subject of depreciation is one that is occupying the attention of all street railway people today, as it is recognized that the property will wear out, and eventually have to be replaced, no matter how well maintained so far as repairs are concerned. The Municipal company has made no charges to its accounts for maintenance of tracks, electric line and buildings, claiming that no repairs have been necessary, and the officers claim that it is not proper to charge off any amount for depreciation "at this time." In this we wholly disagree with them, as wear and tear is going on all the time, and in lieu of maintenance and depreciation charges which the company should have made, we have set up a reserve of \$9,500 for the period from January 12 to June 30, 1907, which in our judgment represents the very lowest charge that should be made if the recognized rules and principles of "Depreciation" are observed. Charges in the adjusted statement of income and profit and loss to maintenance of way and structures and main-

tenance of equipment aggregate \$13,762.64 for a period of almost six months. If the charges for a year amounted to \$30,000, the average per mile would be about \$3,000. [Figures are presented at this point showing the depreciation charges of the Chicago Union Traction Company and the Glasgow Corporation Tramways. These figures were published in the Electric Railway Review of February 23, 1907.—Eds.] The Municipal company's gross receipts in the period from January 12 to June 30, 1907, were \$66,113.92. Maintenance and depreciation expenses of 35.24 per cent of its gross receipts would amount to \$23,298.54. The expenses, as shown in the adjusted statement of maintaining track, electric line, buildings and equipment, amount to only \$13,762.64. The amount of \$9,500 reserved for the depreciation of track, electric line and buildings does not include anything for depreciation of equipment. Neither does it include any amount for the maintenance of track and electric line in joint territory, nor the maintenance of the Superior street viaduct, although the city ordinances provide that the company shall pay a proportion of such expenses. No reserve of this character is shown on the company's books.

Salaries of General Officers.

The salaries of the company's general officers, amounting to \$1,250 per month, were paid by the Forest City Railway and charged to the cost of construction. Of the amount thus paid since January 12, 1907, we have charged 25 per cent to the cost of operation, basing our action on the president's estimate of a proper division of these salaries.

For the same reason we have also charged to the cost of operation 50 per cent of the salaries for the period of the superintendent and auditor.

The records do not show that the officers' salaries for June have been paid.

Legal Expenses.

The company's books do not show that anything has been paid on legal expenses in connection with damages. We were informed that all claims for damages have been settled without suit. It occurs to us that legal advice must have been secured before settlements were made, but as the company claims that no liability had been incurred on this account, we have not included anything in the operating expenses to cover such expenses. We are informed that suits for large amounts have been filed against the company in personal injury cases, but no reserve for legal expenses appears on the books.

The company's books do not show that any payment has been made for miscellaneous legal expenses; neither has a reserve been set up to meet expenses of this kind, and we have not attempted to make an estimate for the purpose of creating such a reserve.

Comparative Statements.

A comparative statement of the income and profit and loss account follows:

	November 1, 1906, to June 30, 1907. Per books.	January 12 to June 30, 1907. As adjusted.
Car earnings—passengers	\$75,541.44	\$66,113.92
Operating expenses	53,649.63	69,101.04
Profit from operation	\$21,891.81	.....
Loss from operation .....	.....	\$ 2,987.12
Taxes—		
Car licenses	230.00	95.81
On earnings .....	.....	661.14
City and county .....	.....	1,953.24
Franchise tax .....	.....	916.63
Total taxes	\$ 230.00	\$ 3,626.82
Profit from operation after taxes	21,661.81	.....
Loss from operation after taxes .....	.....	6,613.94
Other income	461.83	483.57
Gross profit	\$22,123.64	.....
Gross loss .....	.....	\$ 6,130.37
Rent of leased lines	27,623.10	28,385.08
Deficit	\$ 5,499.46	\$34,515.45

Although the company commenced to run cars on November 1, 1906, it was only able to operate over a portion of its road between that date and January 12, 1907, when the first car was run to the public square. This the officers of the company maintain was the date on which the operation of their road really began. In view of this statement the accountants eliminated from the book figures the earnings and operating expenses prior to January 12, 1907, which leaves a deficit at June 30, 1907, of \$3,970.94.

PIPING AND POWER STATION SYSTEMS—LXI.

BY W. L. MORRIS, M. E.

Class R 2—Oil and Drip Lines to Cups and Machines.

The following few essentials in these drip connections should be provided for:

1. The connections to main journals, eccentrics and crank-pins should be arranged so that the journal caps or oil guards can be removed while running and without shutting off the oil supply.
2. Different lines and branches should have a gradual uphill construction, there being a low point which all the branches will drain.
3. Pipes should be supported a sufficient distance from the machine to permit cleaning.
4. The oiling system for each machine should be a unit in itself operative without the general oiling system and capable of being changed over while the machine is running.

The first requirement is shown in Figure 342 (R 2-1), the pipes swinging on their threaded joints. If valves were used

in each of the swing connections they would be placed at A, this being necessary in order to disconnect the cups from the journals. Valve B is the throttle and the T shown at C is pointed down, with a valve or plug at its lower end. For the third requirement some post form of support of the type used for plumbing fixtures, as shown in Figure 343 (R 2-2), is

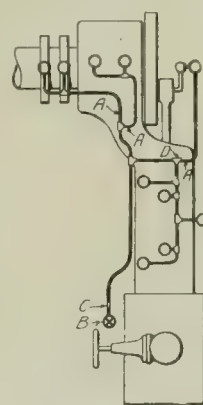
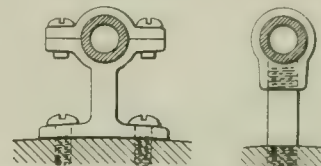


Figure 342 (R 2-1).



Figs. 343 (R 2-2) and 344 (R 2-3).

very desirable. Figure 344 (R 2-3) is objectionable unless the post has a right-and-left thread. The screw holes for the support shown in Figure 343 can be drilled with a breast drill, but for Figure 344 a ratchet drill must be used. The distance from the pipe to the engine frame need not be great—1½ inches on small pipe and 2 inches on larger ones, this distance being quite convenient to allow passing a piece of waste through.

The fourth requirement is quite essential, as its non-observance affects continuous operation. It requires an emer-

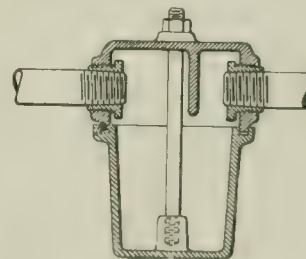


Figure 345 (R 2-4).

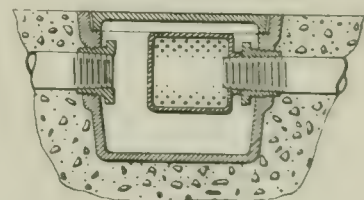


Figure 346 (R 2-5).

gency tank, located between the oil throttle and the journals, permitting engine oil to be supplied in large quantities. Emergency tanks can be kept away from the engine, the valves placed at a high point and the tanks attached when required, using the oil in the combined cup until the emergency tank can be attached and filled, thereby making a very reliable arrangement.

The different drains may be attached to a drip pot located in the main. This avoids the necessity of running many branches. The joining of drips with a T is a very crude detail. It should be an invariable rule that no drip branch

shall be run that cannot be cleaned from end to end by passing a wire through it. The drip pot, Figure 345 (R 2-4), is especially suited for basements where the drips are located close to the ceiling. That shown in Figure 346 (R 2-5) is suited for drip lines built in the cement floor. These drip pots are of size to take six or eight drains, one pot to take three or four drains at one point and discharge into the next pot, the next pot to take four or five more and discharge into another, one engine having possibly three pots, including the one located in the main. When pots are used there is no occasion for using valves in the branches or other means for cleaning except by wire from pot to pot. If the systems shown in Figures 345 or 346 are used engine pots will also be required.

The ordinary method of draining the engine bed and pans is to drill and tap a small opening with which the drip pipes are connected from below. Some engine beds have drains carried to one side, possibly half in and half out of the floor, the details employed being insufficient to provide for the proper flow of the oil and likely to become damaged. The drip pot shown in Figure 347 (R 2-6) should be provided, there

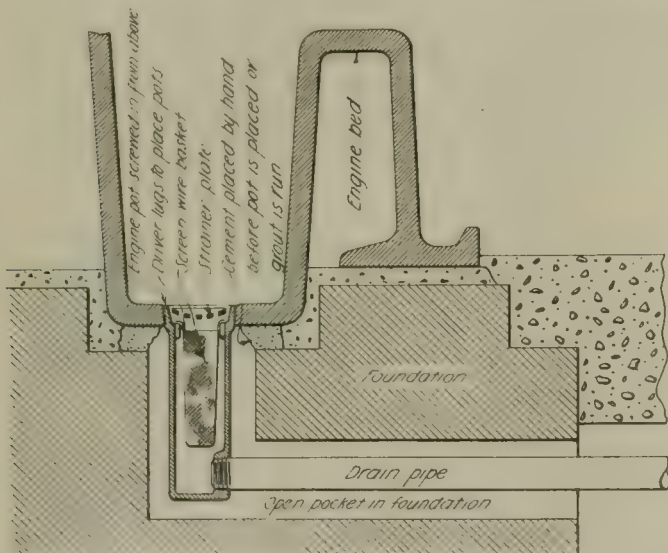


Figure 347 (R 2-6).

being hardly any other detail that can be employed to keep vibration strains from the pipe and also make renewals possible.

Modern practice requires but little piping for cylinder lubricators other than that furnished with the engine. Force feed lubricators are used almost exclusively. They are economic and positive in operation. There is chance for considerable loss due to careless use of cylinder oil when it is supplied from a pipe line. When the drop, sight feed lubricator was extensively used, there were various methods of piping the lubricators, as shown in Figures 54 to 57. For large power plants the cylinder oil supply system, shown in Figure 58, may be found convenient and clean. The saving in oil and labor will be slight, but as the piping for such a system is inexpensive, it may, in an indirect way, be a profitable investment, as it aids in securing cleanliness in the plant.

The method of feeding cylinder oil to the steam valves and the cylinder has much to do with the economical use of the oil, it often being possible to reduce the consumption fully one-half. Oil should be fed to the valves as close to the cylinder as possible. The quantity of animal fat required in an oil is determined by the amount of condensation in the cylinders. The animal fats should have the least possible exposure to high temperature steam. Animal fats are the only lubricants that will adhere to the wet walls of cylinders, therefore the drier the cylinder walls the less animal fat will be

required, thus permitting the use of a much heavier mineral oil. This will require atomizing at a considerable distance from the cylinder. Such heavy oil is a permanent lubricant and will stand coming in contact with high temperature steam.

Atomizers for use in steam pipes serve the same purpose as feeding in the oil higher up in the pipe. The oil is broken up when it leaves the atomizer and does not depend upon the heat of the steam to be thoroughly vaporized. A vaporizer is particularly valuable in the use of oil containing animal

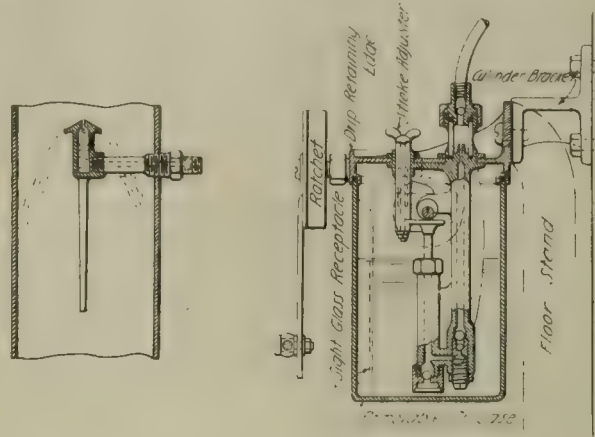


Figure 348 (R 2-7).

Figure 349 (R 2-8).

fats, as it shortens the distance and time that these fats are exposed to steam before precipitation on cylinder walls.

One form of atomizer is shown in Figure 348 (R 2-7). The chief requirement of this device is that no part can become loosened and carried into the engine. The long foot or stem projecting downward from the atomizer prevents the head from unscrewing. Another method of use is to have the atomizer head smaller than the opening in the pipe, made in one piece and screwed in from the outside. A most satisfactory lubricator is shown in Figure 349 (R 2-8). As the oil receptacle incloses the entire pump mechanism, the receptacle is free from all working parts, being held in place by two winged nuts on the end of two eyebolts. The receptacle can be removed while the pump is in operation and oil fed to the pump suction direct. A stroke adjuster, which moves with the plunger, shows the movement of each of the plungers.

Some Corliss engines have lubricators with five feeds, but this is not the best practice for the economical use of oil. There would be in this case one feed at each end of the admission valve, a feed to the top of the cylinder and the other feed into the packing rings. The latter feed is desirable if fed between the inner and outer ends of packing, requiring in this case as much pressure to deliver oil to packing as will be required to deliver it into steam space. The lubricator ordinarily should have three feeds—one to the rod as noted and one a short distance above the throttle valve with an atomizer, as shown in Figure 348. There should be another feed higher up in the steam pipe for emergency use.

With four lubricator pumps in use, it is difficult to get men accustomed to proper feeding. The general tendency is to use too much oil, which is detrimental to proper lubrication—it is more difficult to break up a large drop of oil than a small one.

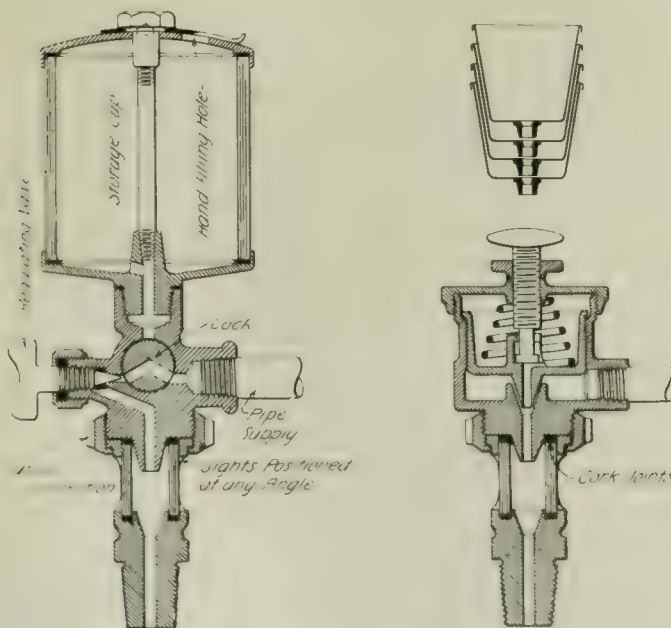
The oil cup shown in Figure 350 (R 2-9) has many commendable features. Oil from the pipe line can be discharged to a journal or cup and oil from the cup can be discharged to the journal. The cup can be filled by rotating the cock shown. The handle of the cock is balanced and shows the position of the parts. The ends of the cock are packed, affording sufficient friction to hold it in any position in which it may be placed, without leakage. The needle valve utilizes its packing, more to retain set than to prevent leaks, as there is no pressure past the valve. In regular operation the line

is shut off with the cock and the needle valve left undisturbed ready to feed the desired amount when the engine is again started. If the oiling system is under pressure before the engine starts, the oil cups at the top of the oil regulator are left off. Instead of using glass body storage cups, they may be made of light sheet metal, as shown in Figure 351 (R 2-10), and shaped to stack up in close quarters.

Another type of oil feeder is the automatic oil cup or valve arranged to close when the oil throttle is closed and open with the throttle. This type of valve is shown in Figure 352 (R 2-11) and to make the system reliable an emergency tank must be used, as shown in Figure 59. This automatic valve consists, primarily, of a free moving piston with a valve at its lower end. The pressure moves the piston from the valve seat as far as the set of the regulating screw will permit and a spring closes the valve when the oil pressure is off. Any leakage that may pass the piston will flow over its edge and be discharged through a port in the center of the regulating valve. When the piston closes the regulating valve it also closes the valve in the open end of the piston, shutting off any oil that otherwise would leak past the piston. The union connection to the sight post is the same as shown in Figure 350. This permits a pipe connection and a position of sights to suit the requirements. The valve in this cup remains at the end of the pipe when the cup is disconnected from the journal, the same as in Figure 350. When it is necessary to change over to the low-pressure gravity system the adjusting screw is run out and the valve mechanically lifted from its seat. The spring used for low-pressure cups is light, so that the pressure will force back the piston and open the valve. The high-pressure requires a spring that will close more firmly but not so accurately as with fitted valve faces. The parts of this cup are few in number and as each is heavy there is practically no danger of the parts becoming damaged.

Class R 3—Oil and Drip Lines for Oil Pumps.

Any of the pumps ordinarily used for water can be used to pump oil if the oil can be kept free from water. The



Figures 350 (R 2-9), 351 (R 2-10), 352 (R 2-11).

animal fats have an affinity for both oil and water and if the oil contains or takes up animal fats it is then in condition to absorb water. Oil in this condition cannot be agitated without foaming and where the oil is used many times these fats are sure to be taken on and considerable water be absorbed by the oil.

The duty of an oil pump is generally so light that the

greatest difficulty is encountered in handling small quantities of oil; for instance, if a 3 by 2 by 3 inch steam pump be used, pumping half a barrel of oil each hour, then the pump would make but 10 strokes per minute or a total piston travel of but $2\frac{1}{2}$ feet per minute. If the steam line to the pump were only ordinarily exposed to radiation, the condensation would almost stop the pump. For handling so small a quantity of oil at a pressure of 15 pounds per square inch a drive equal to 0.004 horsepower will be required to operate the pump.

The pump arrangement shown in Figure 353 (R 3-1) is specially suited for oil systems. The speed of crank A can

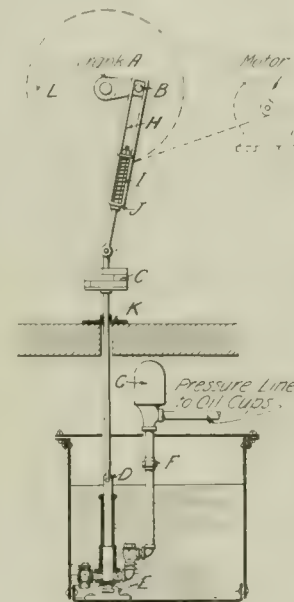


Figure 353 (R 3-1).

be kept constant, power being taken from a small motor as shown. The wear and tear on the motor is much less by allowing it to run continuously. The pin and slide box, B, require a vertical travel, whether it completes a circle in its travel, or but a segment, as would be the case if attached to a rocker arm. Pressure on the oil is exerted by the weight, C, the driving mechanism simply raising the weight each stroke. If no oil is used, the weight will remain elevated. The pump should be located in the oil tank for the reason that any leakage past the piston will then flow directly back to the tank. The plunger should have a long bearing in the cylinder, not less than four inches in any part of the stroke. The connection to the rod at the top of the plunger, D, should be of the ball form, so that it may be free to turn. The anchor block, E, receives the T end, which is a part of the pump cylinder. The air chamber, G, is not absolutely necessary, but serves to minimize variations in the pressure. The slot in the connecting rod, H, must be of sufficient length to permit a complete revolution of the crank without moving the connecting rod. The spring cushions the shock of the slide box, B, striking the open end of the connecting rod and compressing as weight C obtains speed. The guide, K, takes the side thrust of the pump rod. If a small motor is used, it will be advisable to use a counterweight opposite the pin, B, as shown at L. This counterweight should have about half the weight of that lifted by the pin, B. The pump can make as high as 100 strokes per minute with a $\frac{3}{4}$ -inch plunger and 3-inch stroke and work satisfactorily.

Figures are given by the Engineering Journal of the University of Birmingham of the recent performance of gas engines in combination with suction gas producers in driving pumping installations. At a small waterworks at Welwyn (Herts) the duty per hundredweight of Welsh anthracite equaled 102,537,000 foot-pounds, which, with the pump horsepower less than two, is cited as remarkable. On a larger installation at the East Kent District Water Company, Snodland, a duty of over 170,000,000 foot-pounds per hundredweight of Welsh anthracite was obtained. The pumps here were driven by two 29-brake-horsepower gas engines, in combination with suction producers. On a still larger installation at Stourbridge, where suction gas is also employed, a duty of 216,000,000 foot-pounds per hundredweight of anthracite was obtained. On a pumping installation at Paris-Plage waterworks, Etaples, the fuel used is gas coke and the duty per hundredweight of gas coke (allowing for partly consumed fuel in generation) works out at 117,000,000 foot-pounds per hundredweight of gas coke, 128,000,000 foot-pounds.

News of the Week

Trade Extension Trip.

At the invitation of President W. H. Fledderjohann of the Ft. Wayne & Springfield Railway, Decatur, Ind., a large party of Ft. Wayne merchants and jobbers made a trip to Decatur on November 2 in a special car furnished by the company and were the guests of the Decatur merchants at a banquet. The object of the trip was to bring about closer business relations between the two cities, which would increase the freight business of the road. It is expected that a number of similar excursions between neighboring cities in this vicinity will be arranged at the invitation of the traction companies interested.

Recent Accidents.

Three cars were wrecked and about twelve passengers were injured in an accident at Richmond, Ind., on November 4. A city car of the Richmond Street & Interurban Railway had stopped on a down grade to take on a passenger. An interurban passenger car and a freight car of the Terre Haute Indianapolis & Eastern Traction Company were following closely behind. The interurban car struck the city car, and was itself struck by the freight car, which was running at a high speed. It is stated that on account of slippery tracks, due to leaves and frost, the motormen were unable to stop their cars.

One man was killed and about thirty persons were injured by the overturning of a car on the Muncie-Anderson branch of the Indiana Union Traction Company at a sharp curve near Indianapolis on November 7.

Adjust Differences on Chicago Plan.

After the various interests in the Chicago Union Traction Company had failed to adjust their differences Judge P. S. Grosscup and Prof. John C. Gray, the arbitrators under the reorganization plan, announced a plan of settlement on November 2. The plan, in brief, provides that instead of getting 8 per cent dividends, if earned, on their stocks, holders of the Union Traction and the North Chicago and the West Chicago Street Railroad stocks will get 4 per cent a year until one-half the floating indebtedness is paid; then the dividends are to be increased to 5 per cent until the remaining half is paid.

The floating debts, amounting to about \$4,400,000, consist of judgments, promissory notes and receivers' certificates of indebtedness. To take up these obligations "Series C" bonds will be issued, to be retired by means of a sinking fund. Provisions for the disposition of the sinking fund were made by the arbitrators and agreed to by lawyers representing various interests.

The new plan provides that the money for rehabilitation shall not constitute a mortgage on the property until title has been perfected by the Chicago Railways Company. The company is required to perfect its title by February 11, 1910, three years from the date of the ordinance.

Under the new plan the rehabilitation money will be provided as soon as the ordinance is accepted, which must be by February 1, 1908, under the extension of time granted by the city council.

It is expected that a new order of possession will be entered soon by Judge Grosscup granting to the Chicago Railways Company the right to operate the lines for 20 years under the new plan. The company will accept the traction settlement ordinance and the receivership will be continued indefinitely under this programme.

Elevated Changes in Chicago.

M. B. Hereley, the new superintendent of local transportation for the city of Chicago, has submitted a report to Mayor Busse advocating the removal of ticket stations and news stands from the elevated platforms on the Union loop in order to increase the space for passengers. The elevated stations have long been overcrowded and the roads have repeatedly endeavored to secure the city's permission to lengthen the platforms in order to relieve the congestion. It is proposed to place the ticket offices and news stands on the first floor of the station structures, as is already done at some of the newer stations.

The South Side Elevated Railroad of Chicago, which recently adopted a system of color combination signals for indicating the destination and classification of its trains, has this week added plainly lettered signboards, with black letters on a white ground, which are placed on the front of the first car of each train, and which state the destination of the train and whether it is local or express. The color system, which includes ten different combinations of two signs each, with

discs for daytime and lamps at night, met with considerable protest from the patrons of the road as being too complicated to be generally learned and readily used. This system, however, is retained for the convenience of the station guards, who can see the colored signals at a greater distance than the lettered signs.

Tom L. Johnson Re-elected Mayor of Cleveland.

At the city election on November 5 Tom L. Johnson was for the fourth time re-elected mayor of the city of Cleveland, defeating the republican candidate, Congressman Theodore E. Burton, by a vote of 48,338 to 39,026. The main issue of the campaign, the principal features of which have been previously reported in the Electric Railway Review, was the street railway franchise question, as to whether the Cleveland Electric Railway should be granted a new 20-year franchise, providing for seven tickets for 25 cents, or whether the present franchises should be allowed to expire during the next few years and be renewed as they expire in favor of the Forest City Railway, with a provision for revocation by the council and for a cash fare of three cents.

Mr. Burton had outlined his plan for a settlement of the controversy, which has been in progress for about six years, in a letter to Horace E. Andrews, president of the Cleveland Electric Railway, and Mr. Andrews and the board of directors had accepted the plan. The company thus agreed, if given a new 20-year franchise: That the rate of fare throughout the city and suburbs should never be more than seven tickets for a quarter, with universal transfers; that a settlement should be arranged immediately after January 1, 1908, and that three experts appointed by Mr. Burton should ascertain the actual value of the property and report a rate of fare that would yield no more than 6 per cent on that value; that the fare for the first 10 years should never be greater than the rate thus fixed, and that the rate for the second 10 years should be controlled by the city council, but never be greater than for the first 10 years; that the company's books should be open to inspection by the city at all times. The company also agreed to expend \$1,000,000 for improvements for the next five years and to build a subway for the relief of congestion at the public square and a street railway bridge across the river.

Immediately following the election the Cleveland Electric resumed selling tickets at the rate of 11 for 50 cents. For a month it had sold tickets at the rate of seven for a quarter.

On October 30 the city council passed five ordinances granting franchises for short extensions of the Forest City lines.

Cleveland Section American Institute of Electrical Engineers.—About sixty members and associates of the American Institute of Electrical Engineers met on October 28 and organized the Cleveland section of the association. F. M. Hibben, Cleveland Electric Illuminating Company, is secretary.

Shop Foremen's Association.—The shop foremen of the Public Service Corporation of New Jersey, Newark, N. J., have reorganized the shop foremen's association, which was originally formed last spring, with the following new officers: President, W. Rickes; vice-president, Henry Dupras; secretary, J. R. Case; treasurer, H. W. Wightman.

New Platform Regulations in Philadelphia.—The Philadelphia Rapid Transit Company has issued an order prohibiting persons from standing on the front platforms of its cars during the rush hours and requiring conductors to keep the gates on the left-hand sides of both platforms closed at all times. Heretofore the latter rule has applied only to double-track lines.

Indianapolis & Louisville Line Opened.—The Indianapolis & Louisville Traction Company on November 6 began operating cars from Louisville, Ky., to Seymour, Ind., on a 2-hour headway. Connection is made at Seymour with the cars of the Indianapolis Columbus & Southern for Indianapolis. In a short time hourly limited cars will be run from Indianapolis to Louisville.

American Institute of Electrical Engineers.—At the regular meeting of the American Institute of Electrical Engineers, held in the auditorium of the Engineering Societies building, 29 West Thirty-ninth street, New York, on November 8, a paper entitled "Comparative Performance of Steam and Electric Locomotives," was read by A. H. Armstrong of the General Electric Company of Schenectady.

Western Society of Engineers.—At the regular meeting of the Western Society of Engineers on November 6 in the society rooms, Monadnock block, Chicago, A. S. Zinn, resident engineer of the Culebra division, Panama canal, presented a paper on "The Culebra Cut and the Progress of the Work."—A regular meeting of the electrical section was held in the society rooms on Friday, November 8, at 8 p. m. H. V.

Allen, representing W. D'A. Ryan of the General Electric Company, will address the meeting on "Color Values of Artificial Lights." The paper will be illustrated by experiments. —On Saturday evening, November 16, ladies' night, John W. Alvord will give an informal talk with lantern slide illustrations, entitled "Camera Engineering Notes from Mexico," at Kimball hall, Chicago.

Suburban Lines Under Jurisdiction of State Commission.—Attorney-General Young of Minnesota, in an opinion delivered on November 1, holds that the Minneapolis & St. Paul Suburban Railway, a part of the Twin City Rapid Transit System, is a common carrier and therefore under the jurisdiction of the state railroad commission. This is in accordance with a recent decision of the state supreme court that suburban lines are common carriers, which, however, made no reference to the commission's jurisdiction.

Michigan United Railways to Move Offices.—It is announced that about November 15 the general offices of the Michigan United Railways Company will be removed from Lansing to Jackson, Mich., and active preparations for the removal have begun. The offices have been located at Lansing since the company's organization, but Jackson has been selected for the new headquarters because when the Lansing-Jackson line is completed that city will be more nearly in the center of the system.

Through Tickets on Massachusetts Lines.—L. S. Storrs, vice-president of the New England Investment & Security Company, which controls the Massachusetts electric lines of the New York New Haven & Hartford Railroad, has announced that a system of through tickets will be established on those lines at once, in cases where the fare exceeds five cents, in place of the former practice of collecting several single fares. It is stated that if the plan proves successful it will be extended to the Connecticut and Rhode Island electric roads.

San Antonio Traction Company Increases Wages.—The San Antonio (Tex.) Traction Company has just announced an increase of wages for its conductors and motormen. The schedule which has been in effect since November 1, 1906, is 19, 20, 21 and 22 cents an hour, increasing one cent for each year of service up to the fourth. The new schedule is from 20 to 24 cents an hour, increasing one cent for each year of the first five years. Men who have been employed on street railways in other cities will be credited in length of service with half the time they were employed in the other cities.

Free Engineering Library to Open Evenings.—On and after Wednesday, November 6, 1907, the reference libraries of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers and the American Institute of Mining Engineers, 29 West Thirty-ninth street, New York, will be open evenings until 9 o'clock on all week days except public holidays. These libraries, constituting practically one library of engineering, situated near the New York library in the new headquarters of the engineering societies, are available to members of the above societies, engineers and the public generally, subject to proper regulations.

May Vote Subsidies for Indiana Interurbans.—The Indiana supreme court has handed down a decision holding that the circuit court of Kosciusko county properly refused to enjoin the collection of a subsidy tax voted by the people of Oregon township in aid of the construction of the Winona Interurban Railway. Because the statute does not specifically name interurban railroads the law was attacked and the validity of the provision relative to voting aid for the construction of interurban lines was tested by the suit. Judge Hadley, who wrote the decision, took occasion to state that the first railroad law included all railroads, regardless of the power employed to convey their vehicles. This decision is in conformity with the recent ruling of the Indiana railroad commission to the effect that interurban railroads are in the same class with steam lines. It is believed that the decision will greatly facilitate the construction of interurban lines.

Estimates for Municipal Street Railway in San Francisco.—City Engineer Woodward of San Francisco has submitted to the board of supervisors estimates of the cost of constructing a municipal street railway system over the route of the Geary Street Park & Ocean Railroad, which has for several years been operating under a permit without a franchise. Two estimates are given. Each is over the entire route, extending from Market street out Geary street, Point Lobos avenue and Tenth avenue to Fulton street. The original cost of reconstructing the line, using portions of the present roadbed, etc., Woodward estimates at \$865,000, to which he adds for necessary replacements during the first five years of service \$655,000, or a total of \$1,520,000. His estimate for an entirely new road is \$1,272,000.

Construction News

FRANCHISES.

Cleveland, O.—The city council on October 30 passed five ordinances granting franchises to the Forest City Railway for extensions. The first is for an extension on West Twenty-fifth street, from Bridge avenue N. W. to Lorain avenue. The other four give the Forest City company the right to extend its lines around all sides of the public square, on Ontario street to Eagle avenue, S. E., and on Prospect avenue, S. E., to East Ninth street, and thence to Euclid avenue; also on Superior avenue, N. E., from the square to East Ninth street, and on Lorain avenue from West Twenty-fifth street to West Seventy-third street; also over the Abbey avenue bridge to West Fourteenth street, to Kenilworth avenue, S. E., and across the Central viaduct, to Central avenue, and thence to Eagle avenue, S. E.

Dallas, Tex.—The original 50-year franchise which was passed in January, 1903, for the operation of the Dallas & Oak Cliff Electric Railway, now owned by the Northern Texas Traction Company of Ft. Worth, has been presented to the Dallas board of commissioners for approval. This action has been taken in order to make valid the franchise passed at that time, there being no record on the city's books at the present time that the approval of the commission was affixed when the ordinance was passed.

Elyria, O.—A 25-year franchise has been granted to the Cleveland Southwestern & Columbus Railway Company to build a belt line in Elyria. The company agrees to widen the bridge in East Bridge street or give the city \$15,000. The old franchise held by the company also was extended 25 years.

Hanford, Cal.—F. S. Granger of Denver, Colo., and H. P. Brown, an attorney of Hanford, have filed application for a franchise for an interurban railway in Hanford, forming a loop south to Lemoore.

Parsons, Kan.—C. D. Moore, representing capitalists of Huntington, W. Va., has been granted a street railway franchise in Parsons. As a guarantee that work will be started within 90 days and five miles be completed and in operation inside of a year, \$25,000 must be deposited with the city treasurer by the company. It is stated that the line will be part of an interurban system later to be built by the same interests.

Plymouth, Ind.—A 40-year franchise has been granted to the Indianapolis Logansport & South Bend Railway Company for a line along Michigan street. It is stated that funds are available for the construction of the road between South Bend and Plymouth, Ind., with an extension later to Indianapolis. It is planned to have the South Bend-Plymouth section in operation within 18 months.

San Antonio, Tex.—The San Antonio Traction Company has been granted a franchise for the extension of the Tobin Hill line from its present terminus to one of the new suburbs. W. B. Tuttle, general manager.

Tulsa, I. T.—The Sapulpa Interurban Railway, which proposes to build an interurban line from Sapulpa to Tulsa, I. T., with connections to the Glenn oil fields, has applied for a franchise to enter Tulsa. It is stated that work will be started at once. On completing the Sapulpa-Tulsa section it is intended ultimately to extend the line through Broken Arrow to Muskogee, with a possible extension later to Ft. Smith.

RECENT INCORPORATIONS.

Interurban Construction Company, Denver, Colo.—Incorporated in Colorado to build electric railways, telephone and telegraph lines in Arapahoe, Jefferson, Boulder, Adams, Weld, Larimer and Morgan counties in Colorado. The company also filed a trust deed for \$100,000 to the German-American Investment Company of Denver on all real estate and equipments now owned or to be acquired. Capital stock, \$150,000. Incorporators: Eben Reaser, Denver; Henry S. Dickinson and George Van Law.

Murphysboro Electric Railway Light Heat & Power Company, Murphysboro, Ill.—Incorporated in Illinois to build and operate electric railways and public utilities. Capital stock, \$3,000. Incorporators: John G. Hardy, Walter C. Alexander and Philip H. Eisenmeyer.

Oklahoma City & Southwestern Traction Company, Frederick, Okla.—Incorporated in Oklahoma to build and operate an interurban line from Oklahoma City to Hollis in Greer

county 190 miles, passing through Oklahoma, Cleveland, Comanche and Greer counties. Capital stock, \$2,250,000. Incorporators: C. A. Swartz, J. P. Van Allen, S. W. Johnson, D. O. Reed and C. E. Richardson, Frederick; H. W. Curry of Eaton, O.; J. N. Street, Bloomington, Ill.; Frank B. Lucas, Samuel Ecker, Jr., J. W. Woodworth and Thomas R. Clift, Guthrie.

Red River Railway.—Incorporated in Oklahoma to build an electric railway from a point on the Texas state line just north of Bonham, Tex., to Oklahoma City, 200 miles. The headquarters of the company will be at Oklahoma City and Durant. Capital stock, \$5,000,000. Incorporators: George F. Robertson, Atoka; E. M. Abernathy, S. C. Hawk, F. J. Hawk, Lexington; Albert Rennie, Pauls Valley; F. P. Kibbey, Byars; J. W. Hocker, Purcell; T. H. Bayless, Durant.

St. Louis & Staunton Railway, Champaign, Ill.—Incorporated in Illinois to build and operate an electric railway from a point in or near Edwardsville, Madison county, to a point in or near Staunton, Macoupin county, Illinois. This is a subsidiary of the Illinois Traction System for the purpose of building a belt line for freight traffic around Edwardsville. Principal office, Champaign, Ill. Incorporators: George M. Mattis, W. H. Carnahan, Charles Zilly, B. E. Bramble and R. H. Watson, Jr.

Woodstock Marengo Genoa & Sycamore Electric Railway.—Incorporated in Illinois to build and operate an electric railway from Woodstock, McHenry county, to Sycamore, De Kalb county, Illinois. Principal offices, Chicago. Capital stock, \$25,000. Incorporators: Charles A. Spinney, Edward B. Harang, M. W. Powell, H. S. Hedberg and E. C. Spinney.

TRACK AND ROADWAY.

Anacortes Improving & Developing Company, Anacortes, Wash.—It is stated that this company will soon incorporate for the purpose of building an electric railway from Anacortes to Sedro-Woolley, and that the line will cost \$1,500,000. Preliminary surveys will be started at once and as soon as these are completed capital is available for immediate construction. Those interested are: B. J. Weeks, H. B. Spear, Tacoma; F. S. Morton, W. W. Robinson, R. P. Ball, Anacortes, Wash. A feature of the construction will be a 2,000-foot trestle across the tide flats, paralleling the trestle of the Great Northern.

Bloomington Pontiac & Joliet Electric Railway, Pontiac, Ill.—The Fisher Construction Company of Joliet, Ill., which has recently secured control of this company's line from Pontiac to Dwight, Ill., is endeavoring to make financial arrangements for extending the road in both directions to connect Joliet and Bloomington. The Fishers say the lines will be built if local people will subscribe for 25 per cent of the bonds which will be necessary, at about \$25,000 per mile.

Blue Valley Railway.—The county court of Jackson county, Missouri, has confirmed the granting of right of way for the operation of this proposed line on the Blue Ridge road, Forty-ninth street and Swope Park highway, Kansas City, to a point east of the Blue river. It is stated that the road has been financed and that construction will be started at an early date. The officers of the company are: Alexander Massey, president; P. G. Walton, Anthony, Kan.; vice-president; Joseph S. Chick, secretary and treasurer; C. A. Braley, chief counsel; D. W. Pike, chief engineer. The above men, together with C. H. Sharpe, W. E. Winner, E. S. Yoemans, M. F. Simmons, John Georgen and H. E. Chamberlin, form the board of directors.

Boston Elevated Railway.—The extension of this company's tracks from the Sullivan square terminal through Middlesex Falls parkway to Spot Pond is nearly completed to Middlesex Falls and the poles erected for about one-half the distance. The new line begins in Mystic avenue at the Somerville-Charlestown boundary, near the Boston & Maine Railroad bridge, traversing private right of way for a portion of the distance. A force of men is at work excavating and putting in the broken stone foundation for the tracks on the other side of the bridge of the Boston & Maine's Medford branch. It is the intention to have the tracks laid on this section as far as the Medford-Malden car house before cold weather stops the work. When completed the extension will afford a direct line from Malden to Sullivan square.

Boston & Northern Street Railway, Boston, Mass.—This company is about to contract for the construction of a single-track line from Lowell to Lawrence, Mass., about nine miles, via West Andover.

Brookings & Sioux Falls Railway, Brookings, S. D.—Official advice from this company states that the permanent survey for this 61-mile interurban line from Brookings to Sioux Falls by way of Egan, Dell Rapids and Baltic, has been completed and grading is in progress from Brookings to Egan, 25 miles. The work heretofore done has been under the super-

vision of the directors and no contracts will be let until spring. The line has unusually light grades and no sharp curves. Isaac A. Smith, St. Louis, Mo., is chief engineer. Neil Stewart, Brookings, president; T. J. Carlisle, vice-president; A. B. Crosier, secretary; J. D. Wilson, treasurer.

Charleston & Paris Interurban Railway, Paris, Ill.—It is reported that this company has started grading on its proposed line from Charleston to Paris, Ill., 28 miles, via Ashmore, Kansas, Dudley and Conlogue. W. R. Patton of Charleston is president.

Chicago Fox Lake & Lake Geneva Railroad, Chicago, Ill.—M. B. Louis, vice-president and general manager of this road, which was incorporated last week to build an electric line 63 miles long from Chicago to Lake Geneva, Wis., writes that the road is now under survey and that grading probably will begin next spring. The line will touch River Grove, Franklin Park, Desplaines, Arlington Heights, Palatine, Lake Zurich, Fox Lake, McHenry and Lake Geneva. This does not include branch lines. Fifty miles of the road will be in Illinois and 13 in Wisconsin. The headquarters of the company are at 108 La Salle street, Chicago. G. M. Seward, president; E. J. Hall, chief engineer. Communications should be addressed to M. B. Louis, general manager.

Denton Interurban Railway & Power Plant Company, Denton, Tex.—H. M. Griffin, president, has completed financial arrangements for the construction of an electric interurban railroad from Denton to Ft. Worth. Terminal facilities have been secured in the latter city and it is stated that surveyors will be put in the field at an early date. The Denton line is now complete and will be in full operation within 20 days. With this work finished, the attention of President Griffith and others can be directed almost exclusively to the interurban road.

Dillon, Mont.—George R. Weldon of Dillon, Mont., has completed surveys for an electric railway from Blaine Springs to the Eastern Pacific mine, a distance of 12 miles.

Donora & Eldora Street Railway, Donora, Pa.—It is stated that practically all of the stock of this company has been sold and the entire right of way secured. It is planned to start construction work at once and have the road in operation by next spring. The line will be about seven miles long and will give street car service to the steel manufacturing towns along its route. The board of directors at a recent meeting elected the following officers: Dr. B. M. Hanna, president, 718 Penn street; William M. Galbraith, vice-president, Frick building; R. W. Harvey, secretary and treasurer, all of Pittsburg, Pa.

Eugene & Eastern Electric Railway, Eugene, Ore.—Engineers are surveying north from Eugene to connect with the line of the Oregon Electric Railway Company, which has surveyors working south from Albany. The Eugene & Eastern line will extend north from Eugene to Junction, along what is known as the "river road," and will serve one of the richest tracts of land in the state. Final surveys have been completed as far as Springfield and construction work east from the Eugene city limits will be started this week. Much of the material for the construction of the bridge over the Willamette river at Springfield has been assembled, although active construction work will not be started until spring, on account of the danger from high water. The line will be completed and placed in operation to the bridge site, however, where the passengers will use the wagon bridge for entrance into Springfield until the railroad bridge is built.

Ft. Dodge Emmetsburg & Spirit Lake Railway, Ft. Dodge, Ia.—T. F. McCartan, Pocahontas, and M. H. Miller, Ft. Dodge, Ia., president and vice-president, respectively, of this proposed 116-mile interurban road, have secured much of the right of way along the route and have sold liberal amounts of stock to the farmers in that section. Power for the line will be furnished by a power station to be located on the Des Moines river, about seven miles north of Ft. Dodge, where a dam will be built for this purpose. The company will furnish power for commercial purposes, as well as for the operation of its line. The road is expected to develop a large tourist traffic to Spirit Lake, much of which heretofore has been handled by the steam roads. Arrangements with the Ft. Dodge Des Moines & Southern are said to have been made by the company whereby Des Moines people will be afforded direct communication with Spirit Lake over an electric interurban line.

French Point Street Railway, Ambridge, Pa.—This company has increased its capital stock from \$6,000 to \$31,200 for the purpose of building an extension from Merchant and Wagner streets in Ambridge to a point on the right of way of the Economy Belt Line Railway. James D. Callery, president, Pittsburg, Pa.

Illinois Traction System, Champaign, Ill.—Work is being pushed on the Lincoln-Mackinaw extension, the completion of

which will afford a continuous line between Peoria and St. Louis by a connection with the road now in operation between Bloomington and Peoria. Alternating current, which has been used on the Bloomington-Peoria line, will be used on the new branch.

Los Angeles Railway.—It is announced that General Manager H. E. Huntington of this company and representatives of the city of Glendale, Cal., have signed an agreement by the terms of which through car service from the business district of Los Angeles to B street in Glendale will be assured. Deeds to the right of way, all of which has been secured, and the bonus from Glendale citizens of \$17,500 are to remain in the hands of the bank of Glendale until the completion of the line, when they will be turned over to the Los Angeles Railway Company.

Lewiston, Me.—John A. Jones of Lewiston is making surveys for an electric railway from Lewiston to Portland, Me., 33 miles.

Mexico Santa Fe & Perry Traction Company, Mexico, Mo.—S. L. Robinson, president, announces that construction will begin on November 11 on this line from Mexico to Perry, Mo., 25 miles, via Molino and Santa Fe. J. W. Wolf of St. Louis has the contract.

Moline East Moline & Watertown Railway, Moline, Ill.—This company has completed the double-tracking of its line from Twelfth street to Seventh street, East Moline.

Mt. Desert Transit Company, Bar Harbor, Me.—Contracts for the construction of this 40-mile electric railway from Ellsworth to Bar Harbor and Southwest Harbor, Me., will not be let until next spring. Surveys are under way and a portion of the right of way has been secured. John S. Kennedy, president, 32 Nassau street, New York City. Robert Amory, 258 Washington street, Boston, is secretary of the board of directors. W. E. Baker & Co., 27 William street, New York City, have been retained as engineers.

Morris County Traction Company, Morristown, N. J.—It is reported that this company will build an extension from Milburn, the present terminus, to Maplewood, N. J. Robert R. Foote, president, Morristown, N. J.

Michigan United Railways, Lansing, Mich.—This company will begin at once the extension of its city lines south across the Grand Trunk tracks on Washington avenue. T-rails will be used in this work. When completed the cars on this extension will run through to Mt. Hope avenue, where a large number of factories have been located. It is believed that the line will be in operation by the middle of the winter. Grading also has been started in Mason, Mich., for the Michigan United's Jackson-Lansing extension. With the exception of this work in Mason and a short strip in Lansing, the road-bed is ready for tracklaying, the rails for which are expected any day. Weather permitting it is believed this can be done within two weeks from delivery of the steel.

Milwaukee & Fox River Valley Railway.—John Saemann, Sheboygan, Wis., who is promoting this new line from Fond du Lac to Appleton, Wis., by way of Peebles, Clifton and Lake Winnebago, is securing right of way with a view to an early beginning of the work. The company will be capitalized at \$600,000 and it is stated that the road will be in operation by September, 1908. Robert Vrosby and Dr. A. J. Pullen of Fond du Lac are interested. The Western Engineering Company, Milwaukee, is making the surveys.

New Orleans, La.—William J. Kelly is said to be interested in the promotion of an electric railway in St. Bernard.

Ohio Electric Railway, Cincinnati, O.—John T. Adams, Columbus, O., who has the contract for tracklaying and ballasting the Lima-Bellefontaine extension of this company's line, will begin work next week at Lakeview, O.

Okanogan Electric Railway.—It is stated that the organizers of this proposed road for which preliminary surveys were made last winter, are now endeavoring to obtain subscriptions for a liberal amount of the stock from residents along the route, to be paid for in instalments after the line has been completed and in operation for one year. If this is done it is said that funds are available for its immediate construction. If built the road will derive a large tonnage from the rich mines in that section. The line will start from Night-hawk in the northern part of Concouilly county and run to Okanogan on the Okanogan river, by way of Loomis, Concouilly, Riverside and Omak. Spokane parties are said to be interested.

Oklahoma City Railway.—This company has begun work on the 7-mile extension from Britton to Edmond, Okla. J. W. Shartel, general manager.

Pacific Electric Railway, Los Angeles, Cal.—Tracklaying on the Monrovia extension of this company's line is being pushed to an early completion to Glendora, Cal. One-half mile of track has been laid east of the San Gabriel river and the poles have been placed as far as Azusa. The line will be double-tracked.

Parkside, Cal.—It is announced that within 60 days the new electric railway which the Parkside Realty Company will build for the purpose of developing Parkside and vicinity as a residence district will be completed and in operation. The contract for the construction of the line has been let and the grading is now under way. The southern terminus of the line will be at Ingleside, where transfers to the cars of the Ingleside branch of the United Railroads of San Francisco will be given. The temporary northern terminus will be at Twentieth avenue, pending the action of the supervisors regarding an alternative franchise.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company is said to be planning an extension to Healdsburg and the Dry Creek valley on the north and to San Francisco bay on the south. E. M. Van Frank, general manager and purchasing agent, Petaluma.

Portland Railway Light & Power Company, Portland, Ore.—Estimates are being prepared for the double-tracking of a portion or possibly all of this company's Mt. Scott line for the purpose of facilitating the heavy traffic on this branch of its system. If the improvement is decided upon work will be started in the spring.

Riverside, Cal.—Five carloads of rails and truck machinery have arrived for the construction of the new electric line from Riverside to Crestmore, Cal. The line will join the present road at the Hancock brick yard and from there will run to East Main street.

Rockwood & Bakersfield Railway, Rockwood, Pa.—The survey for this proposed interurban line, which will connect Rockwood and Bakersfield, Pa., by way of Roberts, has been completed and it is announced that grading will be started immediately. Tracklaying will be begun early in the year and it is hoped to have the line in operation by next July. John C. McSpadden, Rockwood, Pa., is president.

St. Louis Terre Haute & Quincy Traction Company.—It is stated that as soon as franchises and right of way have been secured capital to the extent of \$10,000,000 will be furnished by the Hanover National Bank of New York for the construction of this road. Col. Edward Yates, Pittsfield, Ill., is president.

San Diego & Eastern Railroad, San Diego, Cal.—John D. Spreckels, San Francisco, Cal., who will build this road from San Diego south to Tia Juana and thence east to Yuma, has been advised that the interior department at Washington has approved the maps and profiles of the proposed route. A portion of the road will be in Mexican territory.

Seattle & Tacoma Short Line, Seattle, Wash.—The first regular meeting of the directors of this company was held in Seattle on October 21, when the following officers were elected: President, T. Coleman Du Pont, Wilmington, Del.; first vice-president, I. A. Nadeau, Seattle; second vice-president, Merle J. Wightman, New York; secretary, C. E. Muckler, Tacoma; treasurer, P. C. Kauffman, Tacoma; assistant treasurer, A. C. De Graw, New York; executive committee, Ira Bronson, Henry Ewing, F. J. Eitel of Seattle, P. C. Kauffman, C. E. Muckler and J. A. Wheeler, Tacoma, T. Coleman Du Pont, Wilmington, Del. Right of way for this 30-mile line has been secured through Pierce and King counties, as well as franchises in Tacoma and Seattle for the operation of the line through those cities. Contracts for grading the first five miles of the road will be let shortly and work on this section started in the near future. Merle J. Wightman, second vice-president and electrical engineer, will be resident engineer in charge of the work. As previously announced, L. B. Stillwell of New York City has been retained as consulting engineer. It is planned to have the road in operation in time for the Alaska-Yukon-Pacific exposition in 1909.

Spokane & Inland Railway, Spokane, Wash.—It is stated that definite plans have been decided upon regarding the extension of this company's line to Lewiston and Clarkston, Idaho, and that work will be started in the spring. The route followed will be down the Steptoe canyon to the Snake river, nine miles below Lewiston. From this point it will parallel the Oregon Railway & Navigation Company's line to the mouth of Dry gulch, crossing the river at Clarkston and again at Lewiston. This route has been decided upon as giving the easiest grade. J. B. Ingersoll, Spokane, general manager.

Yakima Valley Transportation Company, North Yakima, Wash.—E. M. Kenley, chief engineer, writes that one mile at

this company's line running into North Yakima will be completed and in operation on or before the first of the year. This must be done in order to comply with the terms of the franchise. The company is now completing the final transfer of the franchises, rights of way, etc., of the Yakima Inter-Valley Traction Company, which was incorporated over a year ago to build a 24-mile line up the Yakima valley to Moxee and other points. With the completion of this transfer the Yakima Valley Transportation Company will take immediate steps toward the construction of the first 25-mile section of its proposed 125-mile interurban system in the Yakima valley. It is expected to complete this portion of the system in 1908. A rich agricultural and fruit district will be served by the building of this line and its several branches.

Savannah Electric Company, Savannah, Ga.—This company has completed relaying with T-rails a considerable portion of its city tracks and similar work will be done during the winter on other streets. The company has also put in new switches and turnouts and reinforced several of the curves.

Shore Line Electric Railway.—The railroad commissioners have approved the proposed method of construction of this road over its route from Ivoryton to and through Guilford. The commissioners require a bridge in Old Saybrook over the tracks of the Shore Line division to be of steel, 73 feet long with a clear width of 15 feet and a clearance over the steam tracks of 22 feet. A similar order is made for a bridge over the tracks of the Valley branch near Fenwick, except that it is to be 109 feet long. The company was organized at New Bedford, Mass., last May, with a capital stock of \$75,000, to build an electric railway from Horse Neck Beach to West-point, Mass., 13 miles. Charles F. Parkerm of Woonsocket, R. I.; A. C. Ralph, Taunton; J. M. Shorrocks, Westport; and others are interested.

Shreveport, La.—It is stated that John Lorenz of Jackson, Miss., is interested in a proposed street railway in Shreveport, to serve the southeastern portion of the city, including the suburbs of Gladstone, Pinehurst and other new subdivisions.

Spirit Lake, Ia.—It is reported that a number of Des Moines men who own property at Spirit and Okoboji lakes are interested in a project to build an electric railway from Spirit Lake to Sioux City, with a loop around the lakes to accommodate the residents of summer cottages.

Utah Light & Railway Company, Salt Lake City, Utah.—During the past month this company has relaid both tracks on Third avenue, from East street to the city limits, with new 65-pound rails. The Waterloo line has also been rebuilt and work has been started on the Wandamere park line.

Weatherford, Tex.—It is stated that plans are now under consideration for the construction of an interurban line from Weatherford to Bridgeport, Tex., 38 miles. G. R. Turner, New Orleans, La., who is promoting the interurban line between Ft. Worth and Mineral Wells, by way of Weatherford, is said to be interested in the Bridgeport-Weatherford line. The new line will serve a rich coal district.

Wheeling Sherrard & Cameron Interurban Electric Railway, Wheeling, W. Va.—This company is securing right of way for its line from Wheeling to Cameron, W. Va. C. W. McCombs, president; R. A. Kigler, engineer.

POWER HOUSES AND SUBSTATIONS.

Cairo (Ill.) Electric Traction Company.—This company is planning to make improvements in its power plant and will let contracts for the following equipment: Two 500-kilowatt turbine generators, one 300-kilowatt motor-generator set and one 200-kilowatt motor-generator set. O. C. Macy, manager.

Delaware & Hudson Company, Albany, N. Y.—The new power house being built by this company at Mechanicsville, N. Y., is nearing completion and will soon be ready for operation. The new plant was intended for the Hudson Valley Railway of Glens Falls, but it is understood that power will also be furnished to the United Traction Company of Albany and perhaps to the Schenectady Railway in case of emergency. Two turbine generators of 1,000 kilowatts capacity each have been installed.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company has awarded a contract to the Westinghouse Electric & Manufacturing Company for the installation of a 1,500-kilowatt turbo-generator, the necessary auxiliary condensing machinery and additional boiler capacity.

Indianapolis & Louisville Traction Company, Louisville, Ky.—This company has recently completed its power house at Scottsburg, Ind. The building is of brick and is 107 feet by 103 feet.

Personal Mention

Mr. B. A. Conolly has resigned as auditor of the Buffalo & Lake Erie Traction Company.

Mr. C. B. Easty has resigned as master mechanic of the Lehigh Valley Transit Company, Allentown, Pa.

Mr. A. W. Jordan has resigned as assistant general passenger and freight agent of the Ohio Electric Railway.

Mr. John W. Crox has resigned as general superintendent of the Morris County Traction Company, Morristown, N. J.

Mr. D. B. Feters has resigned as general passenger agent of the Toledo & Chicago Interurban Railway of Kendallville, Ind.

Mr. James S. Collins of Savannah, Ga., has been elected vice-president and general manager of the Macon Railway & Light Company, Macon, Ga.

Mr. F. A. Brown has resigned as claim agent of the Schenectady Railway, Schenectady, N. Y., to become connected with the claim department of the Philadelphia Rapid Transit Company.

Mr. A. A. Anderson, general manager of the Indianapolis Columbus & Southern Traction Company and the Indianapolis & Louisville Traction Company, has removed his headquarters from Columbus to Seymour, Ind.

Mr. B. E. Merwin has resigned as general superintendent of the Interurban Railway & Terminal Company of Cincinnati to become superintendent of transportation of the Aurora Elgin & Chicago Railroad, with headquarters at Wheaton, Ill., succeeding Mr. Joseph O'Hara.

Mr. James E. Monnell has been appointed superintendent of transportation of the Illinois Traction Company at Bloomington, Ill., succeeding Mr. H. E. Davisson. Mr. Monnell's jurisdiction includes the Bloomington city lines, the Peoria Bloomington & Champaign Traction Company and the Chicago Bloomington & Decatur Railway.

Mr. George S. Rice, member of the American Society of Civil Engineers, has resigned as chief engineer of the New York public service commission of the first district; effective on December 1. He will remain in the service of the commission, however, as assistant engineer in charge of construction. Mr. Henry B. Seaman will succeed Mr. Rice as chief engineer.

Mr. P. G. Gossler of New York City has been elected president of the Pottsville Union Traction Company and its subsidiary companies, succeeding Mr. W. E. Harrington, who resigned last September, as announced in the Electric Railway Review of September 7. The resignation of Mr. F. G. Lasher, secretary-treasurer of this company, also is announced.

Mr. Fletcher Durbin, for the past four years assistant superintendent of the Indianapolis Traction & Terminal Company at Indianapolis, Ind., has been appointed general manager of the Evansville & Southern Indiana Traction Company lines, with headquarters at Evansville. He succeeds Mr. R. R. Smith, who recently resigned to become general manager of the Louisville (Ky.) Railway, as announced last week.

Mr. J. L. Adams, heretofore general manager of the western district of the Ohio Electric Railway Company at Dayton, O., has resigned, effective on November 1. Mr. Adams was formerly connected with the Hartford Manchester & Rockville Tramway lines at Hartford, Conn., resigning from that company about a year and a half ago to accept the position which he is now leaving. Mr. W. A. Gibbs, manager of the eastern district, will have charge temporarily of the lines formerly under the jurisdiction of Mr. Adams, with headquarters at Columbus, O.

Mr. Orville H. Ensign has been appointed to fill the chair of electrical engineering at the University of Wisconsin, Madison, Wis., succeeding Mr. Dugald C. Jackson, who resigned recently to take charge of the electrical engineering department of the Massachusetts Institute of Technology, Worcester, Mass. Mr. Ensign has been connected with prominent electrical enterprises for 20 years, having been connected with the General Electric Company, the Schenectady Locomotive Works, the Redlands (Cal.) Light & Power Company, the Consolidated Edison Electric Company of Los Angeles and the United States reclamation service. In 1893 he was electrical and mechanical engineer of the Pasadena & Los Angeles Electric Railway. He retains his connection with the reclamation service in charge of electrical and pumping problems on the Pacific coast.

Obituary.

Edwin J. Wilcoxon, general superintendent of the Rochester Railway, Rochester, N. Y., died in that city on November 4, following an operation for appendicitis. Mr. Wilcoxon was born in Seneca Falls, N. Y., on April 27, 1871, and for many years had been connected in various capacities with both steam and electric roads. It was during his connection with the Geneva & Cayuga Lake Railroad, from 1896 to 1899, that he entered electric railway work, this road having been converted for electrical operation during his connection with it as general passenger agent. In 1900 he was appointed assistant superintendent of construction of the Rochester & Sodus Bay Railway, and after its completion was successively assistant superintendent and general freight and express agent. Two years later he was made general superintendent of this company, then division superintendent of the Rochester Railway, and more recently superintendent of transportation, which position he held until his appointment last May as general superintendent of the Rochester Railway and its subsidiary companies.

Jefferson S. Polk, president and organizer of the Des Moines City Railway Company, died at his home in Des Moines, Ia., on November 3, after an illness of two weeks.

Mr. Polk had been prominently identified with the business activities of Des Moines for about forty years, especially with the development of the steam and electric railways of the city and state. He was born in February, 1830, near Georgetown, Ky., and was educated in the common schools and at Georgetown College. He went to Des Moines in 1855 and for several years was engaged in the practice of law. In 1866, with his law partner, Mr. F. M. Hubbell, he financed the first street railway in Des Moines and during the next 15 years he built three narrow-gauge steam roads, now parts of the Northwestern, Missouri Pacific and Chicago Milwaukee & St. Paul systems. In 1888 he built a street railway, which was operated by a Baldwin gasoline engine. In the following year he purchased the franchises and consolidated all the existing city lines, which were subsequently electrified and which formed the nucleus of the present Des Moines City Railway, of which he was practically owner at the time of his death. He was also a pioneer in the development of interurban electric railways in Iowa and, together with his son, H. H. Polk, and his son-in-law, George B. Hippee, organized the Inter-Urban Railway Company, which has built its lines to Colfax, Perry and Woodward and has projects in several other directions. The funeral was held on Tuesday, November 5. The pall bearers included five officials of the street railway. During the ceremony service on the Des Moines City Railway, the Interurban Railway and the Ft. Dodge Des Moines & Southern Railroad was stopped for 15 minutes. How Mr. Polk's work was appreciated by this city is well illustrated in the following extracts from an editorial published in the Des Moines Register and Leader of November 4: "He was not a mere speculator in street railway stocks. He became a street railway builder. And while he saw to it that the profits came on the right side of his ledger account, no one who knew him will believe that it was the investment that interested him. * * * Mr. Polk has lived in a period in which the relations between the people and their public service corporations have been forming. If in such a period there has been misunderstanding, if sometimes there has been storm and stress, if it has not been possible at all times to give due credit to the pioneers, the experience has not been unusual. But now when a life work is to be summed up and the larger view is to be taken of the achievements of one of the founders of Iowa, there will be but one judgment. Mr. Polk was a man of breadth of view, of great purpose, and of great energy. He has left his mark on the city and on the state."



Jefferson S. Polk.

Financial News

Boston & Worcester Street Railway, Boston, Mass.—The issue of \$300,000 new stock, at \$100 per share, to provide for floating debt incurred for construction, equipment and in the purchase of property, has been approved by the Massachusetts railroad commission.

Denver & Northwestern Railway, Denver, Colo.—S. M. Perry, the president, has made the following announcement: "On August 1, 1907, this company published a notice pursuant to its first and collateral mortgage that on November 1, 1907, all of said bonds should be presented for payment at the Mercantile Trust Company of New York. When such notice was published the company had made arrangements with certain financial institutions in New York to make all deposits and do such things as were necessary under the terms of the mortgage to mature and pay the same. Having full confidence and relying in the arrangement made, the company up to present time expected to take all further steps necessary, but the present financial condition in New York is such that it cannot obtain at the present time the money arranged for and relied upon, and it is consequently unable to make the deposit necessary to mature the bonds. All bonds will remain in force and unaffected by the published notice of August 1, 1907." The interest due on November 1, 1907, was therefore promptly paid.

New York New Haven & Hartford Railroad.—At a special meeting of shareholders at New Haven, Conn., on October 30, Charles S. Mellen, the president, is quoted as having stated that the investments in electric railways had been profitable, and that the prospect for future income from electric railways is better than from steam roads. Looking five years ahead, Mr. Mellen stated that he would rather have equities in electric roads than in steam roads. The Connecticut Company, a subsidiary company of the New Haven, has filed a report with the Connecticut railroad commission for June, 1907. Gross earnings were \$565,557 and operating expenses were \$538,223. Other income amounted to \$25,460. The report of the Consolidated Railway Company for the 11 months ended May 31, 1907, showed gross earnings of \$5,323,854 and net earnings of \$1,926,336.

ELECTRIC RAILWAY EARNINGS.

American Railways Company, Philadelphia (Subsidiary Companies).

	1907.	1906.
Gross earnings—		
September	\$270,057.87	\$258,096.78
July 1 to September 30.....	866,216.78	808,538.22

Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.

	1907.	1906.
September—		
Gross earnings	\$125,732.11	\$106,275.58
Operating expenses	69,984.27	61,257.94
Net earnings	55,747.84	45,017.64

Lexington & Interurban Railways Company, Lexington, Ky.

	1907.	1906.
September—		
Gross earnings	\$ 59,195.36	\$ 61,633.91
Operating expenses	31,119.56	34,369.57
Net earnings	28,075.80	27,264.34

Norfolk & Portsmouth Traction Company, Norfolk, Va.

	1907.	1906.
September—		
Gross earnings	\$295,610.89	\$155,557.69
Operating expenses	161,920.62	94,907.78
Net earnings	133,690.27	60,649.91
Gross earnings	\$1,977,296.95	\$1,275,753.56
Operating expenses	1,200,668.02	833,831.02
Net earnings	776,628.93	441,922.54

Toledo Railways & Light Company.

	1907.	1906.
September—		
Earnings	\$208,684.60	\$203,463.65
Operating expenses	119,520.27	102,969.89
Net earnings	89,164.33	100,493.76
Miscellaneous income	910.31	1,167.87
Gross income	90,074.64	101,661.63
Deductions	68,819.70	60,717.77
Net income	21,254.94	40,943.86

Dividends Declared.

Grand Rapids (Mich.) Railway, preferred, quarterly, 1 1/4 per cent.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

Manufactures and Supplies

ROLLING STOCK.

Toronto Railway, Toronto, Ont., is building 100 pay-as-you-enter cars in its own shops.

Bowling Green Railway, Bowling Green, Ky., is reported to have purchased three new cars.

Colorado Springs & Interurban Railway, Colorado Springs, Colo., is building two interurban cars in its shops at Colorado Springs.

Choctaw Railway & Lighting Company, McAlester, I. T., has placed an order with the Niles Car & Manufacturing Company for two interurban cars.

Monterey Railway Light & Power Company, Monterey, Nuevo Leon, Mexico, is having 20 pay-as-you-enter cars built in the shops of the Toronto (Ont.) Railway.

Portland Railway Light & Power Company, Portland, Ore., advises that no definite action has been taken with regard to building its own cars in Portland, as has been reported by the press.

Louisville & Eastern Railroad, Louisville, Ky., which was reported in the Electric Railway Review of September 28 to have placed an order for four double-truck cars, has contracted for them with the American Car & Foundry Company.

Indiana Union Traction Company, Anderson, Ind., advises us that it will purchase eight cars to replace those burned in the destruction of its car house at Tipton, Ind., on October 31. Three interurban and five trail cars were lost and the company will buy the same type of cars.

Seattle Electric Company, Seattle, Wash., was reported in the Electric Railway Review of October 12 to have made arrangements for the purchase of from 50 to 75 cars. We are officially advised that the order has not yet been placed and probably will not be decided upon until December. The number of cars to be purchased is also indefinite.

SHOPS AND BUILDINGS.

Berkshire Street Railway, Pittsfield, Mass.—This company has prepared plans for a car house and freight depot at Bennington. Construction will not begin until next summer.

Indiana Union Traction Company, Anderson, Ind.—This company's car house at Tipton, Ind., was destroyed by fire on October 31. Eight cars were destroyed, as mentioned elsewhere in this issue, but the loss was fully covered by insurance. We are advised that the building will be rebuilt immediately on the old site.

Wheeling (W. Va.) Traction Company.—A passenger and freight station is being built by this company on the Glen Run line.

TRADE NOTES.

Western Electric Company, Chicago, will have its quarters at Third and Depot streets, Omaha, Neb., enlarged.

Baldwin Locomotive Works, Philadelphia, Pa., has been awarded a diploma of a gold medal by the jury of awards of the Jamestown exposition, for the "most admirable, effective and artistic installation of exhibit."

General Electric Company, Schenectady, N. Y., has been awarded two gold medals and a bronze medal for its exhibits in the machinery, the manufactures and liberal arts, and the mining departments at the Jamestown exposition.

American Steel & Wire Company has awarded the contract for a new gas engine plant house at Cleveland to the D. C. Griesse & Walker Company. It will be a brick and steel structure, 130 by 130 feet in size, and will cost \$40,000.

Preston Car & Coach Company, Preston, Ont., manufacturer of cars for electric and steam railways, is laying the foundations for a new plant, to be built of concrete. At present the company is occupying temporary quarters. Donald M. Campbell is managing director.

D. L. Benson, for a number of years on the construction and operating staff of H. M. Byllesby & Co., Chicago, died at Lake Geneva, Wis., on November 5. Mr. Benson was a man of marked executive ability and stood high in his profession. He is survived by a widow and daughter.

Edmund Lang has severed his connection with the Wheeler Condenser & Engineering Company of New York, with which he has been affiliated for a number of years, and

has accepted a position with the De Bevoise-Anderson Company, dealer in iron, coal and coke, 95 Liberty street, New York.

R. W. Marshall & Co., 93 Liberty street, New York, announce that Henry F. Kellogg will handle their New England trade, effective on November 1. Mr. Kellogg, who is widely acquainted in the field, recently resigned as manager of the railway department of the Frank Ridlon Company, Boston, Mass.

American Locomotive Company, New York, has declared a dividend of 1¼ per cent on the common stock, payable on November 26 to stockholders of record November 8. At a meeting of its board of directors, held in New York on November 6, the company elected S. T. Galloway as secretary to succeed Leigh Best, recently appointed vice-president.

Joseph T. Ryerson & Son, Chicago, will soon award the contracts for the superstructures of warehouse and office buildings at Sixteenth and Rockwell streets. The warehouse will be one story in height, 144 by 238 feet, with an L extension, 101 by 267 feet. The office building will be 40 by 227 feet, and three stories high. Brick, steel and concrete construction will be used.

Tweedy, Hood & Finlen, Incorporated, announces that it has succeeded to the business of the Tweedy-Randolph Company, dealer in railway, mill and mine supplies, Chicago. The business will be conducted under the same policy as heretofore, and the offices of the company will remain in the Fisher building. The new firm is composed of O. S. Tweedy, P. W. Hood and James T. Finlen.

Jones Positive Nut Lock Company, Chicago, manufacturer of nut locks, has found it necessary to increase the size of its factory in order to meet the increasing demands for its product. The company is also manufacturing conveying machinery chains. The addition recently made is a 2-story structure, 40 by 60 feet. The main building now is 40 by 183 feet, located at 2812 Wabash avenue.

Allis-Chalmers Company, Milwaukee, Wis., has opened an office at Deadwood, S. D., with O. F. Purnell as district manager. Special attention will be given by Mr. Purnell and the members of his staff to the sale of mining, crushing, pumping, power and electrical machinery, many installations of which have been made by Allis-Chalmers Company and its predecessors throughout that section of country.

Pressed Steel Car Company and the Western Steel Car & Foundry Company have opened offices in the National Bank of Commerce building, Fifth and Olive streets, St. Louis, Mo., with W. P. Coleman and his assistant, C. D. Terrell, in charge. The business in the southwest territory has increased so steadily of late that the management of these car companies has found it necessary to have representatives located in the principal city of that section.

Atha Steel Casting Company of Newark, N. J., under the receivership which was announced last week, will continue the business as hitherto. The court has given the receiver authority to do this and there is no likelihood of any change in the personnel of the company or in the general routine of its business. All orders will be filled promptly and we are assured by the acting manager, Louis A. Shepard, that the same high standard of quality will be adhered to that has been maintained in the past by this company.

Waddell & Mahon, special agents, 1133 Broadway, New York, who handled the Yonkers strike, are also acting for the Northern Pacific, Chicago & Northwestern and St. Paul Minneapolis & Omaha, in the strike of the machinists and boilermakers. Waddell & Mahon furnished men to take the place of the strikers, and the shops were thus kept in operation. In six weeks the strike of the Merchants' & Miners' Transportation Company, Baltimore, was broken in this way, and non-union workmen are now being employed with success.

S. T. DeLaMater, engineer, formerly with the Standard Construction Company of Chicago, has been engaged by the General Fireproofing Company and for the present is located at the home office in Youngstown, O. Mr. DeLaMater is a graduate of Cornell University, and through his connection with a large number of contracting firms has acquired a wide experience in reinforced concrete design and construction. Among his connections have been Osborne Engineering Company, Cleveland, O.; Paul F. P. Mueller, Falkenau Construction Company, Standard Construction Company, Chicago; and L. P. & J. A. Smith Company, Cleveland, O.

Technical Publicity Association of New York City devoted its meeting of October 31 to "The Mailing List," in securing foreign business. The discussion, introduced by F. F. Coleman, advertising manager of the Lidgerwood Manufacturing

Company, became general. Steven de Csesznak of the American Exporter, gave an address on the subject. The following were elected to membership: Randolph T. Ode, Providence Engineering Works; C. Dickens Sternfels, Standard Roller Bearing Company; J. Mason Knox, General Electric Company; L. D. Gibbs, Boston Edison Electric Illuminating Company; Walter S. Rogers, Crane Company; H. S. Snyder, Joseph Dixon Crucible Company. It was announced at this meeting that organizations modeled on the Technical Publicity Association were being started in Chicago and in London, England.

J. H. Wagenhorst & Co., Youngstown, O., report a phenomenal demand for the Wagenhorst electric blue printing machines. Recent sales have been made to the following: Eugene Dietzgen Company, Toronto, Can.; H. W. Caldwell & Son Company, Chicago, Ill.; Betts Machine Company, Wilmington, Del.; Green Fuel Economizer Company, Matteawan, N. Y.; Atlantic Terra Cotta Company, Tottenville, N. Y.; Kansas City Structural Steel Company, Argentine, Kan.; Sawyer & Garstin, Colorado Springs, Colo.; H. Vogt Machine Company, Louisville, Ky.; Toledo Machine & Tool Company, Toledo, O.; S. G. Fetterman Engineering Company, Johnstown, Pa.; American Locomotive Works, Schenectady, N. Y.; H. L. Sprague, Springfield, Mass.; R. M. Jones Company, Muskogee, I. T.; Ajax Forge Company, Chicago, Ill.

The Durkin Controller Handle Company of Philadelphia advises that the interference suit on controller regulators which has been pending in the patent office for some time between Durkin's patent and Ebersole's application for a patent on the "automotoneer" has been decided in Durkin's favor, the claims being as follows: (1) A controller provided with a dog jointed to permit of its movement in two directions, a series of stops for engaging said dog, and a rack for throwing said dog into engagement with said stops. (2) A controller provided with a dog jointed to permit its movement in two directions, stops for engaging said dog, and serrations for throwing said dog against said stops, the construction being such that the dog will automatically disengage. (3) A controller provided with an oscillating dog having a pivotal action in transverse directions, a supporting and limiting mechanism for said dog, and means for shifting and holding said dog. (4) A controller provided with a revolving supporting and limiting device, an oscillating dog having a universal joint connection with said device for supporting it and limiting its action, stops for engaging said dog, and serrations for throwing said dog against said stops, said dog being disengaged from said stops automatically. This litigation, it is stated, does not in any way involve the Durkin company's later patent for the "Ball Check Controller Regulator."

W. Edgar Reed, electrical engineer, formerly with the Westinghouse interests, for some time in Paris, and for a considerable time at East Pittsburg, has opened an office for general consulting work in the Machesney building, Pittsburg, Pa. Mr. Reed entered the employ of the Westinghouse Electric & Manufacturing Company in 1891 as an engineering apprentice. Upon finishing his apprenticeship course in the Westinghouse works he took a course in the Massachusetts Institute of Technology, from which he was graduated in 1897. Later he took a post-graduate course in Paris at the laboratory of the late Prof. Henri Moissan, the well-known chemist and metallurgist. Following this Mr. Reed became connected with the French Westinghouse Company at Havre, France, filling the position of chief designing engineer of that company from 1898 to 1903. In 1903 Mr. Reed came to Pittsburg, filling the position of designing engineer for the French and American Westinghouse companies, which position he has filled up to this time. He has had long experience in designing both continuous and alternating current machinery, and has had direct charge of induction motor designing for several years. He has also had much experience in the practical application of direct and alternating current motors and generators, and is thoroughly familiar with their characteristics and applications. Mr. Reed is a member of the American Institute of Electrical Engineers, and also of the Engineers' Society of Western Pennsylvania.

ADVERTISING LITERATURE.

Jeffrey Manufacturing Company, Columbus, O.—Catalogue D, just from the press, is devoted to coal and ash handling machinery for power plants. A large number of widely diverse installations are illustrated.

Edwards Manufacturing Company, Cincinnati, O.—A new booklet tells of the advantages of sheet metal building material, particularly of metal shingles, as compared to wood and slate. A number of illustrations are used effectively.

General Storage Battery Company, New York, N. Y.—A recent bulletin describes the operation of a storage battery plant installed by the company at the Johnstown works of

the Cambria Steel Company. Diagrams show the difference between operation with and without the battery, and a number of illustrations are included.

Allis-Chalmers Company, Milwaukee, Wis.—Bulletin 1514 illustrates and describes the "OB" type of pneumatic governor for Christensen air brakes. Bulletin 1515 is devoted to the type "J" emergency valve for straight air brake equipments.

Champion Rivet Company, Cleveland, O.—A new catalogue of 78 pages contains a compilation of scientific facts and other valuable information about Victor boiler, structural and ship rivets. The catalogue is fully illustrated by a number of interesting halftones and diagrams.

Anderson Forge & Machine Company, Detroit, Mich.—A handsome catalogue now being distributed is devoted to drop forgings, cold chisels and tools. Considerable space is devoted to Vanadium steel, which, because of the excellent results attained, is used largely in the Anderson products.

The J. G. Brill Company, Philadelphia, Pa.—The numerous advantages of the Brill convertible car in meeting the conditions of modern city service are well set forth in a neat catalogue recently published. Numerous illustrations are used, as well as a number of letters of commendation. A list of 75 railway companies operating Brill convertible cars is shown.

The J. G. Brill Company, Philadelphia, Pa.—A handsome catalogue, just issued, is devoted to the Brill truck No. 27-E, described as a perfectly equalized truck for steam and high-speed electric service. A detailed and fully illustrated comparison is made between this truck and the Master Car Builders' type. A feature of the catalogue is a list of 125 railway companies in America and in foreign lands which operate with the Brill trucks.

WESTINGHOUSE TEST LOCOMOTIVES.

The accompanying halftone illustration shows the single-phase 15-cycle high-speed electric locomotive exhibited by the



Westinghouse Single-Phase Locomotive.

Westinghouse Electric & Manufacturing Company during the recent convention of the American Street and Interurban Railway Association at Atlantic City. This locomotive was built for the Pennsylvania Railroad for demonstration purposes. The unit is one-half of an articulated type locomotive, designed to handle a 400-ton passenger train. Each of the two units comprising the locomotive is complete in itself. The following description of this locomotive is extracted from a paper by N. W. Storer, entitled "Twenty-five Versus Fifteen Cycles for Heavy Railways," which was presented before the twenty-fourth annual convention of the American Institute of Electrical Engineers at Niagara Falls, N. Y., on June 27, 1907:

This locomotive is designed to haul a 400-ton train both on heavy grades and at high speeds on a level track. The locomotive as built for 15 cycles weighs approximately 140 tons, and has four motors each with a nominal rating of 500 horsepower. With a 400-ton train behind it, this locomotive would thus have to handle a total of 540 tons. It is of the articulated type, each half of which has two pairs of drivers and a 4-wheel truck similar to the standard American type of steam locomotive, the two halves being coupled back to back.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 20

CHICAGO, NOVEMBER 16, 1907

WHOLE No. 238

TABLE OF CONTENTS.

Editorial:	Piping and Power Station Systems—LXII. By W. L. Morris, M. E. (Illustrated).....	796
—Instructions Regarding Pay-as-You-Enter Cars.....	Communications	799
—Important Trolley Freight Decision.....	News of the Week:	
—Trolley Express Service.....	—Austrian Railway to be Electrified.....	799
—Operating Expenses of the Northwestern Elevated Railroad of Chicago.....	—Recent Accidents	799
—The Future of the American Street and Interurban Railway Association	—Pittsburg Subway Ordinance Delayed.....	799
—Locating Trolley Grounds.....	—Negotiations for Settlement in Cleveland.....	799
High-Speed Cars for the Aurora Elgin & Chicago Railroad (Illustrated)	—New York Public Service Commission.....	800
Through Routes in Chicago.....	Construction News:	
Results of Operations of the Montreal Street Railway (Illustrated)	—Franchises	801
Comparative Performance of Steam and Electric Locomotives. By Albert H. Armstrong (Illustrated).....	—Recent Incorporations	801
Recent Power Station Progress of the Boston Elevated (Illustrated)	—Track and Roadway.....	802
Central Electric Railway Association.....	—Power Houses and Substations.....	803
Automobile Truck for the Connecticut Company (Illustrated).....	Personal Mention	803
Track Layout to Provide Clearance at Curves in Chicago (Illustrated)	Financial News:	
Instructions to Trainmen Regarding Pay-as-You-Enter Cars and Dispatching System in Chicago (Illustrated).....	—Electric Railway Earnings.....	805
Standard Curved Guard Rail for Chicago (Illustrated).....	Manufactures and Supplies:	
	—Rolling Stock	806
	—Shops and Buildings.....	806
	—Trade Notes	806
	—Advertising Literature	807
	American Blower Company's Exhibit (Illustrated).....	807
	Economy of Graphited Wood Grease in Gear Cases.....	807
	New Closed Cars for Cincinnati (Illustrated).....	808

That the use of pay-as-you-enter cars will prevent undue overcrowding is the expectation of T. E. Mitten, president of the Chicago City Railway. In issuing instructions

Instructions Regarding Pay-as-You-Enter Cars. concerning the new cars, which will be placed in operation soon, Mr. Mitten expresses the belief that if the cars prove successful

they will, by tending to correct overcrowding, prevent numerous accidents arising from that condition. The directions just issued point out to trainmen the advantages afforded to passengers by the pay-as-you-enter cars. Besides the prevention of excessive crowding it is believed that the new cars will be ventilated better than the present cars. Under a strict interpretation of the purpose of the cars no passenger would be allowed to pass beyond the platform without paying fare, but the instructions contemplate occasional conditions which will make it necessary to allow passengers to enter the interior of the car without payment to the conductor. In such cases the conductor will enter the car as soon as his duties permit. The adoption of the pay-as-you-enter car involves so many principles affecting the successful operation of street railways, including the maintenance of proper relations with the public, that the attitude of passengers when the innovation is introduced in Chicago will be followed with close interest by all managers of large urban roads.

Plans leading toward the establishment of a trolley freight and express service by the Old Colony Street Railway Company between Brockton and Boston were given a marked stimulus last Saturday by an important decision of the Massachusetts railroad commission under the so-called "missing link" law. At the last session of the Massachusetts legislature this law was enacted because of the Old Colony company's representation that it was unable to establish this service on account of the refusal of the city authorities of Quincy to grant the right, although the route would be through an unsettled part of the district. The board points out that the law was enacted for the general purpose

of protecting public interests against local indifference or prejudice, and calls attention to the fact that in this instance the city council of Quincy has denied the company the right to do an express and freight business in a part of the city occupied neither for residential nor business purposes. No suggestion has been made that the exercise of this privilege would in any way affect individual or public interests, while it is clear that the right to carry baggage and freight over the line would be an advantage to the residents of other cities and towns. The board further points out that the company is ready to submit to all proper regulations, and states that it is difficult to conceive of a more extreme case of indifference to the general interests of neighboring communities. The company was therefore granted the right to handle freight and express matter as petitioned, under the usual restrictions as to safety appliances on cars, speeds, explosives and non-interference with passenger service. This decision clearly indicates the advantage of being able to appeal to an impartial tribunal in cases where both public rights and company privileges are being blocked by the prejudice of local authorities, and establishes a precedent by which the benefits of electric express service are certain to be more widely distributed in Massachusetts.

Officials of lines which are getting deeper into the problems of the express business with each succeeding month will no doubt be interested in the automobile truck recently delivered to the Connecticut Company, which is designed to run as a motor car on the lines of the company or as an automobile where there are no overhead wires. This truck is offered as one possible solution of the delivery problem as far as large shippers of freight are concerned, but is not intended for use in a house-to-house delivery of small packages and miscellaneous freight, because it seems to be quite generally agreed that whatever profits there may be in the express business are ultimately wiped out where an expensive delivery system of the latter sort is maintained. With respect to large shippers the situation

Trolley Express Service.

is different and a truck service of the sort which could be afforded by an automobile truck of a type adapted for use also as a motor car would in many respects be in the nature of the service rendered by steam lines when a spur or side-track is laid. In the case of the electric lines the expense of a spur track would not be warranted by the amount of freight handled, but the expense of operating an automobile truck would, it is estimated, be practically proportional to the value of the business and of equal efficiency. The truck service could be charged for at prices amounting to less than the expense of the manufacturer or shipper in maintaining a team service for delivery of freight to the express terminal and would be equivalent to the switching charge of steam lines. It is hardly probable that with such an arrangement and scale of charges the small shipper could claim discrimination. In addition it is assumed that a basis of charges for the truck service could be established which would show a profit strictly on the drayage portion of the express business. Without consideration of the small package and miscellaneous express business the situation with regard to large shippers affords an opportunity for a careful consideration of the preparations which must be made for the ultimate development of the freight and express business of electric lines. If it is to be required that the electric lines shall lay spur tracks to the warehouses of their large shippers the sooner the managers of the express properties take steps in that direction the better it will be for the properties they represent. If there is a more feasible solution of the problem it should be obtained as early as possible and the effort of the Connecticut Company in this connection is creditable.

OPERATING EXPENSES OF THE NORTHWESTERN ELEVATED RAILROAD OF CHICAGO.

Appropriations for a maintenance reserve have been included by the Northwestern Elevated Railroad of Chicago in operating expenses for each full fiscal year since the road began operation. The portion of operating expenses set aside, together with the balance sheet reserve at the end of each fiscal year, as stated in the annual reports, may be shown as follows:

Fiscal year.	Charge to operating expenses.	Total maintenance reserve.
1901.....	\$15,000	\$ 15,000
1902.....	36,000	51,000
1903.....	36,000	81,505
*1904.....	36,000	130,553
*1905.....	39,500	188,294
*1906.....	71,700	238,763
*1907.....	35,054	250,000

*Year ended June 30.

In the reports in which mention has been made of the setting aside of these sums it was announced in the first five years that the money was to be reserved for "betterments and maintenance of structure." In these years the appropriations were charged as part of the cost of "maintenance of way and structure." The references to the appropriations in the reports for the two following years, ended June 30, 1906 and 1907, respectively, are not so plain as the earlier statements. The footnote accompanying the figures for the 12 months ended June 30, 1906, says: "The above figures include \$71,700 set aside in monthly instalments as a reserve for future betterments and maintenance, \$41,700 on main line and \$30,000 on loop division." Presumably the \$41,700 was included in the total of \$65,092 charged to operating expenses under maintenance of way and structure and the appropriation for the Union loop was derived directly from the earnings of that property. In the report for the year ended June 30, 1907, it is stated that the figures "include \$35,054 set aside as a reserve for maintenance."

The charges for maintenance of way and structure have

not increased in the same proportion as those for maintenance of equipment. Maintenance charges for both accounts have been as follows:

Fiscal year.	Maintenance of way and structure.	Maintenance of equipment.
1901.....	\$26,748	\$ 28,993
1902.....	58,063	51,261
1903.....	56,428	66,416
*1904.....	58,968	67,097
*1905.....	63,720	85,851
*1906.....	65,092	147,387
*1907.....	50,681	141,738

*Year ended June 30.

The percentage of gross earnings required for operating expenses by the road in the year ended June 30, 1907, was slightly less than in the preceding 12 months. The operating ratio last year (excluding loop net earnings from the computation) was 46.38 per cent, as compared with 46.62 per cent in the year ended June 30, 1906. In the other years the ratio has been as follows:

	Operating ratio.
Year ended June 30, 1905.....	44.55 per cent
Year ended June 30, 1904.....	42.75 per cent
Year ended December 31, 1903.....	42.59 per cent
Year ended December 31, 1902.....	38.80 per cent
Year ended December 31, 1901.....	36.26 per cent

It is shown that with the exception of the slight decrease last year there has been an increase in the percentage each fiscal year since the company began operation.

The original elevated structure comprised 25.45 miles of single track, of which 5.52 miles is 4-track structure. In May, 1907, the company began operating trains on the Ravenswood extension, and this service adds 3¼ miles of double-track structure to the property. The loop property was acquired in September, 1901. This has 20,900 feet of single track, which forms two loops on the structure.

While the maintenance expenditures have risen as shown in the foregoing tables, gross earnings, both from passenger traffic and other sources, have increased rapidly. Gross earnings of the loop are not included in the figures; loop net earnings are included in "other earnings." Passenger earnings of the Northwestern road in the year 1901 amounted to \$1,016,187; in the year ended June 30, 1907, they were \$1,550,816. In the earlier of these two years other earnings, including the loop net earnings for four months, amounted to \$84,677; in the last year other earnings reached the aggregate of \$549,500. The company had the benefit of ownership of the Union Elevated loop for only one-third of the year 1901. In 1902 its other earnings aggregated \$243,470. The total number of passengers carried in 1901 was 20,327,005, a daily average of 55,690; in the fiscal year ended June 30, last, the total passenger traffic was 31,022,575, a daily average of 84,993. The increases each year over the preceding year in the daily average passenger traffic and the percentage of gross passenger earnings required for conducting transportation are as follows:

Fiscal year.	Daily average traffic increase over previous year—per cent.	Conducting transportation —per cent of gross passenger earnings.
1901.....	*17	26.3
1902.....	14.9	26.2
1903.....	6.76	29.7
+1904.....	4.61	30.1
+1905.....	5.45	29.9
+1906.....	8.65	28.5
+1907.....	6.48	29.6

*Comparison with seven months of 1900. +Year ended June 30.

The fluctuation in the cost of handling the traffic has been relatively slight. In the seven years the extreme variation between high and low in this expense has been 3.9 per cent of gross passenger earnings. It is evident that the cost

of maintenance has risen materially as time passed. This accords with the experience of other elevated railways.

THE FUTURE OF THE AMERICAN STREET AND INTER-URBAN RAILWAY ASSOCIATION.

Although as yet it has not attracted much attention, probably the resolution passed shortly before the American Street and Interurban Railway Association adjourned its last session at the Atlantic City convention will prove to be the most important and far-reaching action taken by the association in many years. We believe that this resolution, directing that the executive committee take the steps necessary to secure the organization of another affiliated association, "the work of which should pertain to transportation, traffic and general operation," will result in making the American association what it ought to be and what it never has been since the very early days when it was in effect a club of horse railway owners. The decadence of the Street Railway Association, which finally led to its reorganization in 1905, was a natural result of the expansion of the street and electric railway industry without making corresponding changes in the association.

As we have frequently pointed out, the men who it is desirable shall be active in the work of the American association, are the presidents and general managers, or other high executive officials, of the companies which are members of the association. These men have no desire to discuss details. They do not handle detail work when in their own offices and they should not be expected to do so at meetings of the association. Naturally, therefore, when the papers presented at the meetings of the American association are nearly all on purely departmental subjects, as has been the case for many years, the result is a scant discussion. The executive officers are, for the most part, interested only in general results, and, in fact, lack the knowledge of details necessary to bring out many really interesting points. At the same time the presence of an executive officer in a debate on a departmental theme as a general thing acts as a wet blanket on the subordinate officers from his company who may be present.

When the relations between the general manager and his heads of departments are considered, it is the part of propriety as well as of wisdom for the latter to refrain from public discussion of matters on which there well may be a difference of opinion. It does not follow that the general manager is right; but, if wrong, the place for his subordinate to undertake his conversion is in the manager's private office rather than on the floor of a convention. Summarized, the situation in the American Association has been that those delegates who felt free to talk had nothing to say, and those who were equipped for discussion could not talk.

Heretofore the subjects falling within the traffic, transportation and general operating departments have had no place before any of the existing affiliated associations, and, as the subjects were important in themselves, it is natural that they should have been made the bases of reports and papers before the American association.

When the action proposed by the resolution passed at Atlantic City is carried out we predict that what we may designate, provisionally, as the Traffic association will achieve the same measure of success as has resulted with the Accountants', the Engineering and the Claim Agents' associations. Before it will come naturally all but two of the subjects presented at the meetings of the American association at Atlantic City.

Public relations and municipal ownership and depreciation—for that has now ceased to be purely an accounting matter—will furnish plenty of opportunity for work on the part of the association of executive officers. It requires no gift of prophecy to say that this narrowing of the field of the

American association to include only questions of managerial policy, some of which even should not be discussed, in public, will result in purely executive sessions for the American association, at which will be discussed freely and frankly those questions of policy in which all of the executive officers are interested, and, as such discussion is a necessary step in the proper solution of these questions, the American association will become as effective an agent in its own proper field as are the affiliated associations in theirs.

LOCATING TROLLEY GROUNDS.

The electrical measuring instruments in a power house or substation are of equal importance with the gauges and meters of the steam boiler and engine portion of a generating station. It is therefore necessary that they should be kept in such condition as will assure accurate service. Of course, the most important reason for maintaining thorough inspection and calibration of electric instruments is that the loading of units may be properly adjusted and confidence be placed in the meter readings. When instruments vary in accuracy their readings may tend to exaggerate the unit costs of current and thereby place a wrong impression upon the efficiency of a plant's operating economy.

Recognizing as of primary importance the special need for keeping switchboard instruments in accurate calibration, we call to mind another use which is made of the current-indicating meters in the stations of a large railway system in Ohio. The substation attendants on this road are instructed, as usual, to diligently observe the needles of the meters with a view to the proper operation of the station and also to assist in locating short-circuits or grounds before they cause trouble and before current has been wasted for an unknown length of time. To serve this purpose a fixed scale or table has been calculated by the engineer. With the ammeter reading at the time of trouble the switchboard operator can, by reference to this table, obtain the approximate distance from his station at which a ground may have occurred.

The quantities involved in the preliminary calculation of the table, of course, include the resistance of the trolley circuit and the track return circuit, together with the indicated amperage at the time of loss through a ground. On the railway system mentioned the following results are shown in tabular form, copies of which are given all substation attendants: Two feeders extend from each substation, and if with no car operating the least reading on either of the two feeders is 400 amperes the ground will be found to be about nine miles away. Similarly, a 500-ampere ground indicates trouble 7.5 miles away; 600 amperes, 6.2 miles; 700 amperes, 5.4 miles; 800 amperes, 4.8 miles; 900 amperes, 4 miles; 1,000 amperes, 3.6 miles; and if the breaker opens at the time the ground comes on it will be found to be less than four miles distant from the substation.

This detail of operation is one that might well be followed on any extended interurban system, and when proper recognition is made of the various quantities entering into the calculation of the distances the results undoubtedly will be found of much value in times of trolley breakdowns.

In the annual railway returns of the British board of trade for 1906, some statistics are given of the electric railways in the United Kingdom. Excluding the electric lines of the Lancashire & Yorkshire and Northeastern companies, the number of passengers carried was 267,826,481, or nearly 25 per cent of the total number of passengers carried on all the railways in the kingdom. The total quantity of electrical energy used for all purposes (including the Lancashire & Yorkshire and Northeastern railways) was 159,581,401 units, compared with 100,977,467 units in 1905. Electrical Engineering

HIGH-SPEED CARS FOR THE AURORA ELGIN & CHICAGO RAILROAD.

There are now being equipped in the company shops at Wheaton, Ill., two especially well built passenger cars for the high-speed service of the Aurora Elgin & Chicago Railroad. In general appearance these cars, which were built at the Chicago Heights plant of the Hicks Locomotive & Car Works, conform to the standard type of this road, which has been in operation since August, 1902. Several details in design have

dimensions of the cars conform closely with those of the cars operated over the Metropolitan structure. The Aurora Elgin & Chicago cars are provided with Van Dorn couplers, which permit of operating in multiple with the Metropolitan cars similarly equipped, should occasion warrant. The new cars will be mounted on trucks of the M. C. B. type, similar to the truck made by the former Dorner Manufacturing Company, but with certain changes and improvements dictated by the engineers of the Aurora Elgin & Chicago Railroad. On each truck will be mounted two GE-66 motors with type M control.



Aurora Elgin & Chicago Cars—Two New Cars Ready for Delivery.

been included, however, which, on account of their high character, seem worthy of description.

Accompanying illustrations will show the controlling dimensions of the cars and the details of the underframing and interior finish. Over buffers the cars are 52 feet 10½ inches long; from end to end of sills, 44 feet 4½ inches; over sheathing at corner posts, 8 feet 8 inches; maximum width over all,

The brake equipment will be of the Westinghouse A M R schedule, affording quick service, graduated release and quick recharge features.

Accompanying illustrations show the side and end finish of the interior of the cars and exhibit the detail dimensions. One of the interesting features of these new equipments is the Pullman type of window construction with permanent double



Aurora Elgin & Chicago Cars—Interior End View.



Aurora Elgin & Chicago Cars—General View of Interior.

8 feet 10 inches. The underframing comprises two center sills of 6-inch 12.25-pound I-beams reinforced by 3 by 6 inch fillings. The side sills are 25-pound 9-inch I-beams. The detail method of connecting the sills and supporting the platforms is illustrated in the accompanying elevation and plan of the steel underframing.

It should be noted that the service of the Aurora Elgin & Chicago Railroad extends into the business district of Chicago, operating over the elevated tracks of the Metropolitan West Side Elevated Railway. This necessitates that the controlling

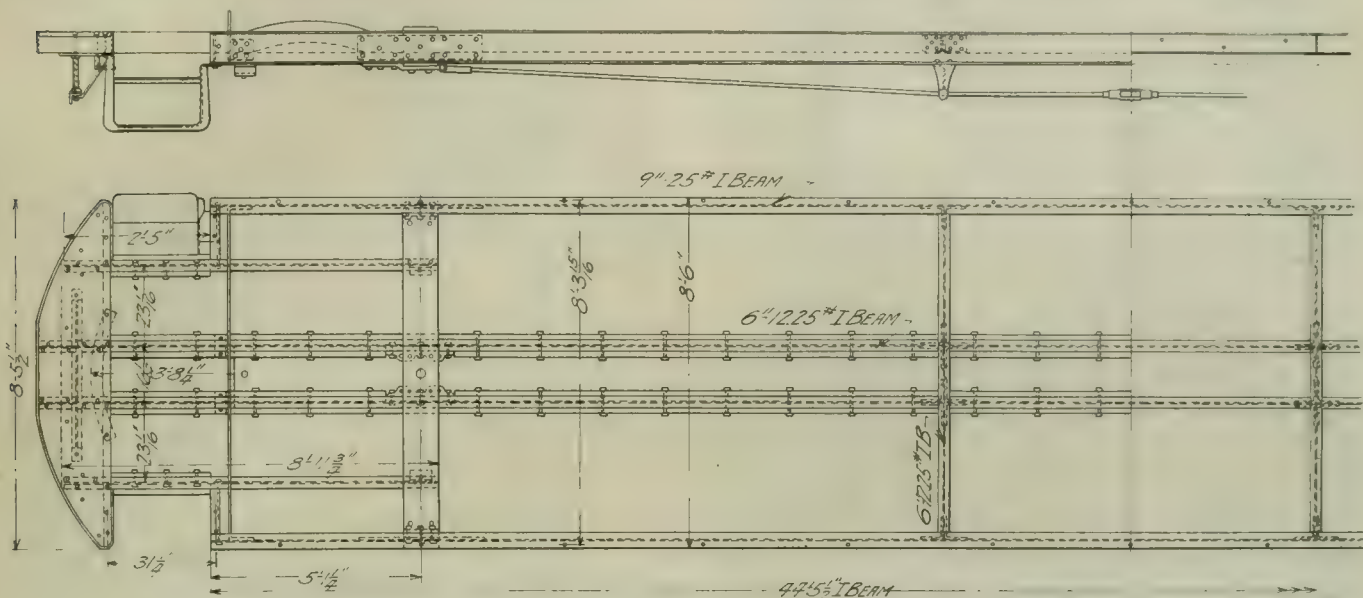
sashes, each provided with fasteners. The gothic sashes with leaded glass over the side windows also are double, and, together with the curtain boxes continuous over the entire length of the double window, enhance the attractiveness of the car interior. The curtain material is Pantasote, fitted with Keeler eccentric roller fixtures, manufactured by the Curtain Supply Company. At either end of the car is a panel cabinet replacing one bulkhead window, in which are the lighting and control switches. These panels are asbestos lined and have doors swinging into the vestibule so that the

switches are readily accessible from the motorman's operating position.

Detail drawings are presented illustrating the construction of the end and side vestibule doors. As these cars are operated in trains it is necessary to provide a means for the conductor to pass from one car to another; this is afforded by doors in the ends of the vestibules. By reference to an

provide for this feature of operation the side vestibule doors have two sashes as shown in the illustration. The bottom sash is fixed and the upper sash arranged to lower so that an opening about 17 by 22 inches is had for the convenience of the motorman in observing the rear of his train.

With a view to eliminating noise and affording a more attractive interior appearance all the doors in the new cars

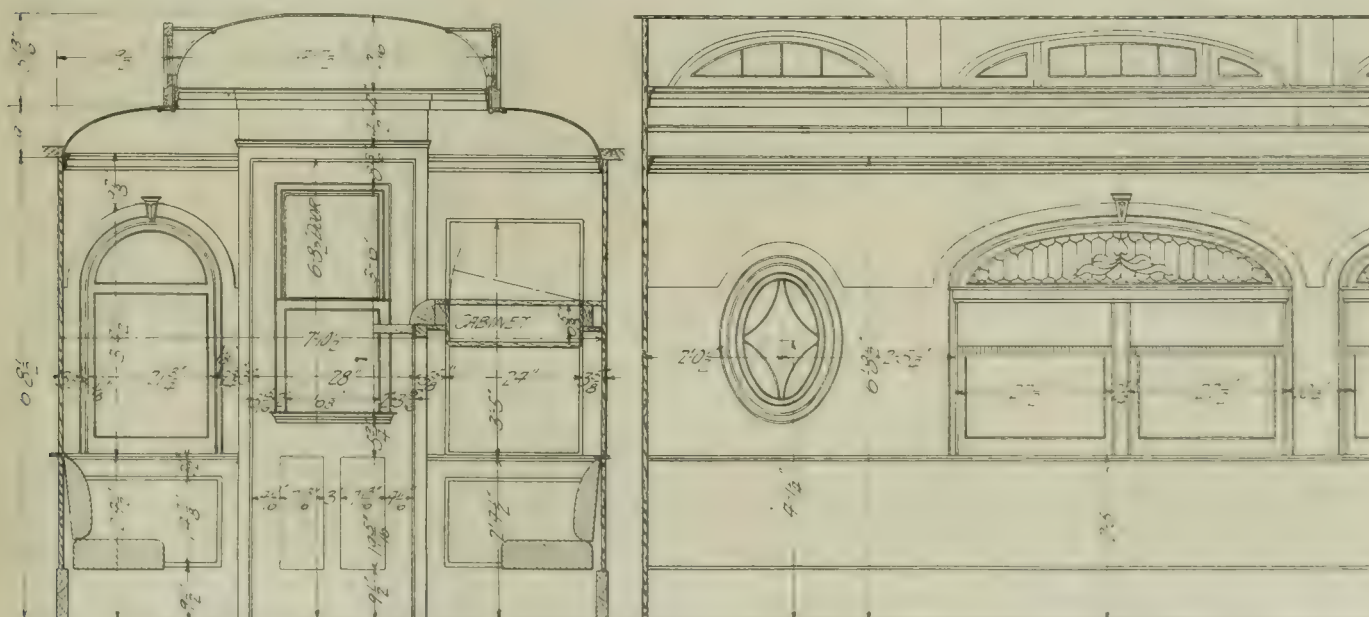


Aurora Elgin & Chicago Cars—Steel Underframing.

illustration which shows an elevation and section of one of these doors it will be noted that the construction is of a very substantial type, comprising, in fact, two doors separated with filler pieces and securely mounted, so that they may be supported on one set of hinges. Inasmuch as the air pressure on the door at the head end of the train is very severe at high

are of the swinging type. The door between the main and smoking compartments is hung on spring hinges which swing in either direction and the doors in the bulkheads swing inward against a stop in front of the longitudinal seats.

The lighting facilities of the car include frosted bulbs in ornamental husks over each of the seats, dome lights in the



Aurora Elgin & Chicago Cars—Interior Side and End Finish.

speeds, this solid type is demanded. When closed the end vestibule doors are fastened with wedge locks having long handles.

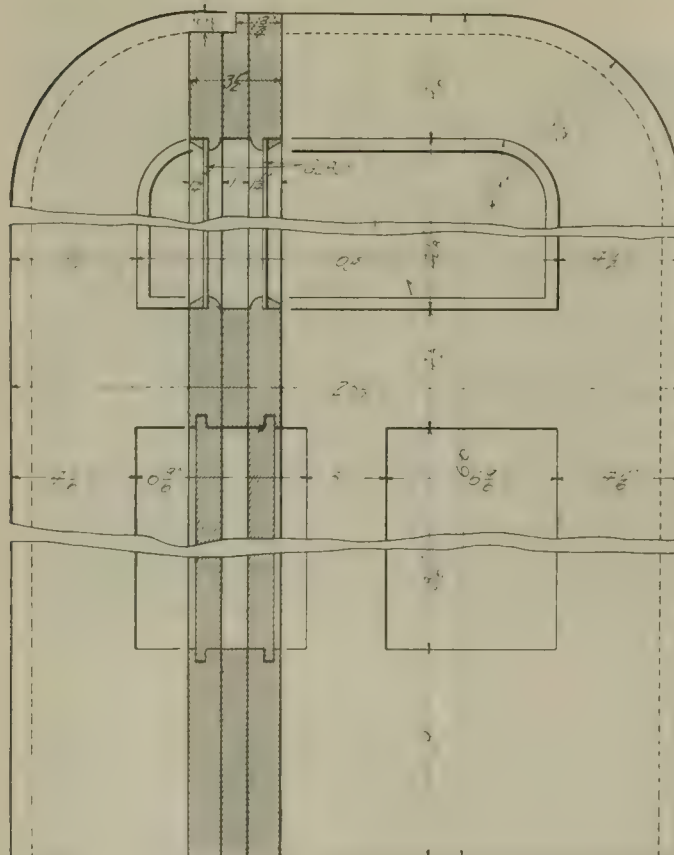
The vestibule side doors are also of interesting construction. In train operation it greatly facilitates matters if the motorman can extend his head and shoulder out of the side door so that he can observe signals from the conductors. To

vestibules and three 5-light clusters concealed by inverted holophane bowls.

The interior of the cars is divided by a bulkhead into a main and smoking compartment with an especially well-finished toilet room built against the partition. There are 22 Hale & Kilburn No. 197 walkover seats in the car, supplemented with four longitudinal stationary seats and three cross

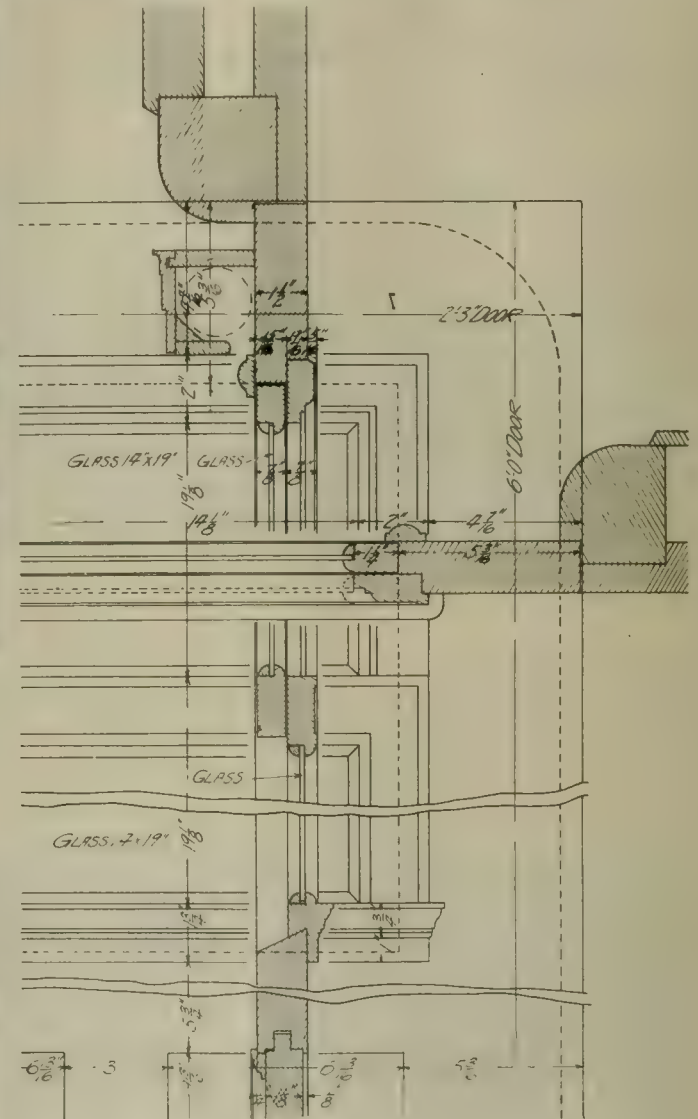


Aurora Elgin & Chicago Cars—Exterior End View.



Aurora Elgin & Chicago Cars—Details of Vestibule End Door.

stationary seats. The seats are upholstered in green leather and, with the well-finished quarter-sawn mahogany veneer and full Empire ceiling tinted yellow, afford an attractive car interior. Some of the special fittings on these cars are the "Q & C" Stanwood steps manufactured by the Quincy-Manchester-Sargent Company, Van Dorn couplers, organ pipe whistles,



Aurora Elgin & Chicago Cars—Details of Vestibule Side Door.

fire tool boxes and the company's standard destination signs, as shown in the end view of one car.

Acting for Adrian Joline and Douglas Robinson, receivers for the New York City Railway Company, A. V. Porter, the company's architect, has filed plans with Building Superintendent Murphy for protecting against fire the two car houses on Lexington avenue, from One Hundred and Twenty-ninth to One Hundred and Thirtieth streets, and on Amsterdam avenue, from One Hundred and Twenty-eighth to One Hundred and Thirtieth streets, by equipping them with complete sprinkler extinguishing plants. Each plant will be supplied by two storage tanks of 25,000 gallons capacity each, and five pressure tanks, each of 7,500 gallons capacity.

According to the local newspapers of Trondhjem, Norway, it has been decided to establish a motor car service between Stenkjaer, at the end of the Trondhjem fjord, and Roedhammer, on the way to Namsos. It is reported that if this proves a success an express service may be added.

THROUGH ROUTES IN CHICAGO.

Considerable special track work and other changes will be required in Chicago before it will be possible to inaugurate the through routes for which provision is made under the new traction ordinances. Bion J. Arnold, chairman of the board of supervising engineers, Chicago traction, has addressed a letter to the city authorities regarding the subject, in which he says:

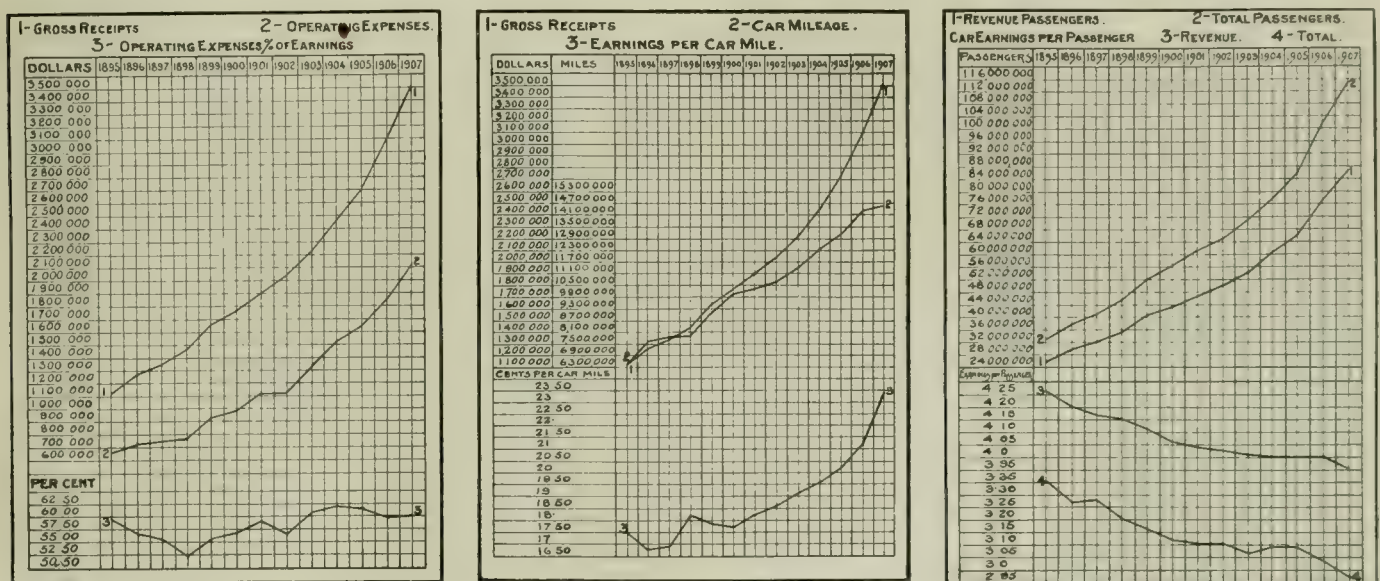
While the energies of this board have heretofore been almost entirely absorbed in attending to such matters as were necessary to push the actual work of rehabilitation of the street railway properties, and of valuing additions to capital account made by the company since June 30, 1906, the board has, nevertheless, compiled considerable information regarding what is necessary to be done before putting into operation the through routes named in the ordinances. I beg leave to call your attention to certain physical obstructions that will interfere with the operation of cars over these routes, which to remove will probably require action on the part of the city council or other city officials.

In order to get the matter clearly before you I will enumerate, in a general way, the changes that will be required in the tracks, etc., of the routes in order to place cars in

of track which will have to be built, the amount of special work which will have to be provided, and the changes which will be required in bridges, viaducts, etc., in order that suitable clearances may be assured on each route. Only one location has been found so far where the tracks are too close together or the clearance otherwise too small for the safe operation of the large cars.

RESULTS OF OPERATIONS OF THE MONTREAL STREET RAILWAY.

In last week's issue of the Electric Railway Review, page 759, the figures of the results of operations of the Montreal Street Railway for the fiscal year ended June 30, 1907, were published. The pamphlet report contains diagrams showing the progress in gross earnings, and the changes in expenses, the operating ratio, car-mile statistics and traffic. These diagrams are reproduced herewith. Included in the report is a summary of the principal operating results and traffic statistics from the fiscal years ended September 30, 1896, to Sep-



Diagrams of Results of Operations of the Montreal Street Railway.

operation over them. This board, acting jointly with the commissioner of public works, as authorized by the ordinances, can take care of all changes and additions to track and special work referred to, except where such extensions and additions require the consent of property owners, or action on the part of the city council. In the latter cases, and where modifications are necessary to viaducts, bridges, etc., action on your part will be required.

In the following statement where overhead clearances are referred to it has been assumed that the minimum distances from top of rail to bottom of trolley wire allowable for the successful working of the large cars of each of the roads are as follows: Chicago City Railway, 13 feet; Chicago Union Traction Company, 12 feet 6 inches, and the clearances hereinafter given are the differences between these figures and the distance between the top of the rail and the bottom of the trolley wire in each case. In determining side clearances the latest type of cars of each company has been taken as the standard for each company, as follows: Chicago City Railway Company, 9 feet; Chicago Union Traction Company, 8 feet 5 inches; but it should be borne in mind that the former company has 300 cars that are 9 feet 1 inch wide and the latter company has 150 that are 8 feet 7 inches wide, and that consequently if cars of either company having greater widths than the standards herein assumed are used over these routes the clearances will be correspondingly reduced. Where side clearances are less than 6 inches it has been assumed that they should be increased.

The letter then takes up the different through routes for which the Chicago City Railway and the Chicago Railways Company ordinances make provision and shows the amount

of track which will have to be built, the amount of special work which will have to be provided, and the changes which will be required in bridges, viaducts, etc., in order that suitable clearances may be assured on each route. Only one location has been found so far where the tracks are too close together or the clearance otherwise too small for the safe operation of the large cars.

Year ended			
September 30—	1907.	1906.	1896.
Gross earnings	\$3,503,643.43	\$3,100,486.88	\$1,265,898.39
Operating expenses..	2,104,653.42	1,850,719.97	710,864.70
Expenses—per cent of earnings	60.07	59.69	56.48
Net earnings	\$1,398,990.01	\$1,249,766.91	\$ 555,033.69
Net income—per cent of capital	12.83	12.96	11.55
Passengers carried ..	86,741,212	76,356,099	29,896,471
Car earnings per passenger—cents ...	3.95	4.00	4.20
Transfers	28,675,256	24,516,067	8,541,530
Total passengers carried	115,416,468	100,872,166	38,438,001
Car earnings per passenger total carried—cents	2.97	3.03	3.27

The interurban freight business on the Peoria-Bloomington line of the Illinois Traction System has grown very rapidly of late. When the service was first instituted one car a night was able to handle all of the business from Peoria to points beyond Bloomington, but later a trailer was added. On November 1 another trailer was added to the equipment and now three carloads of freight are handled out of Peoria every night, bound for points between Bloomington and St. Louis.

COMPARATIVE PERFORMANCE OF STEAM AND ELECTRIC LOCOMOTIVES.*

BY ALBERT H. ARMSTRONG, GENERAL ELECTRIC COMPANY.

So many excellent papers bearing upon the subject of steam road electrification have recently been presented to the engineering public that the writer hesitates to add to their number. In the hope, however, of offering a somewhat clearer insight into the fundamental reasons underlying the electrification movement, this paper is written from the standpoint of a technical comparison of the performance of steam and electric locomotives.

It is concerning the sections of steam lines demanding other reasons for electrification than those of cleanliness, smokelessness, convenience, etc., that this paper is written, and the best means to be employed in getting a thorough grasp on the subject seems to lie in an investigation into the comparative inherent qualities of steam and electric locomotives.

Before considering the electric locomotive, much the simpler of the two, it is advisable to determine the general characteristics and limitations of the steam locomotive view from the standpoint of the electrical engineer, in order that the scope of the problem may be thoroughly understood and the lines of contrast be sharply drawn.

This preliminary study of the steam locomotive is made necessary by the fact that railroad practice today is essentially steam railroad practice and is hedged about by practices and methods of operation demanded by the use of the steam locomotive as a type of motive power. Viewed in the light of greatest benefits to be secured, the coming of the electric locomotive is not due to petty economies effected in coal consumption and cost of locomotive repairs; indeed, with coal as a common source of power, little gain in efficiency is secured through burning the same grade of fuel under stationary boilers over the excellent results obtained with the highly perfected modern compound locomotive. As will be discussed later, there exist certain fundamental relations between the cost of producing a horsepower at the drivers of a steam locomotive burning its fuel on the structure, and a horsepower at the drivers of an electric locomotive deriving its energy from a distant stationary power house via a distribution system. The use of water power, or of a cheaper grade of fuel than can be burned on a steam locomotive, will in many cases afford a means of reducing the fuel cost well below the present cost of high-grade coal required for successful locomotive operation; but in general the fuel item reduction does not in itself offer a sufficient saving to pay an adequate return on the large investment required for electrification.

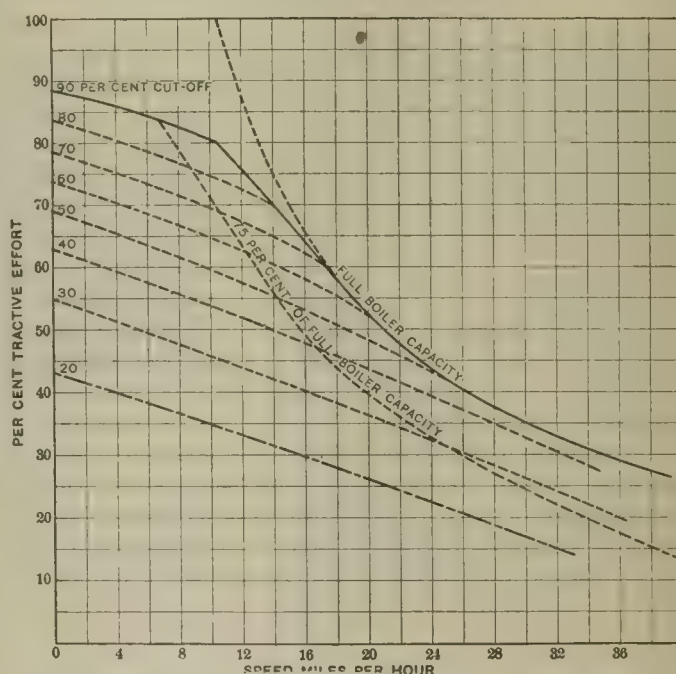
It is necessary, therefore, to look for more far-reaching benefits, and, not considering the reasons governing the introduction of the electric locomotives at terminals and in tunnels, we find in a comparison of the characteristics of the steam and electric locomotives a contrast so marked that it shows not only the superiority of the electric locomotive for general railway conditions, but it also suggests changes of a fundamental nature in present methods of operation now necessary with steam locomotives. And these benefits to be secured occur not only in the operation of passenger trains, but are felt to an even greater degree in the haulage of the heaviest freight trains, a field supposedly the exclusive domain of the steam locomotive.

The steam locomotive has two component parts, the boiler and the engine, both of which have their own individual characteristics; and the relation between the two is generally determined by the character of the service for which the locomotive is desired.

The general shape of the steam locomotive characteristic is given in Figure 1, which shows the relation between the speed and tractive effort of a simple consolidation locomotive designed for heavy freight service. Owing to clearances it is seldom that a locomotive can work at more than 90 per cent of the theoretical full stroke, and hence the maximum tractive effort at starting with lever in the corner will not be much greater than 88 per cent of the theoretical tractive effort available with gauge pressure in the cylinders. An inspection of Figure 1 shows that the steam locomotive is limited as to maximum tractive effort by its engine design, and limited as to the speed at which this tractive effort is available by the capacity of the boiler to supply steam. Thus, assuming that the locomotive will give 88 per cent of its theoretical tractive effort when starting, it is capable of providing but 80 per cent tractive effort at a speed of 10.6 miles per hour (with the constants of the particular locomotive chosen for illustration) at which the boiler is giving its full output. Hence higher speeds can only be reached with a lesser cut-off and a conse-

quent reduction in mean effective pressure and tractive effort. Locomotive engines are generally designed to give their maximum tractive effort at 90 per cent theoretical cut-off at a point corresponding to a coefficient of adhesion of approximately 22 per cent of the weight upon the drivers; that is, at about the slipping point of steam locomotives with good rail conditions. It is immediately evident, therefore, that the tonnage rating of the locomotive on ruling grade must be so proportioned that the maximum tractive effort called for will be less than the available tractive effort of the locomotive in order to provide a small percentage, say 10 or 15 per cent, for possible starting under maximum grade and load conditions. In other words, as the steam locomotive is designed so that the maximum tractive effort is delivered at a point not greater than 22 per cent of the weight upon the drivers, it is not possible to take advantage of possible abnormally good rail conditions (either natural or made abnormal by the use of sand), as the engine itself will fail to deliver any excess tractive effort thus made available with increased coefficient of adhesion.

On the other hand, the tractive effort of the electric locomotive is limited only by the adhesion between driving wheels and rail, and aside from some 15 per cent greater adhesion possible with the uniform tractive effort provided by the electric locomotive, it is possible with this type of motive power to take momentary advantage of abnormally good rail condi-



Steam and Electric Locomotives—Figure 1. Typical Steam Locomotive Characteristic (Simple).

tions or to derive full benefit from the use of sand; indeed, tests have been taken with electric locomotives showing as high as 35 per cent coefficient of adhesion between driving wheels and rail. This point is emphasized as with the greater tractive effort of the electric locomotive it becomes possible to give them a higher tonnage rating for the same weight upon the drivers than would be possible with steam locomotives operating over the same track profile.

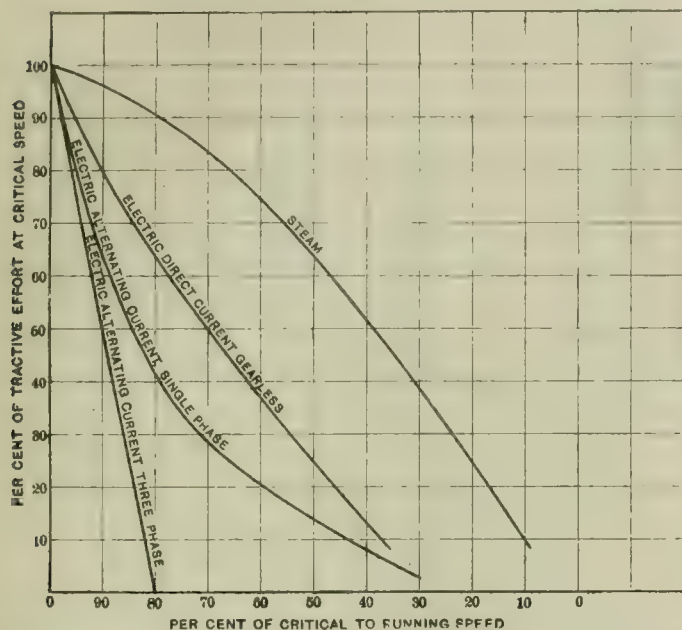
There is a marked difference in the speed characteristics of the steam and electric locomotive, and indeed there is also a marked difference in the speed characteristics of different types of electric locomotives. Although this paper is not intended to enter into any discussion of the relative merits of different types of electric locomotives, there is so striking a difference in the several speed characteristics, each of which possesses special advantages for certain operating conditions, that Figure 2 has been prepared contrasting the characteristics of the steam locomotive and the direct-current gearless, alternating-current single-phase geared, and alternating-current three-phase geared electric locomotives. As all types of motive power share in common the fact of a certain critical speed beyond which full tractive effort cannot be maintained, the curves in Figure 2 have been prepared on the basis of showing the relation between percentage of maximum tractive effort available at speeds higher than the critical speed, ordinates being tractive effort and abscissæ percentage of critical speed to running speed.

A more familiar presentation is given in Figure 3, showing

*Abstract of a paper presented at the two hundred and twenty-second meeting of the American Institute of Electrical Engineers, New York, November 8, 1907.

a concrete case of a 22 by 30 steam locomotive of the simple type with 57-inch drivers, contrasted with both an alternating-current geared and a direct-current gearless electric locomotive designed for the same tractive effort both maximum and running, but for a higher speed. The contrast of these different speed characteristics brings out sharply the small speed variation with different tractive efforts delivered by the electric locomotives, this small variation being even more marked in the case of the direct-current gearless than in the case of the alternating-current geared motor working at a lower iron saturation and thus affording a more sloping speed characteristic.

The steam locomotive chosen is typical of those in general use upon our mountain grade divisions, the tonnage rating in



Steam and Electric Locomotives—Figure 2. Typical Characteristics of Steam and Electric Locomotives.

operation of this particular locomotive being such as to call for a tractive effort of 25,600 pounds on average grade and 33,200 pounds on the maximum ruling grade occurring on a certain engine division, thus leaving a margin of 6,300 pounds above the demands of maximum tonnage on maximum ruling grade for starting the train from rest.

The maximum speed available at the different tractive efforts is a matter of boiler capacity, condition of boiler, quality of coal, and efficiency of fireman. The first of these factors, the boiler capacity, can be controlled by properly proportioning the design of the boiler to engine capacity, but there are three other factors which the locomotive manufacturer cannot control and two of these factors constitute sufficient cause to warrant a considerable reduction in the theoretical rated capacity of the boiler. Thus, referring to Figure 1, such a locomotive in prime condition, carefully fired with the best coal (approximating 14,000 British thermal units), should be able to deliver full tractive effort at 10.6 miles per hour, but in practice it has been found that the average condition of boilers and the average firing provided by the none too conscientious or diligent fireman, cuts the sustained boiler output down to not much greater than 75 per cent of its output under what must be considered exceptionally or momentary conditions.

The locomotive characteristic in Figure 3 has been prepared on the basis of 75 per cent of the possible boiler capacity in the following manner:

General Constants of Simple Consolidation Locomotive.

Diameter of cylinders	22 in.
Length of stroke	30 in.
Diameter of drivers	57 in.
Heating surface	3,397 sq. ft.
Total weight of locomotive	103.5 tons
Weight on drivers .....	.93 tons
Weight of tender	61.5 tons
Total weight locomotive and tender	165 tons

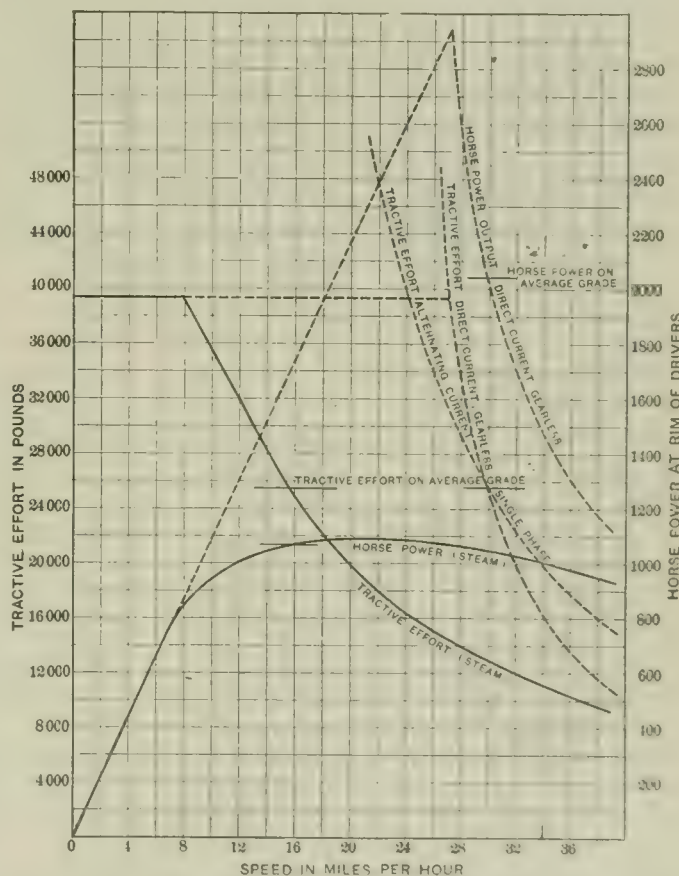
This particular locomotive has been chosen for illustration as it is the type in daily use on the mountain division of one of the largest western roads.

Under the above conditions the theoretical tractive effort

is 49,500 pounds, of which 39,600 pounds is available at 90 per cent cut-off. The contents of each cylinder is approximately 6.6 cubic feet and with four cylinders of steam per revolution and with steam weighing 0.41 pound per cubic foot at 170 pounds cylinder pressure, each revolution requires 10.85 pounds steam. With 3,397 square feet of heating surface there is a possibility of evaporating six pounds of water per pound of coal when burning two pounds of coal per square foot of heating surface, thus giving an available supply of 40,700 pounds of steam per hour when working boilers in prime condition at the full output resulting from perfect firing with good quality of coal. In practice, however, the available steam for sustained output would not be greater than 75 per cent or 30,500 pounds per hour, thus giving full tractive effort at 46.8 revolutions of the drivers corresponding to 7.93 miles per hour on a 57-inch driver. The "critical speed" of the locomotive is therefore 7.93 miles per hour when working at 75 per cent of full attainable boiler capacity, and the coal consumed under such circumstances will be 4,360 pounds per hour, corresponding to 1.28 pounds of coal burned per square foot of heating surface, at which rate we would expect an evaporation of approximately seven pounds of water per pound of coal.

What might be termed the "performance capacity" of a steam locomotive may be worked out from the speed and tractive effort characteristics given in Figure 3, using as a basis the 1,000 ton-miles trailing load moved per hour on a level or any gradient selected.

Having broadly outlined the performance characteristics of the simple consolidation engine frequently met with in heavy



Steam and Electric Locomotives—Figure 3. Steam and Electric Locomotive Characteristics.

grade operation, it becomes necessary so to proportion the constants of the electric locomotive, assumed to replace it, as to gain the greatest benefit from the different inherent characteristics of the latter type of motive power.

Referring to Figure 2, it is evident that with the small speed variation of the electric locomotive, and due to the fact that its motive power is separate from its unlimited source of power generation, it is possible to consider radical changes in the method of moving freight, more especially on mountain grade divisions. It has become a partly accepted fact that the electric locomotive characteristic should be so proportioned as to enable it to operate trains at a high rate of speed on level track and at a much slower speed on grades, in fact, conforming with present steam practice in this respect. The writer

would again point out that steam railroading today is in reality steam locomotive practice in that the speed possibilities of different track divisions are restricted to a large extent by the limitations of the steam locomotive. In other words, the only reason why it is common practice to run at very low speeds on mountain grade divisions instead of continuing the high speeds in vogue on more level portions, is because a steam locomotive cannot be built powerful enough to supply the heavy tractive effort required at any higher speeds than those now in vogue.

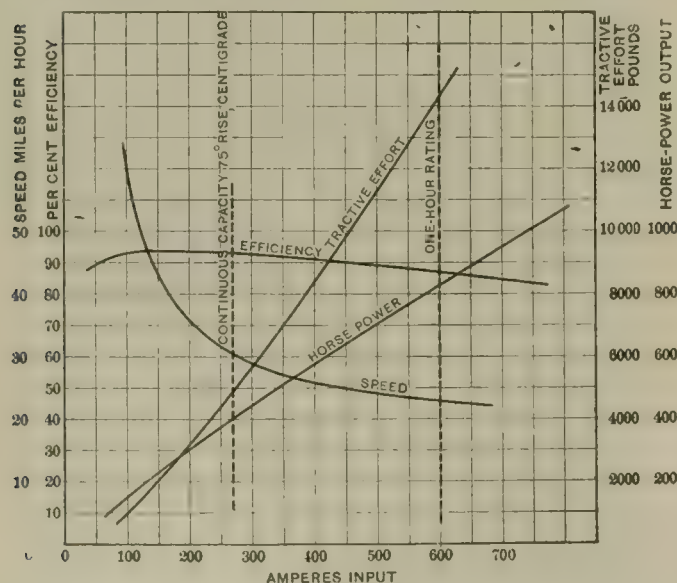
In general it may be stated that the freight movement over mountain divisions is effected at very low schedule speeds, and the cause is evident from an inspection of the steam locomotive characteristic. Except for the fact that curves are usually of shorter radius on heavy grades than on levels, there is no reason for the slower speed of trains, provided a type of motive power is available that is capable of supplying great drawbar pulls at high speeds. It is just this characteristic which the electric locomotive possesses to an almost unlimited extent, and such locomotives can be built which are even more powerful and operate at higher speed than can be utilized at present.

For example, the simple consolidation locomotive considered is capable of sustaining a tractive effort of 25,600 pounds at a maximum speed of 15.4 miles per hour, and weighs 165 tons with tender, while a single New York Central electric locomotive of the 6,000 type is capable of delivering the same tractive effort at approximately 37 miles per hour, and the weight is only 100 tons. The Central locomotive is of course designed for moderate speed passenger service and could not be run continuously at such a large output, but it is cited only as an example of a well-known electric locomotive having an enormous horsepower capacity, although in this respect it is but the forerunner of other electric locomotives having still greater outputs. Owing to the fact that such units may be run in groups of two or more and still be perfectly under the control of a single operator, the advantage of very large single units is somewhat modified, and the introduction of the electric locomotive may also introduce new ideas as to the size and construction of single hauling units.

The electric locomotive may be equipped with motors of several different types, each having characteristics best quali-

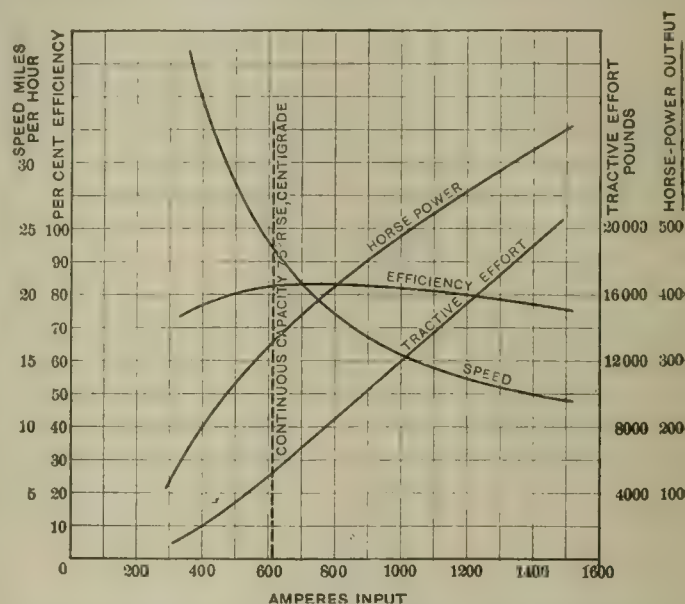
operation upon a very important division of one of the largest steam roads, it is here chosen as the equipment of a typical electric locomotive.

The large output, 840 horsepower for one hour and 400 horsepower continuous, shown in Figure 4, illustrates what can be accomplished with this type of motor. The output of the complete locomotive is dependent upon the number of motors permitted with the construction adopted. Thus, such a 4-motor equipment is capable of delivering a tractive effort of 56,800 pounds at a speed of 23 miles per hour approximate (depending upon the voltage) while the efficiency of conversion at this output would be 87 per cent, rising to a maximum of 93 per cent at higher speeds and lower tractive effort. Another form of construction, say, one similar to that em-



Steam and Electric Locomotives—Figure 4. Direct-Current Gearless Motor Characteristics, 1,200 Volts.

fying it for certain classes of work. Figure 4 and Figure 5 illustrate the usual speed, torque and efficiency curves of two typical motors, the direct-current gearless and the alternating-current single-phase geared type. The type of motor to be adopted is a matter requiring full local knowledge of the conditions obtaining in each individual instance before a proper selection can be made. All three of the available motors—direct-current, alternating-current single-phase and alternating-current three-phase—possess the one needed characteristic of great output per pound and hence the arguments advanced for the substitution of the electric for the steam locomotive are general in character and do not apply strictly to locomotives equipped with any one type of motor to the exclusion of all others. As the direct-current gearless motor can be built in the largest sizes, is the best understood, and is in successful



Steam and Electric Locomotives—Figure 5. Alternating-Current Single-Phase Motor Characteristics, 25 Cycles, 375 Volts.

played in the largest Mallet compound, would permit the use of two 4-axle articulated trucks, providing an equipment of eight motors and an output of 113,600 pounds at a speed of 23 miles per hour.

To illustrate this point: Two test locomotives and trains were operated over a mountain division under regular service conditions—steam and fuel consumption, duration of delays, etc., being carefully noted. The total work expended up grade was 5,700 horsepower-hours at the rim of the drivers, including allowance for 1.54 per cent average grade and seven pounds per ton track and curve friction. The total water evaporated on the trip, divided by the total horsepower-hours, gave a steam consumption of 36 pounds per brake horsepower-hour at the rim of the drivers. Indicator cards taken upon the engine in question at all cut-offs up to 90 per cent showed that the greatest steam consumption did not exceed 32 pounds per indicated horsepower-hour, or 35.5 pounds per brake horsepower-hour, allowing 10 per cent internal engine friction. Values as low as 23 pounds of steam per indicated horsepower-hour, or 25.5 pounds per brake horsepower-hour were recorded for the average cut-off of 40 to 50 per cent used throughout the run. A third and fourth series of tests, conducted up the same grade, gave similar results, except that the values were slightly higher than those quoted, showing that there was a considerable loss of water unaccounted for by indicator cards and useful work performed.

Operating down grade, it was necessary to accomplish 1,110 horsepower-hours on account of the somewhat broken profile, and again the water consumption showed on two trips 57.7 pounds of steam per brake horsepower-hour, and on two subsequent trips 66.5 pounds, values entirely unaccountable on the basis of useful work performed.

During all tests the usual service delays occurred, and as the traffic on the road in question was very much congested, these delays constituted a considerable proportion of the total elapsed time. In fact, during the runs up grade the trains were in motion but 66 per cent of the total elapsed time, and down grade the trains were in motion from 52 per cent down to 40 per cent of the total elapsed time. As these delays were frequent and undetermined, it was necessary to maintain full steam pressure while waiting for the momentarily expected release from the block, hence the waste of fuel and water was considerable. Averaging this waste at

400 pounds per hour, at which low rate of consumption the water evaporation would approximate 10 pounds of water per pound of coal burned, or 4,000 pounds of water evaporated per hour, and reducing the total water consumption measured by the waste losses thus obtained, the steam consumption in eight different tests up and down grade ranged 34.7 pounds, 32.4 pounds, 28.1 pounds and 25.3 pounds, etc., water per brake horsepower-hour. These values are fairly commensurate with results of indicator cards taken, and, with the type of engine used and under the operating conditions obtaining, an allowance of 400 pounds of coal stand-by losses per idle locomotive-hour seemed not too great a value to allow, and this figure has been taken in subsequent calculations.

Locomotive performance capacity curves may therefore be plotted which will show approximately the true rela-

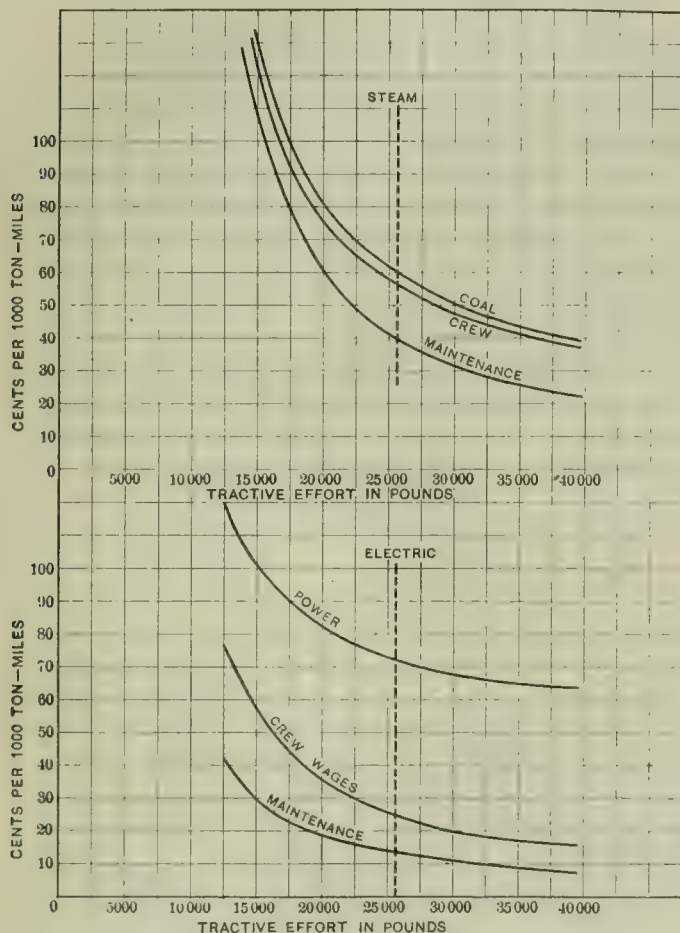
cent, all items are reduced and the total and subdivided comparative costs are given in the following table:

Comparative Operating Expenses per 1,000 Ton-Miles Steam (Simple) and Electric Locomotives. Average of Up and Down Grade Operation.

	Grade—Per Cent.			
	1/2.	1.	1 1/2.	2.
Steam Locomotives—				
Coal	\$0.15	\$0.255	\$0.38	\$0.53
Crew .....	.135	.24	.36	.50
Maintenance .....	.105	.178	.26	.36
Total .....	.39	.673	1.00	1.39
Electric Locomotives—				
Power .....	.20	.355	.505	.66
Crew .....	.072	.122	.18	.24
Maintenance .....	.036	.062	.09	.119
Total .....	.308	.539	.775	1.019
Saving effected by electric operation ....	.082	.134	.225	.371

A study of this table is most instructive, as it shows that while the percentage saving with electric operation is approximately the same, whatever the ruling grade, yet the actual money saving is much greater on the heaviest grades. As about the same investment must be made in each case for distribution system, including third-rail or overhead trolley, substations, etc., the inference must be drawn that heavy grade divisions present a more attractive field for electrification than level sections when considered from the purely economic standpoint. There are other items of saving and other reasons for electrification which may be more or less controlling in individual cases, but it seems possible to make the broad statement that the mountain grade division offers a particularly attractive field for the electric locomotive, and its introduction should be the means of effecting such economies in both freight and passenger transportation as to pay a satisfactory return upon the investment required.

The term "horsepower" is perhaps not fully appreciated by the steam railway fraternity. When the statement is made that a certain electric locomotive is rated at so many horsepower output, it does not leave the impression it should. The horsepower output of a locomotive is a direct measure of its capacity to do work, and while the tractive effort available

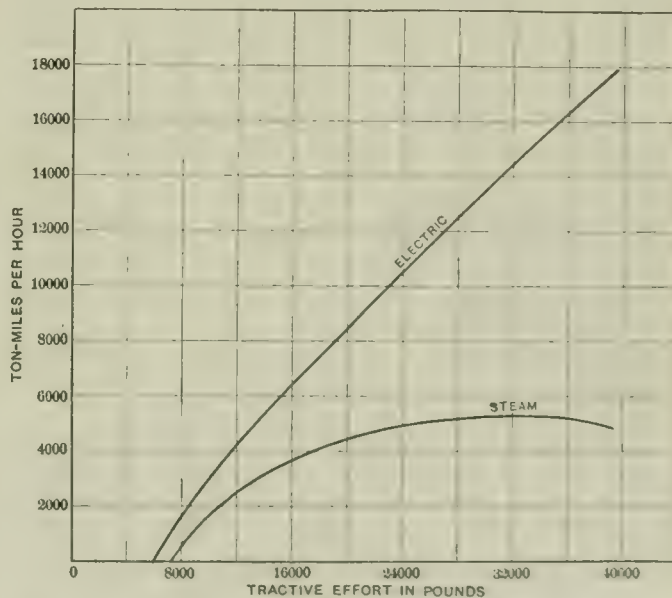


Steam and Electric Locomotives—Figure 6. Tractive Effort in Pounds. Service Capacity Steam and Electric Locomotives Average of Up and Down 2.2 Per Cent Grade.

tion between the several items of fuel, crew wages and motive power maintenance, by adhering to the following assumptions:

Ratio schedule to running speed up-grade steam locomotive .....	.50 per cent
Ratio schedule to running speed up-grade electric locomotive .....	.60 per cent
Schedule speed down-grade steam .....	.15 miles per hour
Schedule speed down-grade electric .....	.18 miles per hour
Cost of coal	\$3.00 per 2,000 lb.
Cost of electric power	0.0075 per kilowatt-hour
Efficiency of distribution .....	.70 per cent
Crew wages per hour, steam	\$2.15
Crew wages per hour, electric	\$1.80
Maintenance locomotive, steam	\$0.137 per mile
Maintenance locomotive, electric	\$0.05 per mile
Fuel waste per idle hour, steam .....	.400 lb.

An inspection of the performance curves shows that in practical operation the fuel expense approaches more nearly to the value of the other items considered, instead of being greatly in excess of them, as indicated in the theoretical performance curves. For operation on lesser grades than 2.2 per



Steam and Electric Locomotives—Figure 7. Hourly Tonnage Capacity of Steam and Electric Locomotives Up 2.2 Per Cent Gradient.

governs the tonnage of the trailing load, it is the product of the tractive effort times the speed at which it is available, or, in other words, the horsepower output, that measures the hourly tonnage capacity of the locomotive upon which the crew expense of the entire train depends. Hence the great claim for recognition of the electric locomotive lies in its great horsepower output, that is, its ability to carry full tractive effort or to slip its wheels at speeds two or three times greater than can be done with any steam locomotive yet built.

As against the reduction in fuel expenses promised by the use of the compound locomotive fitted with superheaters and feedwater heaters, the electrical engineer has up his

sleeve the great possibilities offered by regeneration of power while electrically braking on mountain grade divisions. The amount of power saved by this means may in certain installations amount to as great a percentage of the total as is the saving effected in coal expenditure with steam locomotive by compounding and providing superheaters and feedwater heaters. Such an electrical saving is of course restricted to heavy grade divisions, but the feasibility of electric braking by regeneration is unquestioned. Indeed, with three-phase induction motors regeneration is automatic, the motors being perfectly reversible and returning energy when operating down grade with no change whatever in their connections. Other types of motors may be adapted for regeneration with slight modifications in the control system.

The chief advantage of regeneration lies in the assurance it offers of greater safety in operating on heavy grades. The present method of braking, by friction between wheel and shoe, results in overheated parts, breakages resulting therefrom and consequent danger of derailment. The descent of a long heavy mountain grade is accompanied by the shoes and wheel rims becoming heated to a dull red, while the introduction of the electric locomotive offers an opportunity of holding the train in whole or in part by means of the same motors used to haul it up grade, and thus eliminating one of the greatest sources of danger in mountain railroading.

A high-speed freight train is of necessity a lighter train than could be handled over the same profile by a given locomotive, and the crew and maintenance expense is therefore large. That such a class of service is nevertheless profitable or at least necessary is evidenced by the continuance of the practice and the proposed introduction of electric locomotives, in effect, makes all trains fast freights, gaining the benefits of such a service without incurring the penalty of increased operating expenses inherent to steam operation.

In this paper the writer has attempted to outline some of the fundamental reasons for the electrification of steam roads; the figures submitted are used for illustrative purposes only and are not intended as being directly applicable to any concrete case. Rather than befog the main question at issue, which is the electrification of steam roads, detailed proof of many statements made has not been attempted, as the introduction of such proof would unnecessarily extend a paper already too long. Nor does the writer believe that the time is ripe for the electrification of steam roads at large; indeed, the electrical enthusiasts would be hard put to it if called upon to show reason for the electrification of many branch steam lines carrying a small tonnage at infrequent intervals. There are, however, certain divisions of our steam railways which, either on account of their broken profile or heavy traffic, offer an opportunity to introduce a superior type of motive power which will effect such economies in operation as to provide adequate return on the investment required for the electrification. There are still other divisions where a much desired increase in the track tonnage capacity can only be effected by double tracking so long as the steam locomotive is adhered to as the type of motive power used. Double tracking a mountain grade division is often a matter of enormous expense, and electrification of the single track may relieve the present traffic congestion at a moderate cost.

On mountain grade divisions the subject of regeneration with electric locomotives should receive very careful consideration, not so much on account of the saving in power which it may effect, but rather on account of the greater safety of operation which it guarantees by eliminating the serious defects of holding trains on heavy grades by wheel and shoe friction. Finally, there are the many incidental advantages to be gained with electrification which cannot be predicted with any accuracy, as they result from changes in operating methods sure to follow the introduction of a type of motive power not subject to the service limitations of the steam locomotive.

The subject of the electrification of steam roads is, therefore, a very broad one, and while this paper has been devoted largely to a discussion of operating expenses as affected by the different characteristics of the two types of locomotives, it has been done to illustrate the advantages resulting from increased locomotive capacity. The keynote of electrification is capacity; by approaching the problem from this standpoint only can full benefits be obtained.

Discussion.

After the presentation of Mr. Armstrong's paper, the subject was opened for general discussion and W. J. Wilgus submitted a communication, of which an extended abstract is as follows:

Instead of apologizing for adding to the number of papers on the electrification of steam railroads, the author should feel entitled to congratulations for calling attention to many of

the advantages of the electric locomotive that have heretofore escaped analysis. In my judgment the cause is injured rather than benefited by arguments for the wholesale application of electricity to steam railroads, and it is pleasing to note the increasing tendency in our technical societies to sane discussions that will really enlighten the railroad officer anxious to be in the van of progress.

The pioneer electrical installation in heavy trunk line service on the New York Central & Hudson River Railroad has now been in complete and successful operation since July 1, 1907, the gradual change from steam power having commenced in December, 1906. The working side by side of both kinds of motive power has given unsurpassed opportunities for the observation of their comparative capacity and efficiency. The results are even more gratifying than were expected, and substantiate many of the author's claims of superior capacity of electric equipment, although the conditions widely differ from those that he has assumed.

At this point it may be well to venture a word of caution on the subject of costs. Comparisons are worthless unless all elements of expense that will affect the results are included. For instance, the cost of current delivered at the contact shoes should include not only costs of operation and maintenance, interest, depreciation, taxes and insurance on the power station, but likewise on the entire distributing system. If this is properly done the real cost of current, as finally delivered at the electrical equipment, will be found very largely to exceed the usual assumptions. The author's cost of current seems to me to be considerably too low. On the other hand, the cost of maintenance and care of equipment should embrace not only wages and supplies, but also interest, taxes, insurance, maintenance and depreciation on the structures and real estate required to house and repair the equipment. Steam locomotives require extensive engine houses, coal and water stations, ash pits and appurtenances, often on very expensive lands, whereas electric equipment needs the simplest form of inspection sheds, occupying limited areas of land. Also steam locomotives require extensive and complicated heavy repair shops, usually at far distant points, that necessitate costly dead mileage and lengthy idle periods, while electric equipment, because of its simplicity, can be much more quickly repaired in nearby shops and returned to service.

Many of these features have been mentioned by the author, but possibly their importance can be emphasized by giving some concrete examples from actual practice on the New York Central.

Because of less cost of maintenance of electrical equipment, and less idle time in shops, the greater cost of interest charges and depreciation is not only neutralized, but a net saving in repairs and fixed charges over steam equipment is effected of 19 per cent.

Electric locomotive inspection and light repairs, as compared with coaling, watering, drawing fires, repairs, etc., of steam locomotives, shows a saving in time in favor of the former of over 4 hours per day, equal to 18 per cent.

The electric locomotive, while busy, is a much more nimble and efficient machine than the steam locomotive, showing an increase in daily ton-mileage of 25 per cent.

While not so important in freight service, the question of locomotive weight is a large factor in a comparison of the relative economy of handling passenger traffic by steam and electricity. For instance, in switching service at the Grand Central terminal, 65 per cent of the total steam ton-mileage is due to locomotive or dead weight, while the electric locomotive percentage is but 54 per cent, a saving for the latter of 11 per cent.

In the regular schedule service the steam locomotive shows 51 per cent dead ton-mileage, as against 35 per cent for the electric equipment, a saving for the latter of 16 per cent. When we realize that this saving of dead ton-mileage has a direct proportionate effect on the cost of fuel and current, and an indirect effect on wages and fixed charges, its importance is manifest.

The author calls attention to the speed advantage of electric over steam locomotives in mountain grade operation. This is strikingly apparent in the New York Central installation, where the increase in coal consumption for car ton-mileage in high-speed service as compared with slow-speed service is shown to be 165 per cent, whereas, under exactly the same conditions the increased consumption of current for electrical equipment is but 18 per cent, a difference in favor of electrical operation of 147 per cent.

The net result of all of the economical advantages of electric operation over steam, for the conditions existing on the New York Central, after including all elements of cost of additional plant, shows a saving in summer months of from 12 to 27 per cent, depending on the character of service. A larger saving may be expected under winter conditions.

In addition to this saving, the nuisance and dangers from

smoke and gas in the Park avenue tunnel have been eliminated and the capacity of the Grand Central terminal has been increased about one-third. Later, when the New Haven company effects its change of power, complete electrical operation in the tunnel will permit the use of shorter blocks, and correspondingly increase the capacity of the 4-track main line entrance to the terminal.

It might be well to add to the author's keynote, capacity, the equally important one of efficiency, as the two combined, applied to the problem under consideration, will demonstrate whether or not the adoption of electricity is justifiable from the standpoint of economics.

Dr. Cary T. Hutchinson stated that in his knowledge no electrification had been undertaken from the point of view of economy, but always on account of some special problem, either a terminal problem, such as in New York City, or mountain grade problems or the elimination of dirt and smoke or for similar reasons. But he did not think that the time has arrived where the matter can be determined from a cost aspect because of the uncertainty of present data. Dr. Hutchinson discussed briefly the capacity of locomotives as machines, looking at the question from the point of view that in the construction of electric locomotives it is impossible to build them with anything like the tractive effort that is distinctive in the steam locomotive, and for this reason the steam locomotive has a higher capacity than the electric locomotive, but the capacity of the electric locomotive will be determined by its average performance. Another point emphasized was the saving of dead haulage in the electric locomotive, due to the lesser weight. He stated that there was a difference of 150 tons in the two machines working under the same conditions and, taking a mileage of 100 miles a day, there is 15,000 ton-miles a day, worth \$30 a day, or \$10,000 a year difference in the actual cost of the dead haulage of the two locomotives.

N. W. Storer said that he believed the keynote of the whole subject of electrification of steam railways lies in the capacity. The greater loads per train that can be hauled, the

for a period of one year had shown the cost to be 8.1 cents per locomotive-mile in freight service and 5.6 cents per locomotive-mile in passenger service. Based on the week ending October 25 last, the New York division of the New Haven would show 1,843,664 freight locomotive-miles per annum, and 2,993,228 passenger locomotive-miles, a total of 4,836,992. This figure was low because of the traffic in summer being heavier. This would give an operating cost of \$316,962 for the maintenance and repair of locomotives. Mr. Murray said that two cents per mile was the average figure he had secured for electric locomotive repairs. Increasing this 25 per cent, to be on the safe side, the total for electric locomotive repairs was \$120,924, a saving of \$196,038, as compared with steam locomotives. The total saving in fuel and repairs would be, therefore, \$562,470, which, capitalized at 5 per cent, would be \$11,249,000.

The expense of conducting transportation with electric traction is estimated at but 79 per cent of the corresponding cost for steam traction; and of the 21 per cent saved he believed that 90 per cent would be on account of fuel and round-house expense.

Referring to yard switching and turning of engines at terminals, Mr. Murray said that the experience of the New Haven to date had shown that twice as much yard switching could be done in a given time by electric traction and that electric engines are ready to make their reverse train movements in less than one-quarter the time required by steam locomotives, this being on the assumption that water tanks, dumps and turntables are within the yard limits at the terminal. Mr. Murray believed that ton-miles rather than capacity was the keynote to electrification; that is, while electrical operation would increase the capacity, this increased capacity was of no value unless there were available a traffic to be handled.

William McClellan argued that greatest stress should be laid on the peculiar fitness of the electric locomotive to accomplish what it should on steam roads, instead of con-

	Ton-miles per annum.	Tons of coal, steam traction.	Tons of coal, electric traction.	Cost of coal, steam traction.	Cost of coal, electric traction.	Saving of electric over steam traction.
Express	592,240,000	57,447	29,870	\$183,830	\$ 89,620	\$ 94,210
Express (loco.)	348,000,000	58,300	28,600	186,560	85,800	100,760
Freight	2,223,000,000	187,844	139,010	563,530	417,030	146,500
	3,163,240,000	.....	.....	.....	.....	\$341,470

greater speeds, both on level tracks and on grades, and the greater safety on grades, all tended toward greater capacity, and these advantages were going to be the means of forcing the electrification of a considerable number of the railroads. In a short comparison of train control in the different types of electric locomotives Mr. Storer said that the direct-current locomotive is able to control the train on the down grade at almost any speed by the use of resistance for absorbing the regenerated power. The three-phase locomotive will control at speeds above synchronism by absorbing the excess power in resistance; the single-phase will control at almost any speed and restore energy to the line efficiently at all speeds.

W. S. Murray, electrical engineer of the New York New Haven & Hartford, discussed the comparative performance of steam and electric locomotives, taking exception to the reference of Mr. Armstrong to petty economies effected in coal consumption and cost of locomotive repairs and presenting figures deduced from careful tests on the New Haven to show that these economies were too great in magnitude properly to be called "petty." Mr. Murray considered that the superiority of electric traction lay not in the mechanical efficiency of the engines, but in the efficiencies of steam generation. The accompanying table was submitted to show the saving in fuel on the New York division which will be effected when all trains are operated by electric locomotives:

The New Haven found that in the express service 2.055 indicated horsepower-hours were developed from the evaporation of 57,594 pounds of water, giving 28 pounds of water per indicated horsepower-hour. For local trains this figure was slightly increased, the evaporation being 42,987 pounds of water for 1,435 horsepower-hours, giving a water rate of 30 pounds per indicated horsepower-hour. These figures compare with the guaranteed water rate of 20 pounds per kilowatt-hour for steam turbines, equivalent to 15 pounds per horsepower-hour at the switchboard. Bearing in mind the ratio of 7 to 10 in the evaporation per pound of coal of locomotive boilers, as compared with stationary boilers, he thought that it was not too much to say that twice the drawbar pull per unit of coal burned would be developed by the electric method of traction.

Mr. Murray said that cost data on 20 steam locomotives

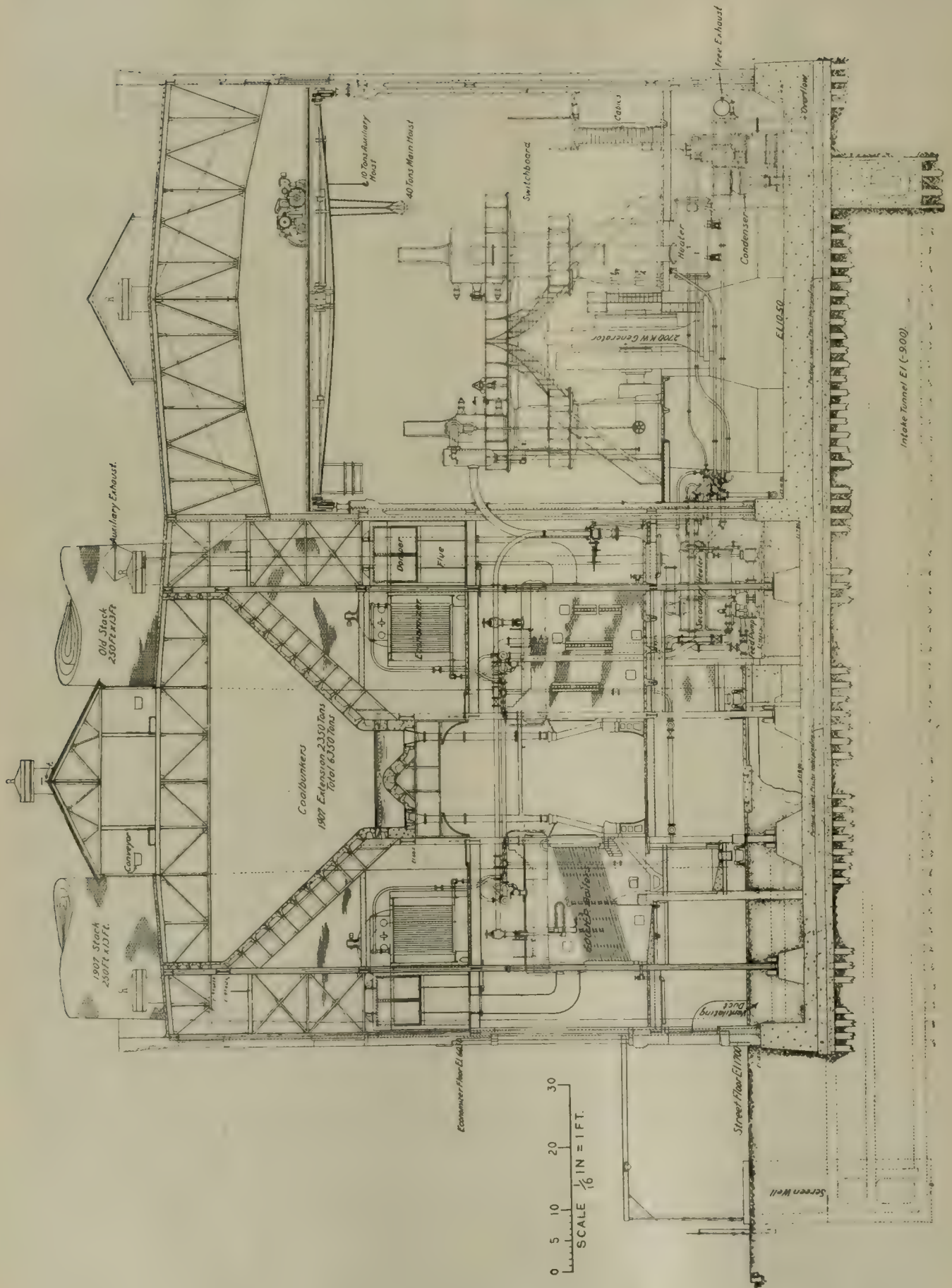
continually taking up differences and savings, but that the problem should be approached not so much from the standpoint of mere substitution as from the point of view of what the electric locomotive will accomplish over what the steam locomotive is accomplishing at the present time.

C. L. de Muralt emphasized the fact that capacity is the real electrification problem, and cited an instance that came under his observation wherein it was possible to handle more traffic over existing tracks with electric locomotives than could be done with steam locomotives. He said that if he understood the correct definition of capacity as explained by Mr. Armstrong it was not merely drawbar pull, but the product of drawbar pull into speed. He said that if considering the drawbar pull per axle of an electric locomotive to be 4,000 or 5,000 pounds, and it was able to carry that drawbar pull up to three or four times the speed at which the steam locomotive can develop 9,000 pounds drawbar pull, then more traffic could be handled by the electric locomotive, or, in other words, its capacity was much larger. It was his opinion that those lines which are now at the limit of traffic under steam conditions will be the first to be electrified.

W. Nelson Smith agreed that the whole question of electrification focused upon capacity, but that capacity could be viewed from several different points. He said that one of the aspects which he believed had been given much consideration was the train movement of any given piece of single-track road; that capacity is a problem that operating men come in daily contact with and any increase should appeal first to them.

Dr. C. F. Steinmetz made the point that the change from steam power to electric power was not merely a substitution of the electric locomotive for the steam locomotive, but a readjustment of the ways of operation, and to enjoy the full benefits of such a change the rearrangement of operation is very essential. Higher speeds necessarily mean increased capacity of the system and therefore a readjustment especially of the most important part of the railway, the freight traffic.

Publicity of management by private individuals can be trusted to accomplish better results than the privacy of management by public officials.—The Electrical World.



RECENT POWER STATION PROGRESS ON THE BOSTON ELEVATED.

An addition of 10,800 kilowatts in generating capacity is approaching completion in the power plants of the Boston Elevated Railway Company. In December, 1906, the Stone & Webster Engineering Corporation was requested by the Boston Elevated Railway Company to make an examination of its power supply and recommend a system of generation and distribution of power which would best provide for present and future requirements. This report was presented and a comprehensive scheme of power development recommended. Investigation showed that the requirements of the system at that time exceeded the capacity of the existing stations by 7,500 kilowatts, and it was estimated that this shortage would amount to 12,250 kilowatts by the time additional apparatus could be installed. The company decided to add 5,400 kilowatts capacity to Lincoln power station, 2,700 kilowatts to Charlestown and 2,700 kilowatts to the Harvard power station. The selection was made of direct-current steam engine driven generators, conforming in general design to the existing units in the various stations, and space was provided for one additional unit in the Charlestown and Harvard stations. The work of designing and constructing these extensions was placed in the hands of the Stone & Webster Engineering Corporation, with the object of completing the work by January 1, 1908.

In detail, the additions consist of the following units:

Charlestown Power Station.

Four 600-horsepower Babcock & Wilcox water-tube boilers.

One 2,700-kilowatt General Electric generator, direct-connected to one McIntosh & Seymour vertical cross-compound engine, 40 by 82 by 80 inches, 90 revolutions per minute.

Engine room extension, 104 by 66 feet.

Boiler room extension, 140 feet 6 inches by 55 feet 6 inches.

Second chimney, 225 feet high, 11 feet inside diameter.

Harvard Power Station.

Equipment similar to Charlestown.

Extension, 158 by 65 feet.

New stack, height, 200 feet, inside diameter, 12 feet.

Lincoln Power Station.

This is the largest modern steam plant operated by the company. It supplies power for surface and subway cars operating in the heart of the business district, as well as a large proportion of power for the elevated system. The old station contained three 2,700-kilowatt 575-volt units, driven by vertical cross-compound engines, two of which were built by the Rice & Sargent Engine Company of Providence, R. I., and the third by the Westinghouse Machine Company of East Pittsburg. Steam was supplied by 6,000 horsepower of Babcock & Wilcox boilers, the gases being carried away by a single stack 250 feet high and 13 feet inside diameter.

The addition at Lincoln power station required an extension 83 by 152 feet. The plant is located on the shore of Boston harbor. As far as possible the architectural lines of the old building were followed in making the extension. The general arrangement of the machinery is shown in the accompanying engraving, reproduced from the Stone & Webster Public Service Journal for November, 1907.

A second stack has been built, 250 by 13 feet, the foundation having been placed at the time the original building was erected. The boiler installation for the new equipment consists of eight 600-horsepower Babcock & Wilcox units, each having two hundred and ninety-four 4-inch tubes, with a superheater section capable of raising the normal steam temperature 50 to 75 degrees F., according to the load conditions. The boilers are designed for a working pressure of 200 pounds per square inch. The furnaces are equipped with

Roney mechanical stokers, 150 inches wide and 20 grate bars deep, providing an effective grate area of 111 square feet, exclusive of the dead plates and one-half the dumping grates. These stokers are fitted with a new "sectional fin-type grate," which it is expected will be much less expensive to maintain than the type of grate heretofore furnished with this stoker.

Four 14 by 9 by 18 inch Warren feed pumps are installed. Two Sturtevant fuel economizers will also be installed. The feedwater will be heated by first passing it through primary heaters in the exhaust pipes, then through an open heater receiving the exhaust of auxiliaries, and finally through the economizers. Each primary heater has 1,055 square feet of heating surface and is of National make. Each is guaranteed to heat 130,000 pounds of feedwater per hour from 40 degrees F. to within 5 degrees of the exhaust steam temperature. The open heater is of the Cochran type, and it has capacity to heat the feedwater within 3 degrees of the auxiliary exhaust temperature. After passing through the economizers the feedwater is expected to have a temperature of about 250 degrees F.

The engine at the Lincoln power station are built by the William Tod Company of Youngstown, O. Their principal particulars are:

Cylinders, 42 by 90 by 60 inches; speed, 75 revolutions per minute; flywheel weight, 270,000 pounds; diameter, 25 feet; shaft diameter in bearings, 32 inches, at center, 37 inches; hollow forged, 9-inch hole. Each flywheel is provided with a circular rack on the inside of its rim for turning by a 30-horsepower motor, to facilitate valve setting and repairs. Each engine is direct-connected to a 2,700-kilowatt 575-volt Allis-Chalmers generator. The old switchboard was located at the level of the engine room floor, but has now been moved to a gallery extending the entire length of the engine room. A new oil room and filtering system have been installed.

Previously in this plant the cooling water was supplied to the condensing system through a suction main. This was found to be inadequate for the demands of the enlarged station, and it was decided to install a gravity intake. Owing to the limited space for building operations room could not be spared to use the open cut method of construction, and tunneling was therefore resorted to. The bottom of the tunnel is 19 feet below mean high water and the entire work of construction was carried on with compressed air. Steel roof plates were used to prevent a cave-in from above, but the entire work was constructed without a head shield. The tunnel is 6 feet in diameter and 210 feet long, and it was completed in 56 working days, without accident. The completion of the installations at Lincoln, Harvard and Charlestown power stations will give the Boston Elevated a total normal generating capacity of about 50,000 kilowatts.

CENTRAL ELECTRIC RAILWAY ASSOCIATION.

The next regular meeting of the Central Electric Railway Association will be held at the Claypool hotel, Indianapolis, Ind., on Thursday, November 21, 1907. Owing to the fact that Thanksgiving day falls on the regular date of meeting the executive committee deemed it advisable to change the date to the 21st. The following programme is announced:

Morning Session.

10:30 a. m. Business meeting.

11 a. m. "Analysis of the Cost and Methods of Electric Railway Maintenance." Paper by Albert Herrick, electrical engineer, New York, N. Y.

12 m. Adjournment for lunch.

Afternoon Session.

2 p. m. "Foundation Brake Arrangement for Electric Cars." Paper by Fred Heckler, master mechanic Lake Shore Electric Railway, Fremont, O.

3 p. m. "Does It Pay Interurban Electrics to Cater to Long-Distance Travel?" Discussion.

INSTRUCTIONS TO TRAINMEN REGARDING PAY-AS-YOU-ENTER CARS AND DISPATCHING SYSTEM IN CHICAGO.

The Chicago City Railway Company has issued special instructions to conductors and motormen relating to the pay-as-you-enter cars and the telephone system of car dispatching. An abstract of the instructions, which have been published in booklet form, follows:

Introductory.

In order that all conductors and motormen may intelligently co-operate with the management in making the new method of fare collection, and also the new method of car dispatching, a success, it is essential that a thorough understanding of the objects to be attained be made clear at the outset and that the instructions in connection therewith be clearly set forth. "Knowing why makes doing easier."

"Pay-as-You-Enter" System.

It is confidently expected that the use of this system will either entirely remove or materially improve existing conditions, viz.:

1. "Accidents occurring by cars being started while passengers are in the act of alighting from or boarding car." The position of conductor on rear platform will insure against car being started until the rear platform steps are clear. Such accidents as occur at the front steps are almost entirely due to persons attempting to board moving car and as passengers will now use the front platform for exit only, and while so doing be directly in view of the motorman, there should be no further trouble from accidents of this character.

2. "Extreme overcrowding of cars." It is believed that as the conductor is now placed in a position to control the loading of car, it will be possible to at once prevent a repetition of the 100 to 140 passenger loads of the past. Whenever there are in excess of 80 passengers upon the car the conductor will step to the outer edge of platform and, with arm extended to bar the "entrance" step, courteously request passengers to "take next car, please." Such passengers as ignore this request must not be forcibly ejected, but the reason for the request being made will be courteously explained by the conductor, which action it is expected will thereafter insure the co-operation of the passenger.

3. "Jostling and undue crowding of passengers, particularly ladies, while entering or leaving car." The exit portion of rear platform will be kept clear at all times. The entrance portion of rear platform will be occupied only by passengers while paying fare, all others being required to proceed to the interior of car or through to front platform, excepting only the last few passengers taken on before car becomes fully loaded.

4. "Collection of fares upon the rear platform." Fares will be collected on the rear platform before passengers enter the car, excepting only when conductor is forced to absent himself due to accident or other cause, or in the case of women with small children, or infirm persons. At the outset a certain amount of leeway must be allowed by conductors to guard against delays to traffic or disturbance caused by misunderstanding; much of this can be avoided, however, by the conductor securing the co-operation of his passengers, by courteously requesting them to "Have your fares ready, please." He should also, whenever opportunity affords, explain to complaining passengers that what we are here attempting to do is for the improvement of the service. Whenever it becomes necessary to allow passengers to enter interior of car without paying fare, the conductor will, as soon thereafter as his duties on the rear platform will permit, enter car and collect fares in the usual way, returning at once to his position on rear platform. Conductors will be supplied with a change carrier containing \$15 when going on duty each day, which should be sufficient to prevent any interference, on this account, with the rapid collection of fares, and as all passengers must pass the conductor, the trouble now resulting, both from missing fares as well as the misunderstandings arising from conductors through mistake trying to collect double fare from passengers, should be avoided.

5. "Better heating and ventilation." As the front platform is to be always kept closed while the car is in motion, the extreme drafts which have heretofore occurred when front door, leading from open platform to interior, was opened will be eliminated. The doors as arranged to afford entrance and exit between the platform and interior of car being self-closing, also serve to assist in retaining the heat at a regular temperature, and as there are no doors directly beneath the central ventilator, the draft of air, which by the use of these ventilators passes directly through the car from front to rear and directly beneath the ceiling, is no longer, inter-

fered with and will consequently insure the perfect ventilation of the car at all times.

6. "Comfort of trainmen." Electric heaters have been placed on both front and rear platforms, this together with the toilet conveniences to be established at the outer terminals of lines, and providing men to relieve the crews from the necessity of sweeping and dusting their cars at terminals, should insure an improvement in the appearance of both conductors and motormen, and the strict observance of uniform regulations. The guard railing, protecting motormen from the crowding of passengers, at once relieves the motorman of much annoyance and at the same time insures against accidents resulting from this cause.

Furnishing Change.

The requirement, limiting the amount of change required to be furnished to passengers by conductors to \$2.00, is posted in each car for the information of passenger and the protection of conductor. Change in excess of this amount should, however, be supplied by conductor whenever the supply will permit of its being safely spared.

Dispatching System.

The office of the dispatcher will be adjoining that of the division superintendent, whose aide he is, and will be connected with signal boxes located at side of street, at intervals along the line. These signal boxes, to which each conductor and motorman will be supplied a key, will contain a telephone by the use of which direct communication may be had with the dispatcher. Trainmen will use these telephones in calling for the wagon or on such other occasions as they may be from

No. 6

CHICAGO CITY RAILWAY COMPANY

Traffic Slip

LINE	Indiana Ave.	CAR NO.	5226
DATE	10-17-07	TIME LEAVING TERMINAL	7.30 A. M. P. M.
GREATEST NUMBER PASSENGERS ON CAR AT ONE TIME			
NORTH	44	SOUTH	56
CONDUCTOR BADGE No.		1478	

time to time hereafter directed. In the loop district the signal boxes are also supplied with a signal whereby the wagon located in the loop district may be called by the simple turning of a lever, thus saving valuable time. All signal boxes are also equipped with an alarm somewhat similar to that now used by the police department, by which the supervisors may be called from the street to telephone by the dispatcher when occasion demands.

Depots with telephones will be maintained at the outer end of the lines, and starters located therein, who will act as aides to the dispatcher in controlling the starting of cars, which will be done by the use of a signal bell.

Assignment of runs will be made as heretofore, excepting only that cars will leave the outer ends of lines only as directed by the starter's bell, and will be operated upon such running time as he may designate by the display of a number in plain view. Printed running timecards in accordance with these numbers displayed will be supplied to each crew.

(These cards give the running time for different principal points on the line and for round trips.)

The regulation of the point of heat to be carried in the car will also be governed by the posting of red numbers by starter in place provided upon the outside of depot.

Traffic slips on a printed form will be filled out by conductor each half trip, giving the maximum number of passengers upon the car at any one time and turned in at starter's terminal depot each round trip. A relieving conductor will take up and use the same slip as that used by the relieved conductor. (The slip is illustrated herewith.)

Each terminal depot will be supplied with toilet conveniences for the accommodation of conductors and motormen.

At each terminal depot a force will be maintained to relieve the train crew of the sweeping and dusting of cars, and

quirement can quickly be accomplished with an automatic water discharge placed between the drip main and the filter, preventing the free water from reaching the filter. The fifth requirement requires a special device which should be used occasionally, say once a month, all the oil passing through it at that time.

There are two general types of filters, one having a small filtering area and great depth, the other having a large area and slight depth. Wire screen trays are easily cleaned and a large part of the filtering can be done with them, the final filtration to be carried on through some fine mesh material such as felt or bone black. The screens should be so placed that they may be removed one at a time and the deposits blown out with steam.

The fourth requirement should be cared for before the oil reaches the filter, as oil and water make a wet, greasy surface which is repellant, making the movement through the filter very slow. Water can readily be removed from the oil by the use of an automatic separator, as shown in Figure 356 (R 4-1). The operation of this separator depends upon the difference in gravity of oil and water. The column of oil above line A is maintained the same weight as a column of water above the same line. If an increase in the amount of oil lowers the line A-A slightly, then the oil column will weigh less than the water column and the top surface of the water will fall below the edge of overflow and cause the oil surface to be relatively higher. The oil and water overflows should be long so that the discharge will not rise over them sufficiently to greatly disturb the line between the oil and water. For each inch difference in the height of the overflows a column of 10 inches of oil can be carried. One and one-half inches difference will permit 15 inches of oil above the water. The inlet pipe crosses the separating tank and has holes along the bottom and sides, the water tending to discharge through the lower and oil out of the side holes. The inlet is shown in the oil space as it is preferable to bring the oil in contact with as little water as possible and thus avoid increasing the quantity of water incorporated. This separator will become very dirty and to facilitate cleaning there should be a wash-out valve located at the bottom.

The second and third requirements necessitate putting the used oil out of service; the method of doing this is shown in Figures 61 and 62. These precipitating tanks should be located in the basement and used for no other purpose. The contents of a filter should be discharged into a precipitation tank, the filter being cleaned and filled with settled oil. The precipitation tank should have its contents entirely out of circulation and be as free from vibration as possible. For successful precipitation, the following requirements should be provided for:

1. In removing the clear settled oil from precipitation tank the contents should not be agitated.
2. The clean oil should be passed over only clean surfaces.
3. The discharge should readily be apparent, showing clearly if it is top oil, bottom oil or water.
4. Means should be provided for saving the bottom oil, to be used elsewhere.
5. Means should be provided for the thorough cleaning of the tank.

The above requirements are well provided for in the precipitation tank shown in Figure 357 (R 4-2). The contents of the tank are raised by admitting water from the "spreader" at the bottom of the tank. This spreader is constructed similar to a gas burner, with many small openings so arranged that the current of the water is broken up and discharged into the bottom of the tank without causing agitation. The thin layer, A, is the heavy oil which has precipitated out of the upper light oil. It is easy to raise oil and water and not cause them to mix; but to keep the oil, A, at the bottom and not have it mix with the oil, B, requires a

spreader well designed and water fed slowly into the tank. The three valves at C control the overflow, one line leading to the filter, another to an oil barrel, and a third to the sewer, used only in washing out. The cone at the top of the tank is made of glass, the line between light and heavy oil, also the line between heavy oil and water, being readily noted as it rises and passes the cone. The overflow ring, D, and reflector bar, E, are nickel plated and polished. The distance between the glass and the reflector bar is $\frac{1}{8}$ inch and shows clearly the line between dark and light oil. If the overflow, D, were only used as shown in the enlarged view, the oil would lie on the top surface as at F and water would continue to flow from under it.

After the oil is raised from the tank then the spreader is removed by means of an extension handle and the inside of the tank is ready to be cleaned. A very satisfactory style of

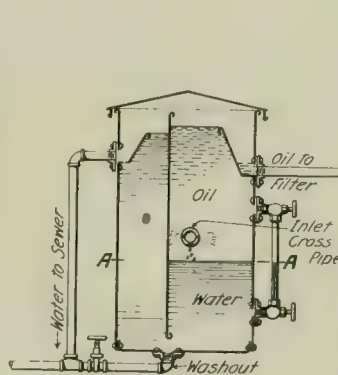


Figure 356 (R 4-1).

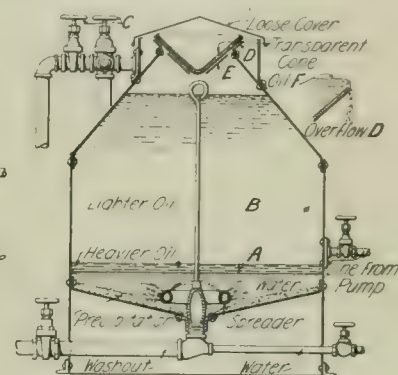


Figure 357 (R 4-2).

cleaner is shown in Figures 111 and 112. The tank has a cone-shaped shell, both to facilitate cleaning and also to reduce agitation of the oil when it is being raised with the water. Instead of the cone being entirely of glass it may be of metal with a slit covered with a narrow strip of glass and the reflectors, D and E, attached to the cone. A loose inverted cone top must in any case weigh more than the oil it displaces, to prevent it from floating. Figure 358 (R 4-3) shows a metal top and section A-B shows glass set in a frame of stiff metal. The reflector is set $\frac{1}{8}$ inch away from the glass and has a sufficient number of holes in it to permit oil



Figure 358 (R 4-3).

to reach the glass at all points from the bottom to the top. The glass alone is not sufficient to indicate the contents. It is necessary for light to pass through the oil to enable the operator to determine the contents of the tank. A cone top permits drawing off practically all of each grade of oil, as there will be but a narrow ring remaining at the overflow, the entire center being taken up by the cone. Instead of oil $\frac{1}{8}$ inch deep covering a $\frac{1}{8}$ -inch section there is only a ring $\frac{1}{8}$ inch deep and $\frac{1}{4}$ inch wide of the same size section.

In considering the use of a precipitating tank the storage space in the filter permits but a partial precipitation and the most conclusive evidence that something more than a filter is required can be found in the oil as used. When the oil is new it will run through the filter freely, but when it has been used for some time it is necessary to heat it in order to force it through the filter. The longer the oil is used the more sluggish it becomes and the more heat is required. If the filter were removing all the undesirable properties, it would not be necessary to heat the oil to enable it to pass the filter. The

filter does the rough work in purifying the oil, but a precipitation tank is needed to complete the process. By the use of a precipitation tank immeasurably fine impurities and the heavy oil and animal fats are separated and the oil deprived of the means of conveying water in suspension. Only by allowing the mixture to remain perfectly still for about two weeks can the heavier oils and incorporated water be made to precipitate.

Another method for removing water from oil utilizes a heater and a blower for passing air at a temperature of

necessary to permit the contents of either filter to be discharged into the precipitating tank. The numerous valves, L, in the oil mains insure that only one machine will be shut down if there is any trouble with an oil main.

If two or more filters were used connections, as shown in Figure 359, would be unsatisfactory because the drips would then flow to the lowest connection. In the arrangement shown in Figure 360 (R 4-5) the oil flows from one filter into another, the clean filters doing the larger amount of work. This method is objectionable because it requires that the joint, A, be broken whenever the storage tank is cleaned.

The water gauge and the line to the pump are located at the lowest possible point. The levels in the different filters are maintained alike with the construction such as will permit oil to flow from one tank to another. The center of the filtering cylinder is open, and through this central opening at the bottom the filtering tub can be plugged. In this manner

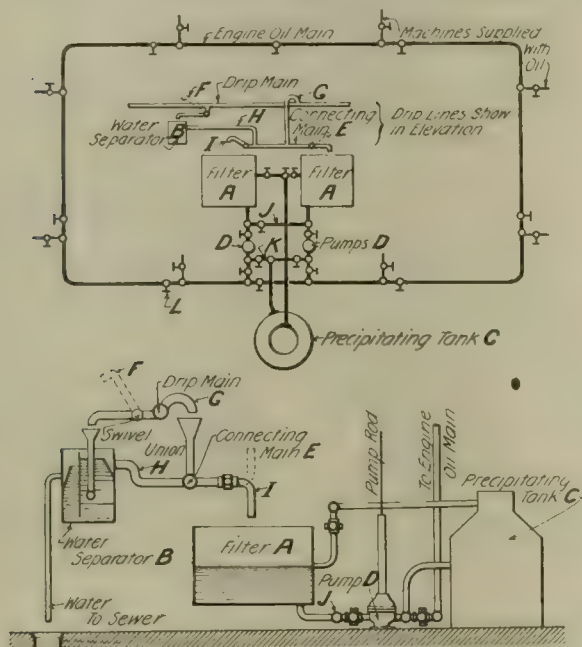


Figure 359 (R 4-4).

140 degrees through the oil. This method is unsatisfactory because it does not remove the fats which again take up water.

In the piping system in Figure 359 (R 4-4) a filter, A, is shown which contains enough oil to fill the oiling system during regular operation with each of the filters half full, thus permitting one to be emptied into the others.

A water separator is shown so arranged that when being cleaned its filter connection, F, can be raised. The water in such filters can be discharged through the washouts. The trap in drip main, G, prevents any drips from passing the water separator when connection, F, is down. Trap, H, likewise prevents drips from backing into the water separator when it is being cleaned. A swivel connection, I, permits the use of either or both of the filters. The precipitating tank, C, is shown in Figure

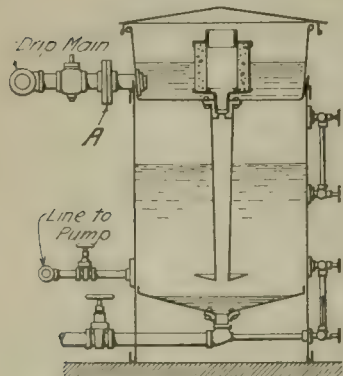
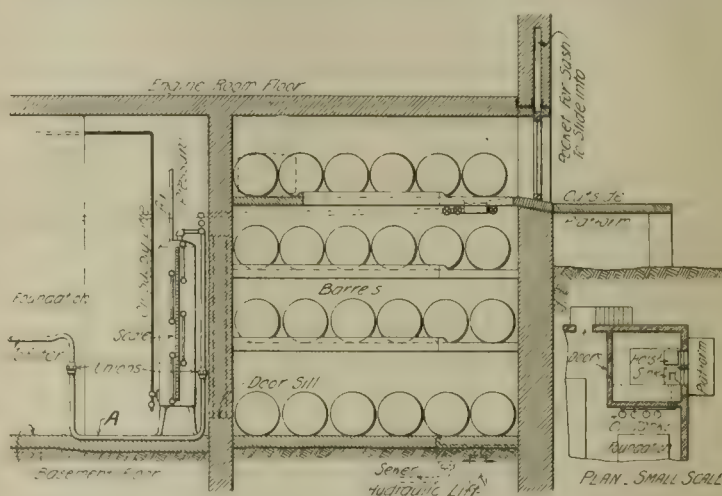


Figure 360 (R 4-5).

357, with the oil overflow sufficiently high so that oil will discharge by gravity into the filter. The pumps, D, are like those shown in Figure 354, and preferably motor driven as shown in Figure 353. It is necessary that two pumps be used to enable repairs to be made to the pumps and to permit filling the precipitating tank with dirty oil from one of the filters while the other pump is supplying the bearings. The crossover connection, G, enables both filters to be in use with but one pump in operation. The crossover, K, is



Figures 361 (R 5-1) and 362 (R 5-2).

the cylinders can be removed one at a time without interfering with the operation of the other cylinders.

Class R 5—Oil in Drip Lines for Oil Storage.

In making proper provision for oil storage it is necessary to consider the following questions: 1. Has the power plant owner or the oil company a sufficiently large oil storage house? 2. Can a saving be effected by receiving oil in carload lots? 3. Must other than the power station draw on the stock?

Upon these conditions largely depends the design of an oil storage plant. If barrels are to be kept in stock it is essential that the storage room shall be shut off from the heat or the barrels will shrink and leak, wasting considerable oil. There should be but one door from the engine room basement into the oilroom. The sill for this door should be not less than 8 inches above the oilroom and basement floors to prevent leakage and fire from passing the doorway. The oilroom should be provided with outside windows both for

ventilation and to give access in case of fire. If the barrels can be rolled through the window onto an overhead platform, then the oil can be emptied from these barrels and by gravity flow to the filter.

Figure 361 (R 5-1) shows an oilroom of this description with a hydraulic lift for raising or lowering barrels. A room 14 feet square is of sufficient size to store a carload of oil in barrels. An emptying sink is located next to the window and close to the hoist. From this sink a number of lines run to the filters and stock tanks. These stock tanks are similar to those shown in Figure 58, with the tanks outside of the barrel room, as it is desirable to keep the tanks warm and also easier to arrange a scale to show the amount of oil used by each shift.

Another arrangement for oil storage is that shown in Figure 362 (R 5-2), which shows three storage tanks with a receiving sink located outside of the building, this sink being provided with waste or other filtering material to prevent impurities reaching the storage tank. If air pressure is available, then the cylinder oil tanks may have dished heads, both top and bottom, and the air pressure be used to deliver oil to the engine room floor.

COMMUNICATIONS.

A Transportation Association.

To the Editors:

The suggestion of ex-President Ely at the Atlantic City convention that a branch organization of the American Street and Interurban Railway Association be formed which would be devoted to the interests of the transportation department is certainly worthy of careful consideration. The man who makes the schedules, who employs and disciplines the car service men, who frequently bumps up against the labor problem, decides upon extra car service, and a hundred other things nearly every hour of the 24 certainly needs and is entitled to all the benefits he can derive from a good, live organization devoted to the particular problems and difficulties of the transportation department. The transportation end of the electric railway business absorbs anywhere from 15 to 45 per cent of the gross receipts and amounts to from 25 to 50 per cent of the total operating expenses according to local surroundings, a fact which in itself indicates how important it is that combined effort be made to solve the various problems that are presented. Let's have a real live transportation branch of the American Street and Interurban Railway Association.

J. W. BROWN,

Superintendent of Transportation West Penn Railways Company.

Connellsville, Pa., November 9, 1907.

The Illinois Traction System has just issued its new folder giving the time of all cars between Springfield and St. Louis, Springfield and Decatur, Springfield and Lincoln, Decatur and Bloomington, Bloomington and Peoria, Decatur and Danville and other divisions of the road. The folder is a very complete compendium of information concerning the system, giving the names and office locations of all officials, together with illustrations of its various types of cars, passenger, express and freight, new bridges and engineering work, a map of the operating and proposed lines, etc. General Traffic Manager Stephens is engaged in getting up an extra edition of the folder in colors as a Christmas number.

It is stated that the service of the Ft. Dodge Des Moines & Southern Railroad, which recently began operating between Ft. Dodge and Des Moines, Ia., a distance of 85 miles, has attained immediate popularity. The running time is now 3 hours and 50 minutes and a 2-hour service is maintained. The company is issuing family mileage books for 500 miles at 1½ cents per mile.

News of the Week

Austrian Railway to be Electrified.

The railway line through the Arlberg tunnel, under the Tyrolean Alps, will be equipped for electric traction. This tunnel is on the main line from Paris to Vienna and is seven miles long, with steep grades from each entrance to the middle. By the new plans it is proposed to increase the speed of trains 25 per cent and the capacity of the road 50 per cent. The stretch of steam railroad to be converted in this connection is about 140 miles, exclusive of the tunnel. It is proposed to use three-phase alternating-current locomotives of 3,000-horsepower capacity. They will be so designed that when coasting down grade from the center of the tunnel they will generate current and return to the system about 6 per cent of the energy required to pull the train up the grade. C. L. de Mural, consulting engineer, of New York City, who was recently appointed professor of applied electrical engineering at the University of Michigan, has been retained as consulting engineer to the State Railways of Austria and this work will be under his supervision. He has been granted leave of absence from the University of Michigan on this account.

Recent Accidents.

A South Chicago City Railway car was struck by a freight train at the crossing with the Baltimore & Ohio tracks at Seventy-ninth street and Oglesby avenue, Chicago, on November 12 and thrown a considerable distance and almost demolished. Thirteen persons are said to have been injured. The crossing is not protected in any way and it is stated that the conductor carelessly signaled to the motorman to proceed without obtaining a clear view of the track.

About twelve passengers were injured in an accident on the elevated road of the Interborough Rapid Transit Company, New York, on November 11. A 7-car train of the Harlem division was stalled just above the intersection of Thirty-fourth street and Broadway, delayed by a 1-car work train. A 3-car Sixth avenue train was following. The motorman of the second train, according to his statement, thought the train ahead would proceed and failed to apply the brakes until too late to prevent a collision. The front car of the rear train climbed the platform of the other, and, although the speed was low, both cars were badly wrecked and a number of passengers were injured by broken glass and the impact.

Pittsburg Subway Ordinance Delayed.

The ordinance granting a franchise to the Pittsburg Subway Company was considered in the Pittsburg common council on November 11 and passed on second reading, but with amendments which, it is stated, make the ordinance useless to the company. The opponents of the measure outnumbered those in favor of it nearly two to one and all efforts to protect it from burdensome amendments failed. As it stands the ordinance requires the company to furnish an indemnity bond for \$500,000 within 90 days after the passage of the ordinance. The company's representatives sent a communication to the council stating that with this provision the ordinance is useless to them, as they would be unable to furnish such a bond until after the contracts had been arranged.

After a number of sections and amendments had been approved a resolution was adopted providing for the appointment of a committee of four members of the common council and three members of the select council, which is to consult with the mayor and city solicitor and prepare a new subway ordinance. This ordinance is to be advertised in the papers of the principal cities and the franchise offered to the highest bidder. The resolution was passed by the opponents of the company and is calculated to delay the project indefinitely. The present ordinance was formulated by a rapid transit commission of the councils and has been considered for 18 months until it has been amended almost beyond recognition. The subway company's charter expires in 4½ months and under a law passed by the last legislature no other state charter can be obtained until a franchise is secured.

Negotiations for Settlement in Cleveland.

Following the election of November 5, at which Tom L. Johnson was re-elected mayor of Cleveland on a 3-cent fare platform, negotiations were begun looking to a settlement of the street railway controversy, or at least to a definition of the relations between the Cleveland Electric Railway and the city as a result of the election. On November 7 Mayor Johnson addressed a communication to the Cleveland Electric Railway stating that the approaching expiration of some of its franchises necessitated early action to determine what

steps should be taken to insure a continuance of service; therefore, if agreeable, he would call a public meeting of the city council for Saturday morning to consider any proposition the company might desire to make. President Andrews replied that he would be glad to attend the meeting and that the company was ready to take any reasonable action looking to an adjustment of its relations with the city.

The council meeting was held on Saturday, but little was accomplished, as President Andrews had been unable to bring about a meeting of the Cleveland Electric directors on such short notice. City officials, officers of the low-fare companies and President Andrews and Vice-President J. J. Stanley of the Cleveland Electric were present. Mr. Andrews said that such of the directors as he had been able to communicate with were ready to take up the matter of a peaceful settlement, and that the company was ready to submit the question of fare to arbitration by outsiders. He said the company's position was that a 3-cent fare was not adequate for the entire system, but that it was willing to agree to an impartial test. He did not believe the company would approve the holding plan of settlement, as was proposed last spring.

Mayor Johnson said that two propositions have been considered, the holding plan and the franchise plan, and he thought the company should make a definite proposal based on one of these plans. He did not believe an agreement could be reached on the franchise plan, but thought the holding plan promised the best results. In his opinion no method of arbitration could be found that would be binding. The meeting was then adjourned until Thursday, in order to give the Cleveland Electric directors an opportunity to agree on the attitude to be assumed by the company.

It will be remembered that an attempt was made last spring to reach an agreement on the holding company basis, by which the property of the Cleveland Electric Railway would be leased to a holding company representing the city, at a rental based on an appraised valuation of the property. A. B. du Pont, president of the Municipal Traction Company, and H. J. Davies, secretary of the Cleveland Electric Railway, were selected as appraisers, but were unable to agree on a valuation. Mr. Johnson then proposed that \$60 a share should be taken as the basis of a settlement. This offer was refused and negotiations were dropped.

The Cleveland Electric directors held a 3-hour meeting on Monday afternoon and long sessions on Tuesday and Wednesday, but it was announced that no plan had been determined upon.

On November 7 Mayor Johnson called a conference of Cleveland Electric and low-fare officials to consider a means of relieving the traffic congestion at the public square, and changes of routing of both low-fare and Cleveland Electric cars were agreed upon in order to do away with some of the loops at that point. The Cleveland Electric agreed to rebuild the East Ninth street loop and to use the tracks and power of the Forest City company for a short distance. Several conferences have since been held and a number of changes designed to improve the conditions have been adopted. Mayor Johnson offered to expend the \$84,000 paid to the city by the Cleveland Electric for the use of the Central-Quincy route in building the needed new trackage, to be used jointly by both companies. Mr. Andrews said he would submit the matter to the directors.

On November 12 the Forest City Railway tendered \$2,750 to the Cleveland Electric Railway in payment for the joint use of the tracks on Bridge avenue, N. W., but the money was refused.

New York Public Service Commission.

On November 12, 13 and 14 the public service commission of New York conducted hearings regarding traffic conditions on the lines of the New York City Railway, at which members of the traffic squad of the police department were the principal witnesses. Most of these presented testimony to show that poor equipment, inefficient motormen and construction work carried on during the day, which could as well be handled at night, were responsible for from 60 to 75 per cent of all delays in car movement. During the hearing it was brought out that the traffic squad of the police department had made an investigation of traffic conditions at all important intersecting points from Forty-second street to the Battery and from the East river to the Hudson river during a period extending from September 27 to November 8. The results of the investigation had been presented to the commission in tabular form and it is stated tended to show that the New York City Railway could operate many more cars provided its equipment were in better condition.

On November 9 the commission issued a notice to the Staten Island Midland Railroad to show cause, at a public hearing on November 22, why it should not add 45 cars to its equipment, increase its car service considerably, and build

several extensions. The Richmond Light & Railroad Company was also ordered to show cause, on November 21, why it should not extend its lines, purchase new cars and make certain improvements in its present rolling stock equipment and methods of operation.

A. E. Blackmar, counsel to the commission, has given an opinion that the commencement of operation of the Belmont tunnel at Forty-second street is likely to prejudice any rights that the commission may have in legal proceedings attacking the validity of the company's rights to the tunnel. He therefore advises that the commission should consider carefully whether an application should not be made to the courts to enjoin the operation. The tunnel is now practically completed and trial trains have been run. The ownership of the property by the Interborough Rapid Transit Company and the franchises for its construction are disputed.

On Monday of this week the commission held a public hearing to receive suggestions for amendments to the present rapid transit law. A number of representatives of boards of trade and civic associations were present and argued that bonds issued for the building of future subways should be exempted from the city's debt limit; that the commission should have exclusive jurisdiction over the city's bridges, and that the period for subway leases should be lengthened from 20 to 40 years.

The Manufacturers' Association of New York has sent to the commission a report of a special committee on transit facilities which includes letters from United States consuls in eight of the largest cities abroad, showing that in six cities, London, Berlin, Amsterdam, Paris, St. Petersburg and Vienna, there are definite regulations limiting the number of passengers in accordance with the carrying capacity of the cars. In Calcutta and Moscow there are no such restrictions. The committee recommends such regulation of all municipal conveyances.

The commission has received from Controller Metz a statement showing that the Interborough Rapid Transit Company has paid the city up to October 1 on the subway contract No. 1, \$4,036,778 on interest and rent account and \$810,376 on the sinking fund account. On contract No. 2, for the subway south of the city hall, \$47,000 has been paid.

Wages Reduced.—It is announced that the Atlantic City Electric Railway, operating the city lines of the West Jersey & Seashore Railroad in Atlantic City, has reduced the wages of its conductors and motormen from 23 to 21 cents per hour.

Engineers' Club of Philadelphia.—A business meeting of the Engineers' Club of Philadelphia will be held on Saturday, November 16. H. C. Parker will present a paper entitled "The Helion Lamp."

Columbus Rejects T-Rail.—The Columbus, O., public service directors have refused the application of N. McD. Crawford, vice-president of the Ohio Electric Railway, for permission to use T-Rails at intersections with streets already laid with that form of rail.

Rock Island to Experiment with Motor Car Service.—It is announced that the Chicago Rock Island & Pacific Railway will shortly establish a motor car service between Des Moines and Indianola, Ia., using the new Ganz steam motor car, built by the Railway Auto Car Company, which has been tried out on several test runs recently.

Fast Speed on the Pennsylvania.—In a speed test of steam and electric locomotives on the Pennsylvania Railroad at Clayton, N. J., on November 14, a steam locomotive, No. 606, traveled a mile at a speed of 91.6 miles per hour. One of the new electric locomotives made one trip at the rate of 72 miles per hour and another at 79 miles per hour.

Owl Car Experiment in Memphis.—The Memphis Street Railway has for several weeks been operating a number of owl cars, leaving the downtown district at 1:00, 2:00 and 3:30 a. m., on three of its lines, for the purpose of ascertaining whether such a service is necessary to meet the conditions existing in Memphis and whether it would prove to be remunerative.

Requires Reports of Electric Railways.—The Michigan railroad commission is sending out blanks to the electric railway companies of the state calling for annual reports for the year ending June 30 last. The electric roads were placed under the jurisdiction of the state commission at the last session of the legislature and this is the first manifestation of state authority over them.

New Jersey Supreme Court Upholds "No Seat, No Fare" Ordinance.—By the recent ruling of the New Jersey supreme court the ordinance enacted some time ago by the street and water board of Jersey City, providing that street railways operating cars from the Erie and Pennsylvania terminals

shall provide a sufficient number of cars to seat every passenger from whom a fare is demanded, is upheld. The ordinance also provides that passengers shall not be kept waiting longer than five minutes for a car. A penalty of \$50 is provided for each and every violation of the ordinance.

New Orleans Transfer System Adopted.—President E. C. Foster of the New Orleans Railway & Light Company and the city officials have agreed on the details of the new universal transfer system which is to go into effect on January 15, 1908. The agreement provides that a passenger may ride from any part of the city to any other for one fare, except from one belt line to another belt line.

Proceedings of New York Association Published.—J. H. Pardee, secretary of the Street Railway Association of the State of New York, has issued in book form a complete report of the proceedings at the twenty-fifth annual meeting of the association, held at Lake Champlain, New York, on June 25 and 26, 1907. The book contains all of the papers and discussions at the meeting, with a list of members and past and present officers of the association.

Opposes 9-Hour Law.—Vice-President Sergeant of the Boston Elevated Railway appeared before the labor committee of the Massachusetts senate on November 12 to argue against the proposed law limiting a day's work for street railway employes to 9 hours inside of 11 consecutive hours, instead of 10 hours in 12, as at present. He said the bill, if enacted, would work great hardship on the company, requiring it to employ more "extra" men, of whom 2,267 are now employed, as compared with 2,250 regular men.

Owl Car Experiment in Des Moines.—G. B. Hippee, general manager of the Des Moines City Railway, has arranged for a conference with a committee of the city council for the purpose of arranging an experimental owl car service for several weeks. An ordinance requiring an all-night service has recently been introduced into the council, but has not yet been passed, and the company has promised to give a service along lines approved by the committee for a time and to make it permanent if it proves remunerative.

Western Society of Engineers.—An extra meeting of the Western Society of Engineers will be held in the society's rooms in the Monadnock block, Chicago, on November 20. Linn White will present a paper on "The Construction of Small Parks in Chicago." The paper by J. W. Schaub on "Railway Track in the Past and Its Possible Development in the Future," which was presented on May 29, 1907, will come up for further discussion. An abstract of the paper was published in the Electric Railway Review of June 1, 1907, page 718.

Strike Declared in Louisville.—The Louisville organization of the Amalgamated Association of Street and Electric Railway Employes of America on Thursday of this week declared a strike against the Louisville Railway, effective at midnight. Of the 1,100 men employed by the company 850 are said to be members of the union. The strike is the result of the failure to reach an agreement with regard to several alleged grievances against the company, which, it is charged, has discriminated against the union, and follows a number of unsuccessful conferences. The men went on a strike for several days last April.

Wisconsin Electric and Interurban Railway Association.—The first annual meeting of the Wisconsin Electric and Interurban Railway Association, which was organized in October, 1906, was held in Milwaukee on Wednesday of this week. The following officers were elected: President, B. L. Parker, secretary Green Bay Traction Company, Green Bay; first vice-president, Ernest Gonzenbach, general manager Sheboygan Light Power & Railway Company, Sheboygan; second vice-president, George B. Wheeler, general manager Chippewa Valley Electric Railroad, Eau Claire; third vice-president, P. H. Korst, Janesville; secretary and treasurer, Clement C. Smith, president Columbia Construction Company, Milwaukee.

Regulating Ordinances Recommended in Chicago.—The local transportation committee of the Chicago city council has recommended for passage an ordinance requiring the elevated roads to provide lettered signs easily read by day and illuminated by night, showing the route and destination of the cars and whether they are local or express. The committee also recommended an ordinance prohibiting the use of open surface cars after October 1, when the thermometer falls below 50 degrees F. M. B. Herely, the city's superintendent of transportation, on November 13 issued a notice to all of the electric railways stating that the "public comfort" ordinance passed last year would be rigidly enforced and requesting the companies to see that all cars are kept adequately warmed and cleaned in the future.

Construction News

FRANCHISES.

Atlanta, Ga.—The Atlanta & Carolina Railway, which proposes to build an electric line from Atlanta to Conyers and West Point, has petitioned for an extension of time under its franchise until March 1, 1908. James W. England, president.

Crawfordsville, Ind.—The county commissioners have granted a 50-year franchise to the Chicago & Western Indiana Traction Company, which was incorporated a little over a year ago, with a capital stock of \$100,000, to construct and operate an interurban line through Lafayette, Crawfordsville, Greencastle and Bloomington, Ind. The company agrees to have the line completed within two years. Edward H. Barrows, president, Indianapolis, Ind.

Detroit, Mich.—William E. Baubie, an attorney of Detroit, representing Detroit and eastern capitalists, has applied for a 30-year franchise to build 80 miles of street railway in and tributary to Detroit. Twenty-five miles of track must be laid within 18 months from the date of the franchise and the remaining 55 miles within three years, the new company to build on or take over the existing routes of the Detroit United Railway as the franchises of that company expire. Eight tickets for a quarter, universal transfers and an offer to exchange transfer privileges with "any other line" are included in the ordinance. The bonded limit per mile is stated at \$55,000, with interest not to exceed 5 per cent; capital stock, \$1,000,000, to be increased as the line is developed. A "municipal ownership" clause provides that in the event of such a transfer of ownership the price shall be fixed by arbitration.

Eveleth, Minn.—The bid of the Mesaba Traction Company for the franchise recently advertised in Eveleth has been rejected by the city council because no provision was embodied in the franchise for requiring the company to pay half the cost of removing snow from the streets on which its line would run.

Iowa City, Ia.—Charles P. Murray of Cedar Rapids, Ia., has applied for a franchise for a street railway in Iowa City. The franchise is for 25 years. Work must begin within one year and four miles of track be in operation inside of three years. Harry Negus and I. J. Hamiel, Tipton, Ia., also have applied for a 25-year franchise in this city.

Jasper, Ind.—The Grand Central Traction Company, which proposes to build from Evansville to Indianapolis, Ind., has applied for a franchise.

Nashville, Ind.—The town board has granted a 50-year franchise to the Ohio Valley Traction Company.

Texas Interurban Railway.—This company has been granted six months' extension of time in which to begin work on its interurban line from Lockhart to Austin, Tex. Col. Thomas Moore, Austin, is president.

RECENT INCORPORATIONS.

Butler & Chicora Street Railway.—Incorporated in Pennsylvania to build an electric line 15 miles long from East Jefferson street, Butler, to Chicora and Kaylor, Pa. Capital stock, \$90,000. Incorporators: John Daly, president, Pittsburgh; W. C. Criswell, W. J. Horgan, W. G. Stern, E. W. Dewey.

Carondelet & Webster Groves Railway.—Incorporated in Missouri to build an 8-mile electric line from St. Louis to Webster Groves, Mo. Capital stock, \$200,000. Incorporators: Willard E. Winner and J. G. Hughes.

Oregon Interurban Railway, Oregon, Mo.—Incorporated in Missouri to build a 6-mile electric line between Oregon and Forest City, in Holt county, Missouri. The articles state that the tracks of the Kansas City St. Joseph & Council Bluffs Railroad will be utilized by the company. Capital stock, \$60,000. Incorporators: Benjamin F. Morgan, Louis I. Moore, C. D. Zook, William Deer, H. C. Cook and William Richards, all of Holt county.

Rapid Transit Interurban Company, Tecumseh, I. T.—Incorporated in Oklahoma to build electric lines from Muskogee to Chickasaw, by way of Tecumseh, 167 miles; Tecumseh to Guthrie, 55 miles, and from Tecumseh to Sulphur, 55 miles, making a total of 277 miles. The estimated cost is \$2,500,000. Capital stock, \$2,500,000. Incorporators: John A. Clark, L. B. Mitchell, J. W. Saxon, G. M. Cisna, T. J. Ray, M. H. Tennison, all of Tecumseh, Okla.

United Traction Extension Company.—Incorporated in Pennsylvania to build a 7-mile electric line from Main street,

Sykesville, over private right of way to the Buffalo Rochester & Pittsburg railroad station in Big Run, Pa. Capital stock, \$100,000. Incorporators: Austin Blakeslee, president; J. B. Sykes, Frank Hahne, M. I. McCreight, W. H. Cannon, J. E. Morris, W. C. Newcome and others.

Washington-Oregon Traction Company.—Incorporated in Washington to construct and operate railways, both steam and electric, steamboats and other transportation facilities, with headquarters at Walla Walla, Wash. It is stated that about 75 miles of railway will be constructed from Walla Walla south into Oregon within the next 18 months. Power for the operation of the line will be secured from the Wenatchee river, 25 miles from Walla Walla. Capital stock, \$1,500,000. Incorporators: Max Baumeister, E. S. Isaacs, Allen H. Reynolds, John Smith and W. A. Ritz, all of Walla Walla.

Waycross Gas & Construction Company, Waycross, Ga.—A charter has been granted to this company by the superior court of Georgia to operate a gas plant and construct the new street railway system in Waycross, franchises for which already have been granted. Capital stock, \$100,000, with the privilege of increasing to \$500,000. Incorporators: Hawley Pettibone, New Rochelle, N. Y.; Burdette Loomis, Hartford, Conn.; George W. Deen, Waycross, Ga.; F. H. Elmore, Jacksonville, Fla. It is understood that the company will do a general construction business in Georgia.

TRACK AND ROADWAY.

Ardmore Traction Company, Ardmore, I. T.—This company has been organized with a capital stock of \$500,000 for the purpose of acquiring by purchase the present Ardmore Street Railway property. In case the property cannot be acquired the new company will apply for a franchise to build and operate another line in that city.

Bayou Teche Railway & Light Company, New Iberia, La.—The engineering and construction contract for this proposed road in New Iberia and an extension to Jeanerette, La., has been let to the Huston Engineering Company, New Orleans, La.

Bozeman, Mont.—Twenty-one thousand dollars of the bonus of \$30,000 asked of the city of Bozeman by the promoters of the proposed interurban line from Bozeman up the Gallatin valley has been subscribed. The road will be built first to Salesville and thence to Three Forks, about 46 miles. A total bonus of \$100,000 was asked for, of which nearly \$50,000 has been subscribed by farmers along the route. The money acquired from the city of Bozeman will be used in purchasing a terminal site and right of way through that city.

Brantford Street Railway, Brantford, Ont.—Several improvements are announced by this company for the coming year. It is stated that the lines will be extended to Eagle Place and Terrace Hills, and also that a 3-mile branch will be built east to Cainesville. The Grand Valley Railway, operating from Brantford to Galt, will be shortened and the track relaid with new rails. A spur also will be built to St. George. From Brantford a new line will be built by way of Buford and Cathcart to Woodstock, where the Thames Valley Railroad, recently acquired, will be used to Ingersoll. A 30-mile line from Brantford to Port Dover on Lake Erie is another important project said to be under consideration. A. J. Pattison, Jr., Brantford, Ont., is manager.

Butte Electric Railway, Butte, Mont.—The Oregon avenue line of this company has been completed and it is stated that the next improvement will be the extension of the road in the spring to the site of the Milwaukee shops, about two miles. The grading for this new work has been completed and there remains only the laying of the rails.

Canyon City & Royal Gorge Interurban Railway.—Surveys are being made to the lime quarries which this company owns near the Royal Gorge, about five miles from Canyon City, and as soon as they have been completed bids will be received for the construction of the line from Canyon City to the top of the Royal Gorge, 12 miles distant. A tract of land near the Rio Grande tracks has been purchased by the company for the storage of construction materials. The road has been financed and the bonds of the company underwritten and it is stated that the road will be in operation by the opening of the tourist season next summer.

Cedar Rapids, Ia.—The Collins Construction Company of Chicago has submitted a proposition to the citizens of Cedar Rapids, Tipton, Muscatine and Davenport, Ia., with regard to the construction of an electric railway connecting those places.

Chambersburg Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company has awarded contracts for 25,000 ties, 6,600 poles and 1,100 tons of 70-pound rails to be

used in the construction of its extension from Greencastle to Chambersburg, by way of Kauffman's, Rhodes' Grove, Marion and Guilford Springs, Pa. Grading is now in progress and it is hoped to have the line completed by April 1, 1908. The road will be practically an air line, rock ballasted and with a grade of not over 2 per cent.

Connecticut Company, New Haven, Conn.—It is reported that this company will build an extension from Middletown to Hartford, Conn., next spring, also a new line from Middletown to Middlefield.

Defiance Paulding & Ft. Wayne Traction Company, Ft. Wayne, Ind.—It is reported that this company has secured much of the right of way for its proposed line from Defiance, O., to Ft. Wayne, Ind. K. V. Haymaker of Defiance is one of the chief promoters.

Evansville & Eastern Electric Railway, Evansville, Ind.—W. L. Sonntag, general manager, is quoted as saying that an extension from Rockport to Grandview, Ind., will be built in the spring. Surveys have been completed.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—The extension of this line, now under construction from Evansville to Patoka, Ind., will be continued to Hazleton, seven miles north of Patoka. Fletcher Durbin, general manager, Evansville.

Ft. Wayne & Springfield Railway, Decatur, Ind.—A. W. Fishbaugh, chief engineer, Celina, O., will soon advertise for bids for the construction of an extension from Decatur to Berne, Ind., 12 miles. The work will include three bridges.

Georgia Railway & Electric Company, Atlanta, Ga.—The new extension from Atlanta to Hapeville was formally opened for traffic on Saturday, November 10.

Grand Central Traction Company, Indianapolis, Ind.—This company, which proposes to build an interurban line from Indianapolis to Evansville, with a branch from Bloomington to Terre Haute, Ind., has engaged H. A. Morgan of Indianapolis as chief engineer.

Illinois Traction System, Champaign, Ill.—Preparations are being made at Venice, Ill., for beginning work on the substructure of the \$2,500,000 bridge which is to span the Mississippi river from Venice to the foot of Salisbury street, St. Louis. The structure will be 2,365 feet long from shore to shore and will have five spans.

Lima & Honeoye Electric Light & Railroad Company, Lima, N. Y.—It is reported that this company expects to place contracts during the next six months for the construction of about 26 miles of track. E. D. Watkins, general manager, Lima, N. Y.

Lima & Toledo Traction Company, Lima, O.—Tracklaying on this company's extension from Leipsic to Toledo has been completed as far north as Weston and the grading to within 20 miles of the Maumee river. It is stated that no further work will be done on this division until the completion of the concrete bridge at Waterville, O. Grading between Toledo and Waterville has been suspended pending the settlement of the company's application for the purchase of a portion of the bank of the Miami & Erie canal. The overhead construction will be completed to Deshler, O., within a few days. The grading force has now been transferred to the Lima-Bellefontaine extension, where the work will be pushed. J. C. Carland & Co., Toledo, have the principal contracts for the several extensions of the Schoepf lines.

Los Angeles Railway, Los Angeles, Cal.—This company has let the contract for the construction of a bridge over the Los Angeles river and work will be started within a few days with the intention of having it completed by the first of the year. The cost will be about \$78,000. The Seventh street car line is to be extended in the near future as far as Montabello and later may be built to Whittier, Cal.

Marietta-MacLand Railway, Marietta, Ga.—This company will soon make application for incorporation for the purpose of building an electric railway from Marietta to MacLand, Powder Springs, Austell and eventually on to Atlanta, Ga. It is said that the line will connect with the Atlanta Northern Railway at Marietta, forming a loop line from Atlanta to Mableton, Austell, Powder Springs, Lost Mountain and Marietta, then to Atlanta over the present street railway system.

Manitou Incline Railway.—Incorporated in Colorado to acquire by purchase the Hydro Electric Company, which operates the cable road running from Manitou to the summit of Mt. Manitou, a distance of one mile. The line is to be rebuilt, equipped with new passenger cars and cables of unusual strength and when in operation on a 20-minute schedule will have a capacity for 900 passengers per day. It

is stated that reconstruction of the track will be started soon, with the intention of having the road in operation early in 1908. The road rises one-half mile in its entire length of one mile and serves one of the most picturesque regions in the country. Capital stock, \$220,000. Incorporators: N. N. Brumback, president; Charles W. Stiff, vice-president; N. T. Brumback, treasurer; E. L. Whitney, secretary; Claude L. McKesson, superintendent.

Memphis Covington & Northern Railway, Covington, Tenn.—We are officially advised that surveys have been completed for this proposed 38-mile interurban railway between Memphis and Covington, Tenn., and that arrangements are now being made for financing the road. The headquarters of the company will be at Covington. W. K. Palmer Company, 718 Dwight building, Kansas City, Mo., chief engineer.

Pittsburg Railways, Pittsburg, Pa.—Preliminary work has been started by this company on the construction of the proposed extension from Castle Shannon to Canonsburg, about 12 miles, and a large number of men will be employed in the near future in grading and building bridges. It was intended to begin this work some time ago, but delay was caused by the failure to secure the right of way.

Portland Railway Light & Power Company, Portland, Ore.—This company has let the contract for the erection of a new bridge over the Clackamas river to Robert Wakefield, Portland. The cost will be approximately \$30,000.

Pueblo, Colo.—It is announced that construction work will begin at once on the interurban line from Pueblo through the Arkansas valley to Fowler, for which M. Douthitt has the franchise. N. C. Vannatta, chief engineer.

Seattle & Tacoma Short Line, Seattle, Wash.—Merle J. Wightman, chief engineer of this company, which proposes to build a 30-mile electric line from Seattle to Tacoma, writes that contracts will be let for the grading on December 1 and that active work on the construction will be started on that date. The catenary suspension type of overhead construction will be used. I. A. Nadeau, vice-president, Seattle; C. E. Muckler, secretary; P. C. Kauffman, treasurer, Tacoma, Wash.

Tidewater Development Company, Birmingham, Ala.—This company has begun construction work on its line from Birmingham to Gadsden, Ala. J. M. Dewberry, president.

Toronto, Ont.—It is stated that the Ontario railway and municipal board has under consideration its jurisdiction with respect to the enforcement of the order made last April in the overcrowding case against the Toronto Railway Company, to the effect that 15 miles of new track must be laid and 100 new cars put on. As the city has not designated the streets for new tracks, the board may do this itself.

Traverse City, Mich.—The Carter Construction Company of Chicago, which is building the line from Traverse City to Petoskey, Mich., has contracted with the Illinois Steel Company for 10,000 tons of rails.

Tuscarawas Traction Company, Canton, O.—It is reported that this company will build a line from Canal Dover to Zoar and Bolivar, O.

POWER HOUSES AND SUBSTATIONS.

Chippewa Valley Electric Railway, Eau Claire, Wis.—This company's new 10,000-horsepower plant at Menominee, Wis., has been completed and will be put in operation within a few days.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—The new \$250,000 power house which this company is building at Aberdeen, Wash., is said to be nearing completion.

Iowa-Missouri Traction & Power Company, Fairfield, Ia.—This company proposes to construct two dams across the Des Moines river at Keosauqua, Ia., and provide water power equipment and electrical machinery for developing 9,000 horsepower for electric lighting and railway purposes. A. W. Carpenter, Memphis, Mo., is interested.

Lima & Honeoye Electric Light & Railroad Company, Lima, N. Y.—Manager E. D. Watkins is quoted as saying that this company is contemplating the erection of a new power station, to be located in the gas fields, four miles south of Lima.

San Antonio (Tex.) Traction Company.—This company has recently installed a 1,000-horsepower generator in its Villita street station.

Springfield (Mass.) Street Railway.—This company has awarded the contract for a 44-inch twin vertical condensing apparatus to the Blake Steam Pump Company.

Personal Mention

Mr. John F. Reardon has been appointed superintendent of the Lehigh Valley Transit Company, succeeding Mr. H. C. Barrow, resigned.

Mr. William E. Sturtevant has been appointed manager of the Puget Sound International Railway & Power Company at Everett, Wash.

Mr. E. V. Pope, who succeeded Mr. J. D. Gaboury as general manager of the Alabama City Gadsden & Attalia Railway Company last August, has resigned.

Mr. Thomas Brennan has been appointed master mechanic of the Dayton Covington & Piqua Traction Company, West Milton, O., succeeding Mr. R. D. Colburn, who has resigned to engage in the lumber business.

Mr. Edward M. Wharff has been appointed electrical engineer of the Syracuse Lake Shore & Northern Railroad, in charge of the power station, rolling stock and overhead work, with headquarters at Syracuse, N. Y.

Mr. C. S. Young, heretofore construction engineer for the Stone & Webster Engineering Corporation in Texas, has been appointed chief engineer of the Ft. Worth-Mineral Wells Interurban Railway, with headquarters at Ft. Worth, Tex.

Mr. Morris McGrath has resigned as superintendent and purchasing agent of the Oakwood Street Railway, Dayton, O., and Mr. Henry Gebhart has been appointed to succeed him. Mr. McGrath will, however, retain the office of secretary.

Mr. J. R. Burris, heretofore superintendent and master mechanic of the Anderson (S. C.) Traction Company, has resigned to engage in other business. He will be succeeded by Mr. L. R. Nelson, formerly of the General Electric Company.

Mr. B. P. Gibbs has resigned as investigator for the claim department of the Pacific Electric Railway and the Los Angeles Interurban Railway of Los Angeles, Cal., to become claim adjuster for the Atchison Topeka & Santa Fe Railway at Winslow, Ariz.

Mr. John E. Overton has been appointed superintendent of the Suffolk Traction Company, which is building an interurban line in Long Island, New York, from Brookhaven to Patchogue and Port Jefferson. Mr. Overton's headquarters will be in Port Jefferson.

Mr. C. M. Waters has been elected president of the Alexandria (La.) Electric Railways Company, succeeding Mr. T. G. Bush, resigned. Mr. Ray Albert succeeds Mr. R. S. Thornton as secretary and treasurer and Mr. W. F. Joffrion, Mooreland, La., has been appointed general manager of the company.

Mr. Richard Barratt, who has been superintendent of the East End Passenger Railway, Williamsport, Pa., has been appointed superintendent of the Lewisburg Milton & Watson-town Passenger Railway, with headquarters at Milton. The latter company is owned and operated by the Railways Company General of New York City.

Mr. D. W. McFetridge, for the past two years purchasing agent of the Lehigh Valley Transit Company, Allentown, Pa., has resigned to accept a similar position with the Lehigh Portland Cement Company. For the present no successor will be appointed, the duties of purchasing agent temporarily being discharged by other officials of the road.

Mr. Thomas E. Mitten, president of the Chicago City Railway Company, has been elected vice-president of the International Railway Company, Buffalo, N. Y., succeeding Mr. Arthur N. Robinson. Previously to this connection with the Chicago City Railway Mr. Mitten was general manager of the International company.

Mr. Charles J. McAleer has been appointed claim agent of the Schenectady Railway, Schenectady, N. Y., succeeding Mr. F. A. Brown, who resigned last week to become connected with the claim department of the Philadelphia Rapid Transit Company. Mr. McAleer has been heretofore an agent in the claim department.

Mr. John L. Matson, whose resignation as general manager of the Muncie & Portland Traction Company at Portland, Ind., was announced recently, has been appointed resident manager of the South Chicago City Railway and the Hammond Whiting & East Chicago Railway, with headquarters at South Chicago. He was superintendent of motive power and machinery for the Chicago & Milwaukee Electric Railroad in 1905 and later held the same position with the Indiana

Union Traction Company at Anderson, Ind., until his appointment as general manager of the Muncie & Portland Traction Company. Mr. Matson succeeds Mr. George R. Folds, who resigned last September to become assistant general manager of the West Penn Railways at Connellsville, Pa.

Mr. George Church, superintendent of the Middletown, Conn., lines of the Consolidated Railway, has resigned to become associated with the contracting firm of L. Suzio of Meriden, Conn. Mr. Church formerly was superintendent of the Southington lines of the company at Bridgeport and only recently succeeded Mr. Charles H. Chapman as superintendent of the Middletown division.

Mr. E. B. McKinney, superintendent of power of the New Orleans Railway & Light Company, has been appointed superintendent of equipment in connection with his office as superintendent of power, and will have, besides the various power stations and substations, entire control of the car barns, car shops and all rolling stock belonging to the company. Mr. McKinney has been connected with the operation of power plants and equipment in New Orleans since 1889.

Mr. Stewart S. Neff, whose appointment as general manager of the Atlantic City & Shore Railroad and the Atlantic City Electric Railway, Atlantic City, N. J., was announced in



Stewart S. Neff.

a recent number of the Electric Railway Review, was born in Cincinnati O., on October 24, 1858, and is a graduate of the Rensselaer Polytechnic Institute at Troy, N. Y. He first entered railway service in 1881 as transit man for the Pennsylvania road, later acting as assistant engineer on construction and assistant supervisor of the same road. From 1887 to October, 1896, he served in various capacities on the larger steam lines of the country as follows: Superintendent coast lines Great Northern Railway from March, 1891, to June, 1892; general manager Pacific Navigation Company from

1893 to 1894; assistant engineer Vandalia Line, main line division, 1894 to October, 1895; October, 1895, to May, 1896, superintendent and chief engineer Lake Superior & Ishpeming Railway. His electric railway service dates from October, 1896, when he was chosen constructing engineer of the Union elevated loop, Chicago; after its completion he served as superintendent from September, 1897, to May, 1900. From May, 1900, to May, 1902, he was general superintendent of the Boston Elevated Railway; in May, 1902, he was appointed consulting engineer of the Brooklyn Rapid Transit Company and other roads. In September, 1904, he was appointed general superintendent of the Mexico Tramway Company, Mexico City, Mex. In January, 1906, he resigned to become superintendent of the Central Passenger Railway and the Ocean City division of the Atlantic City & Shore Railroad, where he has since remained. At the time of his recent appointment as general manager of this road and the Atlantic City Electric Railway, he was general superintendent of all divisions, including lines leased from the West Jersey & Seashore Railroad in Atlantic City and the boat lines between Longport and Ocean City, N. J.

Mr. L. S. Storrs has been elected president of the Springfield (Mass.) Street Railway, succeeding Mr. C. S. Mellen, resigned. Mr. Storrs is vice-president of the New England Investment & Security Company, the holding company of the Massachusetts electric lines of the New York New Haven & Hartford Railway, and was also vice-president of the Springfield company. Mr. H. C. Page, general manager of the Springfield Street Railway, has been elected vice-president in place of Mr. Storrs.

Mr. F. A. Hewett, who has recently been appointed superintendent of the Middletown, Conn., lines of the Connecticut Company, succeeding Mr. George H. Church, was connected with the Camden & Suburban Railway, now a part of the Public Service Corporation of New Jersey, at Camden, N. J., from 1895 to 1906, during the last eight years of that period as superintendent of transportation. From October, 1906, to

October, 1907, he was superintendent of railways of the Eastern Pennsylvania Railways Company, Pottstown, Pa.

Mr. Charles V. Cosby, formerly of New Orleans and more recently of Dallas, Tex., has been appointed superintendent of the railway department of the Jacksonville Electric Company at Jacksonville, Fla., effective on November 1. Mr. Cosby has been in the electric railway business for 11 years, having served successively as motorman, power station operator, general instructor of trainmen and assistant superintendent with the New Orleans street railway lines under the various managements. He later became associated with the Stone & Webster properties in Dallas, Tex., as instructor of trainmen.

Mr. Theodore Stebbins has been appointed general manager of the Texas Traction Company at Dallas, Tex. Mr. Stebbins was born in Iowa and graduated from the Massachusetts Institute of Technology in 1886. In 1887 he became identified with the Thomson-Houston interests and later with the General Electric Company, having in charge the general construction work of this company. He resigned in March, 1903, to become associated with the Appleyard companies as general manager for the receivers, with headquarters at Boston. Since severing this connection, in March, 1903, a portion of his time has been spent on the public ownership committee of the National Civic Federation, New York City, as engineering expert. In his new position he will have in charge the task of perfecting the organization of the Texas Traction Company, which is building a 65-mile interurban road from Dallas to Sherman, Tex. Mr. Stebbins is a member of the American Institute of Electrical Engineers.

Obituary.

John H. Estill of Savannah, Ga., a pioneer in the street railway development of that city, died on November 9. He built the Barnard and Anderson line in 1878 and upon its consolidation with the City & Suburban Railway became its president. In 1889 he built the first belt line in Savannah.

Charles Densmore Wyman, vice-president of the firm of Stone & Webster, of Boston, Mass., died suddenly on a train in Montana on November 11, while en route from Boston to Seattle, Wash. He had long been prominently connected with electric railway interests in various parts of the country and at the time of his death was president of the Whatcom County Railway & Light Company of Bellingham, Wash., vice-president of the Seattle Electric Company, vice-president of the Puget Sound Electric Railway of Tacoma, Wash., and vice-president of the Ponce (Porto Rico) Railway & Light Company, all controlled by Stone & Webster. Mr. Wyman was a native of Racine, Wis., where he was born in 1850, and was educated at the old Chicago University, Rochester University and the



Charles Densmore Wyman.

Albany Law School. For many years he was general manager of the Central Park North & East River lines in New York and from 1894 to 1896 was general manager of the Milwaukee Electric Railway. In the latter year he resigned to become general manager of the New Orleans City Railroad, in which position he remained until August, 1900, when he resigned to become connected with Stone & Webster of Boston. During the past year he was chairman of the committee on "Municipal Ownership" of the American Street and Interurban Railway Association. The accompanying photograph was taken while Mr. Wyman was in New Orleans.

August Belmont, chairman of the board of directors, and Theodore P. Shonts, president of the Interborough-Metropolitan Company of New York, together with Frank Hedley, general manager of the Interborough Rapid Transit Company, were in Chicago on Sunday, November 10, and inspected the new pay-as-you-enter cars which were recently described in the Electric Railway Review and which the Chicago City Railway is about to put into service.

Financial News

Concord Maynard & Hudson Street Railway, Maynard, Mass.—A statement for the years ended September 30, 1907, and September 30, 1906, follows:

Year ended September 30—	1907.	1906.
Gross earnings	\$59,981.92	\$60,130.37
Operating expenses	36,032.20	37,679.73
Net earnings	\$23,949.72	\$22,450.64
Total charges	16,525.77	16,149.75
Surplus	\$ 7,423.95	\$ 6,300.89

El Paso (Tex.) Electric Company.—An issue of \$500,000 of 5-year coupon notes has been authorized, to be dated January 15, 1908, to bear 6 per cent interest, and to be callable as a whole at par and accrued interest on any interest date after November 1, 1910, upon 60 days' notice. These notes are convertible at the option of the holder at any time before maturity into common stock of the company at par and accrued interest. In offering these notes for sale at 92, yielding over 8 per cent, Stone & Webster give the following statement of the business of the El Paso company:

Year ended	December 31—	Gross.	Operating.	Net.
1902.....		\$161,199.20	\$ 97,450.30	\$ 63,748.90
1903.....		222,777.46	162,181.22	60,596.24
1904.....		250,510.14	172,426.89	78,083.25
1905.....		288,943.16	190,560.68	98,382.48
1906.....		391,655.96	276,403.00	115,252.96
*1907.....		474,875.12	364,530.05	110,345.07

*Year ended September 30.

The large increase in operating expenses for the year ending September 30, 1907, is due largely to the scarcity and consequent abnormally high price of fuel oil. As the power station was equipped to use oil as fuel, it was necessary to install coal-burning apparatus and make extensive changes before coal could be used. All work in this connection has practically been completed, and from the period during which the company has burned coal the indications are, Stone & Webster say, that a large saving will be made in operating expenses, and that the net earnings of the company will show increases consistent with the gross earnings.

Indianapolis Newcastle & Toledo Electric Railway, New-castle, Ind.—This company and the Newcastle-Indianapolis Construction Company were placed in the hands of the Union Trust Company of Indianapolis as receiver on November 8. The proceedings on which the action was taken in the superior court of Indiana were instituted by the Electrical Installation Company of Chicago, which alleged that the defendant owed it about \$650,000. Attorneys for the defendant admitted their client's indebtedness and consented to the appointment of the receiver. An official statement says: "There has been invested up to this time about \$1,100,000 in right of way, franchises, material and labor, and but for the existing financial conditions the road would have been in operation by January 1, 1908. Plans for the completion of the road under the receivership are now maturing, and it is expected the road will be finished in the spring."

Massachusetts Electric Companies, Boston, Mass.—Operations in the fiscal year ended September 30, 1907, compare with the previous year as follows:

Year ended September 30—	1907.	1906.	Increase.
Earnings	\$7,761,063	\$7,520,537	\$240,526
Expenses	5,003,204	4,885,849	117,355
Net earnings	\$2,757,859	\$2,634,688	\$123,171
Charges and taxes	1,702,623	1,594,503	108,120
Balance	\$1,055,236	\$1,040,185	\$ 15,051

Metropolitan Street Railway, New York.—The Morton Trust Company of New York has begun suit in the United States circuit court to foreclose mortgages on the property of the Metropolitan Street Railway. By order of Judge Lacombe, Adrian H. Joline and Douglas Robinson, receivers of the Metropolitan company, were made parties to the suit. The action is based on the failure of the company to pay the Third avenue guaranteed rental which was due on October 13. The Morton Trust Company states that this failure broke the lease and was a default under the terms of the mortgage, and the foreclosure action was brought to protect holders of the bonds and to prevent the separation of the system into its component parts. The trust company is trustee under an authorized

issue of \$65,000,000 of 4 per cent bonds, of which \$16,604,000 bonds are outstanding. The Metropolitan company executed the mortgage on March 21, 1902. Of the outstanding amount of bonds \$4,983,000 bonds were deposited with the trust company to secure outstanding bonds issued by Metropolitan subsidiary companies.

Nashua (N. H.) Street Railway.—The New Hampshire railroad commission has approved the issue by this company of \$25,000 additional capital stock. The proceeds will be used for improvements.

North American Company, New York, N. Y.—The following official statement has been issued: "The loans which the company has made to the various companies in which it is principally interested, for extensions and additions chargeable to their capital account, amount as of November 7, 1907, to \$3,612,938. Repayment on account of these advances has been depended upon by the North American Company as required to pay its own dividends. At the moment these companies are unable to comply with this requirement, because of their inability to sell, except at great sacrifice, their own mortgage bonds, which have been issued and are available to reimburse their treasuries for capital expenditures heretofore made, or to make loans on reasonable terms. In order to pay a dividend on December 1, the North American Company would either be obliged to require these companies to make payment to it on account of their loans (which, as stated above, could only be done at great sacrifice) or would itself be obliged to borrow money for the purpose. In view of the disturbed financial conditions now prevailing, the board of directors of the company has decided to defer the declaration of the dividend for the present." The income account of the company for the 10 months ended October 31, 1907, is as follows:

Receipts.

Interest received and accrued.....	\$ 232,005
Dividends received	1,179,328
Compensation for services	23,316
	<u>\$1,434,649</u>

Expenses.

Salaries, legal expenses, rent and other expenses of administration.....	\$74,576
Interest paid and accrued.....	66,193
Taxes	5,260
Losses	10,000
	<u>156,029</u>

Net income	\$1,278,620
Three quarterly dividends paid.....	1,117,212

Surplus for the 10 months.....	\$ 161,408
Undivided profits, as of October 31, 1907.....	4,160,956

ELECTRIC RAILWAY EARNINGS.

American Railways Company, Philadelphia (Subsidiary Companies).

Gross earnings—	1907.	1906.
October	\$ 242,280.64	\$ 230,190.17
July 1 to October 31.....	1,108,523.61	1,038,728.39

Detroit United Railway.

September—	1907.	1906.
Gross earnings	\$626,713	\$593,113
Expenses and taxes	390,152	349,545
Net earnings	236,561	243,568
Other income	3,698	3,124
Total income	240,259	246,692
Charges	116,389	107,519
Surplus	123,870	139,173

International Railway System, Buffalo.

Quarter ended September 30—	1907.	1906.
Gross earnings	\$1,677,300	\$1,538,348
Expenses	901,735	740,872
Net earnings	775,565	797,476
Charges	321,232	296,070
Surplus	454,333	501,406

Lake Shore Electric Railway, Cleveland.

September—	1907.	1906.
Gross earnings	\$96,187	\$89,023
Expenses and taxes	46,279	42,599
Net earnings	49,908	46,424
Interest	25,189	21,172
Surplus	24,719	25,252

Dividends Declared.

Kansas City Railway & Light Company, preferred, quarterly, 1¼ per cent.

Washington (D. C.) Railway & Electric Company, preferred, 2½ per cent.

Manufactures and Supplies

ROLLING STOCK.

Coney Island & Brooklyn Railroad, Brooklyn, N. Y., is in the market for 10 large double-truck cars.

Staten Island Midland Railroad, Stapleton, N. Y., is reported to be in the market for a number of cars.

Terre Haute Traction & Light Company, Terre Haute, Ind., is having a sweeper built by the McGuire-Cummings Manufacturing Company.

Marquette County Gas & Electric Company, Ishpeming, Mich., which was reported in the Electric Railway Review of November 2 to be in the market for one closed car and two trailers, advises that at present it is figuring on only one double-truck car, 40 feet long over all.

TRADE NOTES.

Peter Smith, founder of the Peter Smith Heater Company, Detroit, Mich., died in Detroit on October 18.

American Blower Company, Detroit, Mich., at its annual meeting, increased its capital stock from \$300,000 to \$500,000, in order to handle future expansion of business.

Northern Engineering Works, Detroit, Mich., has furnished the Clyde Iron Works, Duluth, Minn., with two 10-ton and one 15-ton electric traveling Northern cranes, equipped with alternating-current motors.

Ball Engine Company, Erie, Pa., in order to better handle the growing demand for its automatic and Corliss engines, has opened an office at 1001 Arcade building, Philadelphia. H. P. Penfield is in charge of the new branch.

Baldwin Locomotive Works, Philadelphia, Pa., advises that it is building the trucks (class 78-30) for the cars recently ordered by the Louisville & Eastern Railroad, as reported in the Electric Railway Review of November 9.

E. W. Moore has resigned as general manager of the Galena Iron Works Company, Platteville, Wis., to become department manager of the Temple-Ingersoll electric-air drill, manufactured by the Ingersoll-Rand Company, New York.

Electric Cable Company, 17 Battery place, New York, announces that a recent application of Voltex compound was the painting of the steel hull of the municipal ferry boat "Richmond" of the city of New York. The use of Voltex for similar work is rapidly increasing.

Fred G. Whipple has been appointed manager of the sales department of the Wiederholdt Construction Company, with headquarters in the American Trust building, Chicago. The company makes a specialty of reinforced tile-concrete chimneys and other structures in which tile-concrete may be used to advantage.

Norton Car & Foundry Company, Norton, Va., has been incorporated with a capital stock of \$10,000 to \$25,000. The officers of the company are: Rudolph Swank, president; J. R. McNutt, secretary and treasurer; and C. J. Swank, all of Norton. The company intends to manufacture all types of cars for steam and electric railways.

Aluminum Company of America, Pittsburg, Pa., announces the establishment of its Atlanta office, 1331 Candler building, Atlanta, Ga., under the management of John H. Finney, formerly of the St. Louis office. Inquiries concerning aluminum electrical conductors, ingot, tubing, rod, sheet, etc., addressed to Atlanta, will receive prompt and careful attention.

The J. G. Brill Company, Philadelphia, has recently purchased an additional power unit for enlarging the present plant, in the shape of an Allis-Chalmers 22 by 36 inch horizontal Reliance Corliss engine, direct connected to a 300-kilo-watt direct-current generator, of the same build, for lighting and power service. The engine will operate non-condensing.

Spencer Turbine Cleaner Company, Hartford, Conn., has been organized under the laws of Connecticut with a capital stock of \$200,000. It is the purpose of the company to market a cleaning system which is operated by a special design of machinery. The officers of the company are: President, Ira H. Spencer; vice-president, F. E. Pratt; secretary and treasurer, Charles E. Bond.

Jeffrey Manufacturing Company, Columbus, O., is building an addition to its main machine shop building, which will double the capacity of the shop, and give it a building of steel construction practically 125 by 900 feet, with galleries on each

side. The rapidly growing business in electric locomotives, for both underground and surface work, mining machinery, etc., has necessitated increased facilities.

T. B. Arnold Supply Company, Missouri Trust building, St. Louis, representing the Union Spring & Manufacturing Company and the M. B. Suydam Company of Pittsburg, has recently opened an office at 1204 Fisher building, Chicago, where the same companies will be represented. Mr. Arnold will spend considerable time in Chicago and A. C. Woods and J. H. Rogers will look after the St. Louis interests.

Central Inspection Bureau, 17 State street, New York City, has received an order from the Northern Electric Street Railway Company, Scranton, Pa., for the inspection of a number of passenger and baggage cars to be built at the works of The J. G. Brill Company, Philadelphia. This company is at present inspecting at this plant a large number of cars for export shipment to South America and Porto Rico.

Arthur E. Rendle of New York, Chicago and Montreal advises that the contract for the three large skylights for the magnificent new National museum at Washington, D. C., has been awarded to him, to be glazed on his well-known patent Paradigm skylight system. Eleven firms bid on the work, and Mr. Rendle's bid was the lowest. The glass roof and skylights on the new Union station buildings, Washington, D. C., about 80,000 square feet, were also glazed by Mr. Rendle on the Paradigm skylight system.

O. M. Edwards Company, Syracuse, N. Y., manufacturer of window fixtures, extension platform trap doors, shade rollers, etc., has received a large number of orders from electric roads for the installation of its window fixtures. The orders received include 26 cars now being built by the Niles Car & Manufacturing Company for the Lake Shore South Bend & Chicago; 25 cars building at the same plant for the Washington Baltimore & Annapolis and 20 cars for the Worcester Street Railway being built by the John Stephenson Company.

Washburn Steel Castings & Coupler Company, Minneapolis, Minn., has closed its plant for a month in order to make improvements so that the demand for steel castings may be properly handled. The company expects to reopen by December 1 with a capacity of about 400 tons of high-grade steel castings a month. Since the new line of Washburn standard M. C. B. couplers for electric railways was placed on the market the plant has been unable to keep up with orders, and although a new plant was planned for erection in the spring, as mentioned in previous issues of the Electric Railway Review, it was found necessary to enlarge immediately.

American Steel Foundries Company, after a meeting of the board of directors in New York on November 7, issued the following statement: "The directors of the American Steel Foundries have decided to recommend to the stockholders' meeting, to be held at an early date, that for the accumulated dividends on the preferred stock, amounting to \$20 per share, there be given to holders of the preferred stock 4 per cent debentures, payable within 15 years, and also that at the end of the first six months of the present fiscal year there be declared a dividend of 3 per cent, payable in cash; both of the proposed distributions to be made, however, on condition that the holders of preferred stock shall exchange their present holdings for a like amount of new stock, with the cumulative provision excluded. The plan, if accepted, will probably be of benefit to and should be unanimously accepted by holders of both preferred and common stock."

United States Steel Corporation has made an official announcement that it has purchased sufficient stock of the Tennessee Coal Iron & Railroad Company to secure control. This transaction was based on the exchange of Tennessee stock valued at approximately \$120 a share, for United States Steel bonds at par. Judge E. H. Gary, chairman of the Steel Corporation, is credited with making the statement that "by the acquisition of this property the Steel Corporation will increase its capacity by about 2½ per cent, making its capacity about 60 per cent of the total production in the United States. It is believed the purchase will eventually be of great benefit to the corporation and to the steel industry." Through this transaction the steel corporation adds about 700,000,000 tons to its iron ore supply, giving a total tonnage of approximately 2,400,000,000 tons, including the Hill properties, and eliminates its strongest competitor in the manufacture of open-hearth steel rails.

H. L. Hibbard, electrical expert to the bureau of construction and repair, United States navy department, has resigned that position to enter the employ of the Cutler-Hammer Manufacturing Company of Milwaukee, maker of electric controlling devices. Mr. Hibbard's experience in navy yard and shipboard

work extends over a period of eight years, four of which were spent in the office of the superintending naval constructor at Newport News, in supervising installations of electrical apparatus on ships built and equipped at that yard. More recently Mr. Hibbard has been stationed at Washington, where, as electrical expert to the bureau of construction and repair, he has had supervision of all electrical work coming under the cognizance of that bureau. In his new position with the Cutler-Hammer Manufacturing Company his thorough knowledge of navy department requirements and methods will undoubtedly be of great value in the further extension of that company's line of electric controlling panels for navy yard and shipboard use.

ADVERTISING LITERATURE.

Railway Specialty & Supply Company, Chicago.—A recent bulletin describes the P. & M. rail anchor and its uses.

Electric Service Supplies Company, Philadelphia.—The Keystone Traveler for November has a number of interesting features.

Northern Engineering Works, Detroit, Mich.—A bulletin describes Northern electric traveling hoists, four types of which are illustrated.

Berger Manufacturing Company, Canton, O.—Sheet metal roofings, ceilings and other similar materials are described and illustrated in a newly issued catalogue.

John Simmons Company, 100-110 Centre Street, New York, N. Y.—A hanger illustrates and describes Simmons' steel tubular poles and masts in an interesting manner.

Harrison Safety Boiler Works, Philadelphia, Pa.—An unusually attractive and interesting circular is devoted to the Cochrane standard feedwater heater and purifier.

Ellwood Ivins Tube Works, Philadelphia, Pa.—A unique mailing tag carries a miniature seamless steel tube and calls attention to the products of this pioneer American steel tubing plant.

Chase-Shawmut Company, Newburyport, Mass.—Catalogue 101 has for its subject Cushing stage lighting specialties, including stage pockets and plugs, bunch lights and music light shades.

Battery Supplies Company, Newark, N. J.—A neat catalogue, recently issued, is devoted to the "BSCO" primary battery, a new type especially designed for automatic railway signaling.

Ohio Brass Company, Mansfield, O.—The monthly bulletin for November has the usual quota of interesting matter, together with some quite readable recollections of the Atlantic City conventions.

The Arnold Company, Chicago, Ill.—A mailing card bears a picture of the recently completed shops of the Kansas City Southern at Pittsburg, Kan., which were designed and constructed by The Arnold Company.

Trolley Supply Company, Canton, O.—A handsome 28-page catalogue describes the well-known Knutson trolley retriever and the Climax headlight, both of which are attractively illustrated. A picture of the McKinley monument at Canton is reproduced in colors on the cover.

Walter A. Zelnicker Supply Company, St. Louis, Mo.—A hanger in colors distributed by this company reads: "Do business! The best cure for a financial panic and the depression which often follows it is this, Do Business—Work!" A bulletin of rail and equipment offerings accompanies the hanger.

Under-Feed Stoker Company of America, Chicago, Ill.—Publicity Magazine for November describes various plants and buildings in which the Jones stoker equipment is installed. A list of shipments made by the company during September is given and also a table of the properties of saturated steam.

Census of Electric Railways.

The tentative schedule prepared by the census bureau of the department of commerce and labor in connection with the proposed census of electric railways states that the information furnished should cover the business year of the company most nearly conforming to the year ending December 31, 1907. All questions that require a fixed time, such as mileage of track, cash on hand, etc., should be of the date of the year covered by the report. The circular adds:

"The answers to inquiries in regard to financial matters, other than capitalization, will be held absolutely confidential. The separate reports will be combined so as to show totals for all companies in the different states. No publication will

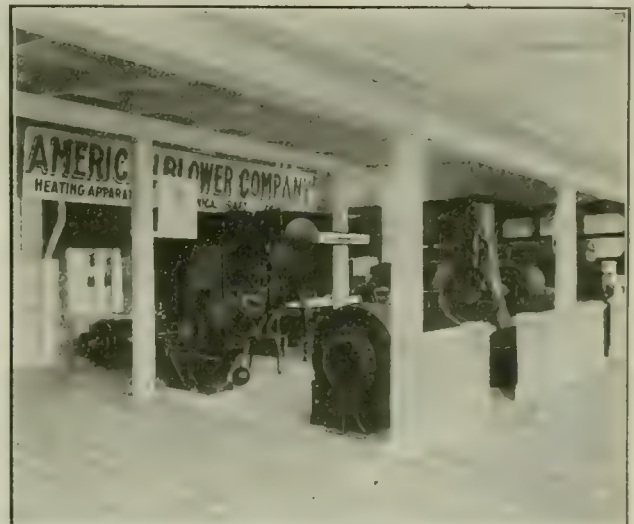
be made in the census reports disclosing the operations of individual companies. The information will be used only for the statistical purposes for which it is given."

The schedule provides for information concerning the names of constituent companies, the track mileage, method of operation, whether the mileage is on private right of way owned by the company, private right of way not owned by the company, or within the city limits, etc. Information is desired concerning the electric line construction, feeder conduit system, cars, equipment of cars, passenger traffic, car mileage and car-hours, accidents, power plant equipment, electrical generators, output of stations, substation equipment and miscellaneous statistics. Provision is also made for showing the cost of construction and equipment, which is not to include estimated value of franchises, operating expenses in detail, and statement of income account, balance sheet, capitalization, number of employees and their salaries and wages.

AMERICAN BLOWER COMPANY'S EXHIBIT.

The American Blower Company's exceptionally interesting exhibit at the recent annual conventions of the American Street and Interurban Railway Association and its allied associations at Atlantic City is shown in the accompanying illustration.

The suspended ball feature which attracted so much attention at the Master Mechanics' and Master Car Builders' conventions in June proved equally interesting to the street railway officials and their friends. As will be seen by reference



A Novel Exhibit.

to the illustration, this consisted of a ball suspended in the air by a current from one of the company's blowers, revolving constantly and retaining its position without other support than the air current.

Any one sufficiently interested in this unusual phenomenon to desire an explanation can secure the information by addressing the American Blower Company at Detroit, Mich.

ECONOMY OF GRAPHITED WOOD GREASE IN GEAR CASES.

With regard to a recent test made with a view to determining the relative values of several different compounds extensively used in lubricating the inclosed gears of electric cars a large traction company operating in Colorado reports under date of October 15 as follows:

Two gear cases on car 51 were packed with from eight to ten pounds of "Graphited Wood Grease" on May 13 and upon being opened for inspection on October 15 the gears were found to be in first-class condition and well lubricated, enough grease still remaining to run the car at least 30 days longer, which would mean a six months' run on not to exceed 10 pounds of graphited wood grease per gear, or approximately 1½ pounds per gear per month.

One explanation of this economy is that the wood grease, instead of adhering to the interior of the case, was all being used in lubricating the gears themselves. Another explanation is the remarkable lubricating properties of the powdered graphite with which the wood pulp in this grease is impregnated.

At the same time there was opened another case filled

with a compound which is softened by heating before introduction. Most of this compound was found to be packed like hard tar to the interior of the case where the gears in revolving had thrown it and where it had adhered, instead of dropping back on to the gears, and being used again, as was the case with the "Graphited Wood Grease."

This test was conducted during the summer months and the inference is that during the winter time a hard, tar-like grease would be even more inefficient. The "Graphited Wood Grease" is manufactured by the United States Graphite Company of Saginaw, Mich., and is so compounded as to be of practically the same consistency in any climate or season.

NEW CLOSED CARS FOR CINCINNATI.

The accompanying illustration shows the exterior of one of an order of 50 single-end double-truck closed cars for city operation which have just been delivered by the Cincinnati Car Company to the Cincinnati Traction Company. Besides presenting an especially handsome appearance, these cars have been designed to meet the local conditions, such as narrow streets, heavy grades, heavy travel and the necessity for

taken into the heater from the inside of the car, which keeps the air in the car in circulation. These heaters were manufactured from designs of the Cincinnati Car Company. The front and rear platforms are of the Detroit type. The dasher on the rear end is placed flush with the bumper, leaving no space for passengers to stand outside the dasher. The rear platform also has the usual division rail to prevent crowding at the entrance to the car. The window spaces have two sashes, the upper ones being stationary, while the lower ones drop into pockets with a hinged dust cap to cover the opening. The front door, by which passengers may enter or leave, as they desire, is placed to the right of the car. Another door at right angles to the entrance door forms a compartment for the motorman. The rear doors are of the mutually operated type.

The cars are equipped with the following:

Brill No. 27-FE-1 trucks, Westinghouse single-end quadruple equipment No. 92-A motors and K-6 controllers, National Brake & Electric Company schedule "O," A-1 compressors, with 8-inch brake cylinders, governors set to cut in at 60 pounds and out at 70 pounds, International double fare registers, Peacock brakes, with cast-iron freight car type hand



Exterior of New Closed Car for Cincinnati Traction Company.

quick transit with a minimum of power consumption, which demanded a strong but light car.

The side sills are light long-leaf yellow pine, $3\frac{3}{4}$ by $7\frac{3}{4}$ inches; the end sills, cross joists and diagonal members of white oak, measuring $5\frac{1}{4}$ by $7\frac{3}{4}$, $2\frac{3}{4}$ by 6 and $1\frac{1}{2}$ by 4 inches, respectively. The cross members are reinforced with $\frac{3}{8}$ -inch steel plates and the side sills with 20 by $\frac{1}{4}$ inch steel plates in one piece, which extend around the corner posts to the door posts. These plates are bolted to the side sills with $\frac{1}{2}$ -inch finished oval head bolts. The side posts are also bolted to these plates, which thus form the lower panel, making a very light and rigid construction and proof against damage by wagon tongues, hubs and wheels. The convex panels are formed of No. 16 gauge steel in three sections, the center section covering the space of four windows, and the end sections covering the space of three windows each. The roof is reinforced with nine $\frac{3}{8}$ by $1\frac{1}{2}$ inch steel carlines, one placed over each post. The balance of the body framing is of white ash.

The interior finish, including doors, sash headlinings, etc., is of Honduras mahogany, the molding being plain and of light dimensions. The seats and backs are of the longitudinal pattern, with spring edges, manufactured by the Heywood Brothers & Wakefield Company, and are upholstered with canvas-lined hard enameled rattan.

The cars are heated by furnace heaters placed in the front vestibule. The heat is discharged into the car through the bulkhead just below the lower dead headlining. The air is

brake wheel, Hunter fenders, perforated sheet steel destination signs on end and side of deck, illuminated from the interior, Dayton Manufacturing Company's No. 1561 headlights, and furnace heaters placed in the front vestibule.

The principal weights and dimensions are as follows:

Weight of car, complete, fully equipped.....	40,100 pounds
Weight of car body, fully equipped with electric controlling apparatus, air brakes, heaters, fenders, etc., except trucks and motors.....	16,780 pounds
Weight of car body as above, exclusive of heater, air brakes and electric controlling apparatus.....	14,352 pounds
Length over bumpers.....	39 ft.
Length from rear dasher to outside of front vestibule.....	38 ft. 6 in.
Length over corner posts.....	28 ft.
Length of rear platform.....	6 ft.
Length of front vestibule.....	5 ft.
Width over posts.....	8 ft.
Width over sill plates.....	7 ft. 10½ in.
Extreme width.....	8 ft. 4 in.
Height from bottom of sill to top of roof.....	8 ft. 11½ in.
Height from rail to top of trolley stand.....	11 ft. 10¼ in.
Truck centers'.....	17 ft. 4 in.
Wheel base of trucks.....	4 ft. 6 in.
Track gauge.....	5 ft. 2½ in.
Diameter of wheels.....	33 in.
Width of tread.....	2½ in.
Depth of flange.....	¾ in.
Diameter of axles.....	4 in.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 21

CHICAGO, NOVEMBER 23, 1907

WHOLE No. 239

TABLE OF CONTENTS.

Editorial:		The Pittsburg & Westmoreland Railway (Illustrated).....	829
—Another Side to "No Seat, No Fare".....	809	Common Carriers Must Provide Seats.....	829
—Correct Braking for Motor Cars.....	809	The Pennsylvania Railroad Tests of Lateral Rail Pressures....	830
—The Use of Tickets.....	809	Piping and Power Station Systems—LXIII. By W. L. Morris,	
—Inspecting Concrete Construction.....	810	M. E. (Illustrated).....	830
—Car-Mile Results in New York.....	810	Recent Electric Railway Legal Decisions. By J. L. Rosen-	
—Rail Corrugation.....	811	berger, LL. B.	832
An Important Power Project.....	811	News of the Week:	
Ticket Methods of the Pacific Electric and Los Angeles Inter-		—New York Public Service Commission.....	835
urban Railway Companies (Illustrated).....	812	—The Cleveland Franchise Controversy.....	835
Car-Mile Earnings and Expenses of New York State Roads....	815	Construction News:	
Plan for Distribution of Chicago Railways Company Securities.	815	—Franchises.....	837
November Meeting of the Central Electric Railway Association.	816	—Recent Incorporations.....	837
Meeting of the Traffic Officials at Indianapolis.....	816	—Track and Roadway.....	837
Foundation Brake Gear Design for Electric Railway Cars. By		—Power Houses and Substations.....	839
Fred Heckler.....	817	Personal Mention.....	840
Analysis of the Cost and Methods of Electric Railway Mainte-		Financial News.....	841
nance. By Albert Herrick (Illustrated).....	819	Manufactures and Supplies:	
The Youngstown & Southern Railway (Illustrated).....	822	—Rolling Stock.....	842
Wire Cleaning and Retaping Device (Illustrated).....	824	—Trade Notes.....	842
The Determination of the Correct Braking Power to be Applied		—Advertising Literature.....	842
to Electric Cars and Locomotives. By H. M. Prevost		Bitulithic Paving in El Paso, Tex.....	843
Murphy, M. E.....	825	Another Manufacturer of Large Gas Engines.....	843
Massachusetts Street Railway Association.....	827	The Telegraph Signal System (Illustrated).....	843
Book Table.....	828	The Stover Motor Car (Illustrated).....	845
Screw Devices for Starting Pinions and Straightening Armature		Electric Switching Locomotive for the Bush Terminal Company	
Shafts (Illustrated).....	828	(Illustrated).....	846

A "no seat, no fare" requirement is unjust if it does not provide some advantage to the company which will make its burden easier. The New Jersey supreme court has upheld the street and water board of Jersey City in ruling that street railways in operation from the Pennsylvania and Erie Railroad terminals shall provide seats between 5 and 7 p. m. for every passenger from whom fare is demanded. Enforcement of a rule of this character will prove distasteful to the public as well as impracticable. So long as business centers in small areas and approximately the same hours of labor are observed by the traveling public which creates congestion, it will be impossible for street, elevated and subway railways to furnish seats in rush hours for all passengers. The "no seat, no fare" idea is based on a misconception of the desires of this age and nation. Few hesitate when given a choice between travel on a crowded car without delay and the certainty that a seat can be secured by a wait of a few minutes. Persuasion is not successful in preventing people from boarding cars, even when they are crowded to a dangerous point; but the companies have no permissible means of inducement except peaceable argument. If it is fair to impose a "no seat, no fare" penalty it is equally right for companies to insist that at all times of the day all seats shall be occupied by paying passengers and that some tribute should be exacted from those who cannot be dissuaded from crowding on cars that are carrying their full quota of passengers.

The desirability of ascertaining the exact weights of rolling stock equipments before designing the braking apparatus should be recognized. So much dependence must be placed on the air brake equipment of a large car that any possible refinements in the design of the braking equipment would seem to be fully warranted. Unless the manufacturers of brakes are supplied with accurate information as to weights it is hardly possible

that their apparatus as installed will offer as satisfactory results as would be given if the brake rigging and pressures were based on accurate estimates of the service to be required. But there is another quantity which enters the equation. In addition to the work of destroying the momentum of the car existing by virtue of its dead weight, the brake rigging on electric railway motor cars must also have included as a factor of its design the additional service required in destroying the momentum of the heavy armatures geared to the wheels and revolving on their own axles. It is not thought that sufficient recognition has heretofore been made of this revolving effect of the armature. The derivation of formulæ by which actual values may be given to the increase in braking effort necessary to stop the rotating armatures on a car in the same length of time that a trail car of like weight would be stopped, involves a large number of quantities. This derivation of the essential equations is introduced, explained and illustrated with practical examples by H. M. Prevost Murphy, mechanical engineer, in an article presented elsewhere in this issue, entitled "The Determination of the Correct Braking Power to be Applied to Electric Cars and Locomotives." In this valuable article he clearly states the reasons why recognition must be given to the additional braking power necessary to overcome the rotative effect of electric motor car axles.

One respect in which the electric railways are now approaching the methods used by steam railways is in the use of tickets. Only a few years ago, before the interurban roads had attained any considerable development, the nickel was considered as the standard for a street car fare and even after the street railways had been extended from town to town and from cities out into the rural districts the standard was in many cases not changed and the conductors continued to collect fares in 5-cent units, generally at the town boundaries. This practice still prevails to some extent, but the great majority of the longer roads

have adopted some form of ticket system. The Los Angeles Interurban and the Pacific Electric railways, whose ticket selling and accounting methods are described in this issue, have developed this system to an unusual extent. Other large companies have recently adopted new methods of issuing and accounting for tickets and the interchangeable mileage book has met with the greatest success. For many years the Massachusetts roads, which are largely extensions of street railways, adhered quite generally to the zone system of fares, but recently the Springfield Street Railway has instituted a ticket system on its line from Springfield to Worcester, where formerly the through passenger was obliged to pay 16 separate fares. The satisfaction of the public at this action was strongly indicated by the comments of the daily press at the time. Also it was recently announced that a similar system would soon be put into effect on all the lines in Massachusetts controlled by the New Haven system. The use of a ticket good for a ride to destination is a great convenience to the passenger and also relieves the conductor of much of the labor of collecting fares, thus giving him more time to attend to the comfort and safety of the passengers, as it is admitted that the collection of tickets is easier and more rapid than that of cash fares.

INSPECTING CONCRETE CONSTRUCTION.

The successful use of reinforced concrete in construction work of the greatest variety is reflected in its increasing application to electric railway bridge, foundation and building design, but notable failures of this combination of materials from time to time should warn operating companies of the immense importance of careful inspection in the field, no matter how good the plans may be. Perhaps no construction material lends itself more readily to abuse than does concrete-steel, and its very flexibility and facility for rapid working invite disaster if responsible designs and installations are placed in inexperienced hands.

Close supervision of all field work by operating companies is absolutely essential. A great deal has been written about the importance of expert design, but the work of the inspector deserves no less mention. Even though the contractor be held responsible for the failure of a reinforced concrete structure, it is desirable that the engineering staff of the client company be qualified to supervise such work with the broad interests of the road in mind. Inspection of all cement used on each construction job is the first essential, and some excellent recommendations for this purpose have been prepared by the American Society for Testing Materials. Sand, gravel, stone and sometimes water used in concrete manufacture in the field should be tested for quality and fitness to the specifications, no less than the cement.

An inspector representing the railway company should be maintained on the work during the setting of forms, placing of reinforcement, mixing and placing of concrete; and familiarity with the plans, ability to observe the way in which the details are handled, and general capacity to keep a record of the progress of the work are essential to the securing of satisfactory results. Too much care cannot be taken to see that the wooden or metal forms are properly set up and braced, allowing the depth, width and batter called for by the plans. The inside of the forms is sometimes obstructed by sawdust, shavings, blocks or wood or other refuse previous to pouring the concrete, and even empty cement bags have been known to become incorporated in the structure. Such precautions may appear self-evident to the railway engineer experienced in concrete supervision, but the character of work often executed in the field justifies repeated reference to the matter. Unless the forms are properly held together by temporary rods or spacing pieces, which can be removed when the concrete reaches the proper height, warping and irregularities are liable to occur. Inspection by the company should look

out for all such points, including the vitally important matter of keeping joints tight by plaster of Paris, calking or wooden waling strips.

One of the most important points to insure in concrete-steel construction, and one that is often improperly handled in the hurry of field work, is the correct placing of the reinforcing steel bars, according to the exact spacing shown on the plans. Failure to install the correct number of rods in the precise location calculated by the designing engineer paves the way toward serious trouble; and, if nothing else be watched on a concrete steel job, this should be. The supervision necessary can be given by any intelligent engineer or superintendent. Disturbance of the steel location during the pouring of concrete is another bad result of inadequate inspection and careless work by the contractor. The proper mixture of the concrete; the forbidding of work without suitable light; the prevention of jarring upon the form work before the concrete hardens and the protection of the surface by boards until it is ready for service, including wrapping to prevent too rapid setting in cold weather; the prompt depositing of concrete, say within from 15 to 30 minutes after it leaves the mixer; the cleaning of all steel from dirt and scale rust, and the prevention of delays in joining wearing surfaces to bases all fall within the scope of the company's inspector. In cases where a company does its own concrete work not a little can often be saved by so designing the wooden forms that they can be removed without excessive waste, and used several times over on large jobs. The cost of the forms may easily become excessive in proportion to the size of the job unless they are handled with care.

CAR-MILE RESULTS IN NEW YORK STATE.

In another part of this issue there are published the operating results for the year ended June 30, 1906, per car-mile, of roads which are members of the Street Railway Association of the State of New York. H. M. Beardsley of Elmira, N. Y., has done a valuable service in compiling these car-mile results annually. The compilation as prepared by Mr. Beardsley shows the car mileage, the "income from operation," the primary operating accounts and the taxes and totals in aggregate figures and per car-mile.

In the summary of the figures we have combined the principal primary maintenance, transportation and general accounts so as to show in condensed form the results yielded by the various roads. The largest gross earnings from operation per car-mile were reported by the Dunkirk & Fredonia Railroad, 35.67 cents, and the smallest were those of the Oneida Railway, 9.26 cents. Of the companies operating more extensive mileage, the United Traction Company of Albany had gross earnings of 23.34 cents per car-mile, the International Traction Company of Buffalo had 25.03 cents, the Rochester Railway 25.47, and the Schenectady Railway 26.80.

The Oneonta Cooperstown & Richfield Springs Railway (the property of which was acquired on May 9, 1906, on behalf of the Oneonta & Mohawk Valley Railroad) shows the largest car-mile charge for maintenance, 13.20 cents. Of this figure 5.95 cents was applied for maintenance of track and roadway and is the largest car-mile expenditure made for this purpose by any of the companies reporting. The Ogdensburg Street Railway reports the smallest maintenance charges per car-mile, 0.99 cent. The total maintenance charges of the following range from 3.35 to 4.13 cents per car-mile, inclusive: Syracuse Rapid Transit Company, Rochester & Eastern Rapid Railway, Auburn & Syracuse Electric Railroad, Utica & Mohawk Valley Railway, International Traction Company, Hudson Valley Railway and Elmira Water Light & Railroad Company.

The Dunkirk & Fredonia road shows the largest car-mile expenditure for transportation, 14.82 cents. The excess over the figures of the other roads was applied to operation of

power plant, etc., the cost of which for this company was 9.51 cents. The smallest amount expended on the transportation accounts was 3.49 cents per car-mile by the Ogdensburg Street Railway, which shows the smallest expenditure for the operation both of power plant and cars. The average transportation expense for all the roads was 8.74 cents per car-mile. The expenditure for this department on the following roads was close to the average: International Traction Company, 8.48; United Traction Company of Albany, 8.76; Hudson Valley road, 8.94.

There was wide variation in the expenditures for damages and legal expenses. This expense was heaviest on the Dunkirk & Fredonia road, amounting to 3.26 cents per car-mile, and was lightest with the Citizens' Railroad Light & Power Company of Fishkill, 0.01 cent. Nine of the roads reported this expense at 1.01 cents per car-mile or over, the average of all companies reporting being 1.05.

The largest operating expenses per car-mile were those of the Dunkirk & Fredonia road, 34.10 cents; with the addition of taxes of 1.59 cents per car-mile the gross revenue from operation was exceeded by 0.02 cent by this company. The Ogdensburg railway shows the smallest operating expense per car-mile, 5.76 cents. The average was 14.97. The Rochester Railway showed total operating expenses of 14.98 cents per car-mile, the International Traction Company of 14.73, and the United Traction Company of Albany and the Utica & Mohawk Valley road 14.75 each. The charge for taxes varied from 2.48 cents per car-mile, shown by the Albany & Hudson Railroad, to 0.30 cent, the charge reported by the Ogdensburg company.

RAIL CORRUGATION.

If one fact appears more conspicuously than any other in the reports of investigations into the matter of rail corrugation, it is the uncertainty that exists as to the cause of the trouble and the conditions under which it is most likely to appear. This uncertainty appears clearly in the report which was submitted to the American Street and Interurban Railway Engineering Association during its recent meeting at Atlantic City. It is perhaps not a fair inference that the difficulty is altogether non-existent upon many roads, if such inference is based solely upon the meagerness of the replies to the committee's circular; but the lack of definite information as well as the varying character of that developed in the experience of different roads suggests the same possibility.

It appears to have been taken largely for granted in the report to which reference has been made that this peculiar wear of rails is due to vibration either in the rail itself or in the entire track structure; but in view of the uncertainty that exists the paper of A. L. C. Fell of the London County Council Tramways, an abstract of which was reproduced in the issue of the Electric Railway Review of October 26, is of particular interest on account of the variety of possible causes assigned and the reasons named as tending to support each. It appears from the report that no particular type of rail is markedly subject to the trouble, nor is any type wholly exempt, while the fact that the length of time rails have been in service before corrugations develop is reported as varying from four months to 13 years would appear opposed to Mr. Fell's suggestion that corrugations are first outlined in the rolling mill. That deep girder rails are most liable to corrugation seems also to be in opposition to the theory that it is caused by vibrations in the rail or track structure, although if it were developed that the cause of the vibration is too little stability in the web the two statements would be capable of reconciliation.

While Mr. Fell is strongly of the opinion that the corrugations are begun in the rolling mill, he mentions a large number of other possible or assisting causes. Among these

there are one or two that appear to be worthy of more attention than has yet been given them.

It is a well-known fact that during a number of years last past much attention has been given by the Master Car Builders' Association, and presumably by the mechanical officials of roads represented therein, to specifications covering circumference gauge and circularity of all wheels put in service. In the absence of such rigid requirements upon the part of purchasers of wheels for street and interurban service, it would certainly be more than human to expect the same attention would be given by manufacturers to these points as would be given under rigid specifications. Wheels of slightly different diameters mounted upon the same axle would obviously tend to exaggerate any tendency to corrugation due primarily to other causes, even if it is not admitted that such difference in diameters is of itself a sufficient cause; and wheels "out of round" do not seem out of place in the same category. If there be added to these defects open joints, tight gauge of track or wheels, trucks out of square, flat spots—all of which and other possible influences Mr. Fell notes—and if in operation we have defective application of brakes and rapid acceleration and retardation, it would seem that enough has been given to account for any amount or vagary of wear upon the rail head, without insisting too strongly upon vibration or a rough surface due to the uneven action of the rolls in the process of manufacture.

Probably as a matter of fact any one or all the influences named may under different circumstances contribute to the difficulty. Evidently, in general terms, this species of irregular wear can only come from a "chattering" between the wheel and the rail instead of a smooth and regular rolling motion. Doubtless, also, any one of the defects named might be a leading cause in connection with defective brake apparatus or apparatus improperly operated when if the two defects were not brought into play simultaneously no such result would occur.

It may well be that some of the causes leading up to this troublesome condition will disappear under the beneficial influence of standardization of equipment and the study of the parts affected which is in progress as a preliminary to this end. In fact, most of the suggested remedies with which Mr. Fell sums up his consideration of the matter come within the purview of this work. It may easily result that in accomplishing the greater results that can but follow the adoption of standards for equipment, the comparatively insignificant evil of rail corrugation will disappear. In which case the exact thing which has caused it may well be left as a subject for academic speculation.

An Important Power Project.

The Southern Power Company of Charlotte, N. C., is having plans and specifications prepared for the construction of a steam power electric plant at Spartanburg, S. C., to have a capacity of 50,000 horsepower, the plant, when completed, to cost about \$2,000,000. It will be built in sections as needed, and construction will probably begin during 1908. Turbines of 10,000 horsepower will be used. The plant will augment during low-water periods the various water power electrical plants which the company is building for transmitting electricity in North and South Carolina. The Southern Power Company has completed two electric plants furnishing 40,000 horsepower daily and has two under construction to furnish 60,000 horsepower. Eventually more than 200,000 horsepower will be distributed to manufacturing enterprises in the two Carolinas. W. S. Lee, Jr., is engineer in charge.

The Mahoning & Shenango Railway & Light Company has recently placed orders for fenders for 200 cars, to be delivered by January 1.

TICKET METHODS OF THE PACIFIC ELECTRIC AND LOS ANGELES INTERURBAN RAILWAY COMPANIES.

Several interesting articles have, within the last few months, been published in the Electric Railway Review describing the physical and operating features of the Pacific Electric and the Los Angeles Interurban railway lines in and about Los Angeles, Cal. It will be remembered that this com-

with tickets as can consistently be done. On the entire system there are 35 ticket agents and about 250 regular stops. Each agent is prepared to sell tickets to any station, either one way or round trip. In Los Angeles agents have been appointed in a number of drug stores, where tickets are sold for the convenience of the public. Each agent receives as his commission 2 per cent of the receipts for the tickets handled. In general the kinds of tickets used on the system com-

PACIFIC ELECTRIC RY. CO.

ONE CONTINUOUS RETURN PASSAGE within ten (10) days after date punched and only in direction indicated by punch marks in margin, between

LONG BEACH AND LOS ANGELES

NO. 1000 SO. 1000 1/2 1000 DOG 1000

Not Good for Stop-Over

DEC NOV OCT SEP AUG JUL JUN MAY APR MAR FEB JAN 1908
31 29 27 25 23 21 19 17 15 13 11 9 7 5 3 1 1907
30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 1906

McMillan

GOING COUPON

PACIFIC ELECTRIC RY. CO.

ONE CONTINUOUS PASSAGE only on car or train issued and only in direction indicated by punch marks in margin, between

LOS ANGELES AND LONG BEACH

NO. 1000 SO. 1000 1/2 1000 DOG 1000

Not Good for Stop-Over

1908 JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
1907 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
1906 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31

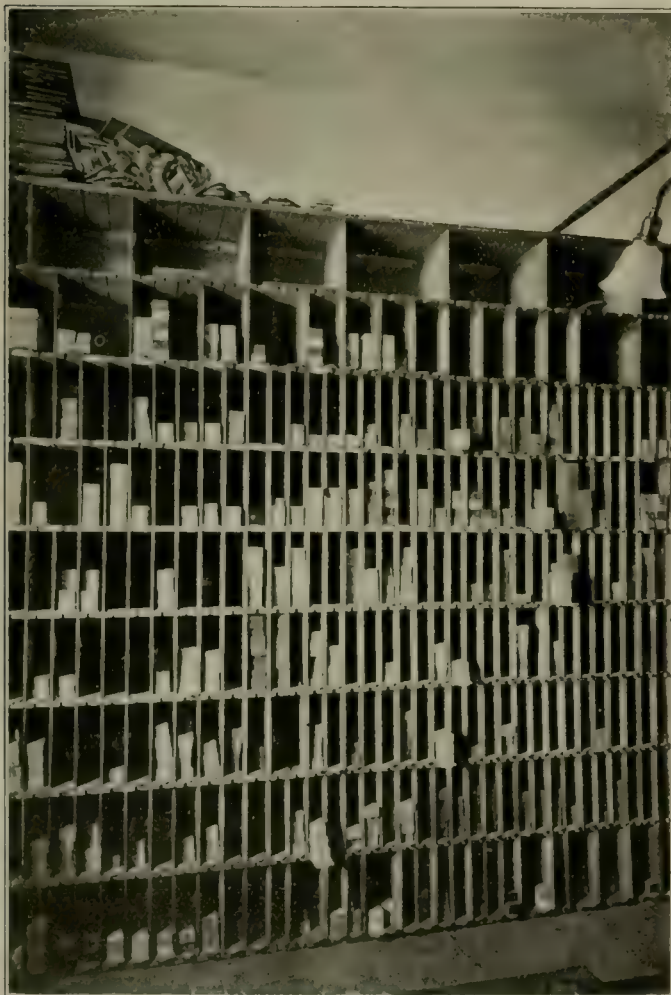
McMillan

GOING COUPON

Los Angeles Ticket Methods—Round-Trip Ticket.

bined system comprises about 550 miles of track and that owing to the rapid growth of the territory served by the electric lines new track construction is pushed forward quite rapidly. All of the lines of these systems center at the large terminal station in Los Angeles, from which the interurban cars are operated.

At this terminal station the arrangement of gates is such



Los Angeles Ticket Methods—Ticket Storage Rack.

that each passenger must have a ticket before he can get on a car. A special effort has been made by the traffic department to have as large a percentage of passengers provided

LINES		STATIONS	
★		FR	TO
★	Long Beach		
★	Whittier		
★	Hunting'n B'h		
★	San Pedro		
★	Alamitos Bay		
★	Santa Ana		
★	Pasadena "S"		
★	Pasadena "M"		
★	Altadena		
★	Rubio		
★	Alpine		
★	Monrovia		
★	Lamanda		
★	San Gabriel		
★	E. San Gabriel		

Pacific Electric Railway Company

COUPON PASS

Not Good Unless Detached by Conductor

Good for one continuous passage only for the person whose name appears on front of cover between points punched.

Book No. 2107 No. 12

FORM P-3

Los Angeles Ticket Methods—Coupon Pass.

prise one way, round trip, half fare, 10 and 52 ride individual commutation, 20, 30 and 100 ride family, and other forms to be described later. Practically all of the tickets sold by agents are printed in skeleton form and read, "From to". Very few printed complete forms are used on account of the multiplicity of stations. Owing to the comparatively large traffic between Los Angeles and Pasadena, however, complete forms are printed for that service.

A novel form of ticket used is known as the "real estate" ticket. This is issued by the Pacific Electric Railway in 100

Return Coupon

Form S.D.-C-3

NO. 1000

McMillan

PACIFIC ELECTRIC RAILWAY COMPANY

Triplet Ticket and Exchange Check.

Good for one continuous return passage only on car or train issued and only in direction indicated by punch marks.

CASH FARE COLLECTOR

5 10 15 20
25 30 35 40
45 50 55 60
65 70 75 80
85 90 95 100

SANTA ANA City Limits
MAIN ST
S. P. DEPOT

Auditor's Check

Form S.D.-C-3

NO. 1000

McMillan

PACIFIC ELECTRIC RAILWAY COMPANY

Triplet Ticket and Exchange Check.

Good for one continuous return passage only on car or train issued and only in direction indicated by punch marks.

CASH FARE COLLECTOR

5 10 15 20
25 30 35 40
45 50 55 60
65 70 75 80
85 90 95 100

SANTA ANA City Limits
MAIN ST
S. P. DEPOT

Los Angeles Ticket Methods—Conductor's Ticket.

different forms, numbered X-1, X-2, X-3, etc., and XA-1, XA-2, XA-3, etc. Such tickets are sold to real estate men who desire to make it convenient for possible purchasers to visit outlying

plots of land. The tickets are limited to 60 days, they are sold in lots of 500 or more and are neither redeemed nor extended by the company. The "X" form reads "From Los Angeles to destination," and the "XA" form reads "From destination to Los Angeles." Thus the patron must go to the real estate agent's local office on the tract being sold in order to get his return ticket of the "XA" form.

The Interurban railway issues 30 forms of real estate

date, destination and limit, so that should the agent make any error it can be traced.

The regular stock tickets indicate that the trip from the starting point must be made on the date of sale, but the return portion indicates that the trip from destination to the starting point can be made within a 10-day limit.

There are also used a number of special tickets for excursions, special parties, etc., which in general comply with

[illegible]

Los Angeles Ticket Methods—Page from Ticket Stock Ledger.

tickets, which are of the same type, varying only in color. These special tickets are sold to the real estate promoters at the 1-way rate for the round trip.

Forms of Tickets.

On the Pacific Electric system the tickets for each division have a distinct and indicating color, while all tickets of the Interurban railway are characterized by some shade of green ink. All tickets of the combined systems have the going portion of white stock. The returning portion has a distinct indicating color.

Blank tickets of the 1-way and round trip forms for use where travel does not demand a complete form, read "From

the rules observed in connection with the stock forms of tickets.

The form of "conductor's" ticket used is illustrated herewith. A supply of such tickets is kept for each line, so that the conductors can sell 1-way or return tickets. They are made up in pads of 100 each and folded as indicated by the dotted lines in the illustration, so that the names of the stations and the time, together with the indication of cash collected, superimpose one another and are punched simultaneously. In collecting for such tickets the conductors use the register. If the conductor sells a ticket for one way only he returns to the auditor the parts marked "auditor's check" and "return coupon." The conductors re-

PACIFIC ELECTRIC RY. CO. L. A. INTER-URBAN RY. CO. (Issuing Office's Stub)	PACIFIC ELECTRIC RY. CO. L. A. INTER-URBAN RY. CO. (Advice of S. R. O. Issued)	PACIFIC ELECTRIC RY. CO.—L. A. INTER-URBAN RY. CO. SPECIAL RATE ORDER
Ticket Agent	Ticket Agent	Ticket Agent Station
Void after	Void after	This Order, presented on or before 190
Favor of	Favor of	will be your authority to sell to
For Tickets	For Tickets	M Tickets from
To	To	At rate of each, limit days
At rate of each	At rate of each	Mark on same
Limit ticket 190	Limit ticket 190	Attaching this to your report to Auditor covering and show hereon form and number of ticket issued.
Account	Account	Form Number
Date issued 190	Date issued 190	Not good unless countersigned by
FORM R O I No. 20499	FORM R O I No. 20499 This slip must be sent to General Passenger Department on date order is issued	FORM R O I No. 20499 <div style="text-align: right; font-family: cursive; font-size: 1.2em;">J. McMillan</div>

Los Angeles Ticket Methods—Special Rate Order.

Los Angeles to” For emergency purpose other tickets are kept in stock which read “From to” On each ticket the general ticket department fills in the blank spaces with a stamp before the ticket leaves the stock room. Another type of blank form, both single and round trip, is made for sale from any station to any other station on one division. Single and round trip tickets are also to be had, printed on blanks and suitable for sale from any station to any station on a different division. Each of these tickets has an auditor's stub for indicating the rate.

ceive their supplies of these tickets by signing for them with the agents who make requisition for them upon the general ticket office in the regular way. These "conductor's" tickets are printed on white paper and each section of the triplicate tick is 2 inches wide by 7 $\frac{3}{4}$ inches long.

Coupon pass books good for 100 rides are used by employes on duty. One coupon from such a book is illustrated herewith. For each ride the conductor detaches a coupon and punches in the line on the left an indication of the route on which the coupon was used; and he also indicates by a punch

mark the mileage between Los Angeles and the destination station. If such transportation is used by a foreman who is taking a number of men with him he signs his name on the back of the coupon, together with the number of men accompanying him.

No free transportation is issued except to those on company business; but in order that employes and dependent members of their families may be recognized, on application to the heads of their departments, they are given orders on the ticket agents, who can sell them tickets at 60 per cent of the regular fare for all rides of more than five cents. For such requisitions the department heads make requests on the traffic manager's office.

To save the conductors' time books of 100 tickets between terminal points on definite lines where the traffic is heavy are sold. These tickets are good only between terminals of the

entire stock of tickets is taken charge of by one young lady.

When tickets are received from the printer notice is given the auditor so that he may charge them against the ticket department. The general ticket agent keeps a stock ledger, the headings for one page of which are illustrated herewith. On the left-hand pages are entered the tickets as received from the printer, with the price per thousand and the totals. On the right-hand pages the agents are charged with the various disbursements. At the end of each month a total statement is made and on receipt of this, with the charges made as tickets are received from the printer, the auditor is able to ascertain the cost of tickets disbursed during the month. Thus he may make the proper charges against passenger earnings.

Requisitions for the use of ticket agents in ordering supplies of stock tickets are available in book form so that carbon duplicates may be made. All agents, except those in the larger offices, are instructed to keep on hand about 30 days' supply. The agent makes requisition on the general ticket department, which fills out an invoice with one original and four copies. The original is kept in the general office; one copy is forwarded to the auditor and three copies to the agent, who keeps one and receipts the other two, sending one copy to the general ticket agent and one to the auditor. The headings for these five blank forms are shown herewith. It will be noted that while the information written in will be duplicated by means of the carbon impressions, the printed matter varies on each form according to the final disposition of the copy of the

N^o 11 A

LOS ANGELES INTER-URBAN RAILWAY COMPANY

190

Auditor: _____
Agent _____ has this day
been sent the following tickets:

FORM	DESTINATION	CONSECUTIVE NUMBERS INCLUSIVE		QUANTITY
		COM NO.	CLOS NO.	

Stock Clerk.

Date _____ 190

Auditor's Advice of Shipment.

N^o 11 A

LOS ANGELES INTER-URBAN RAILWAY COMPANY

190

Agent _____ has this day
been sent the following tickets:

FORM	DESTINATION	CONSECUTIVE NUMBERS INCLUSIVE		QUANTITY
		COM NO.	CLOS NO.	

(Record to be kept in General Ticket Office)

Ticket Clerk's Copy.

N^o 11 A

LOS ANGELES INTER-URBAN RAILWAY COMPANY

190

Agent _____
Herewith I hand you the following tickets:

FORM	DESTINATION	CONSECUTIVE NUMBERS INCLUSIVE		QUANTITY
		COM NO.	CLOS NO.	

Count these tickets immediately and check against this invoice and acknowledge receipt at once by filling out attached blanks and sending one to this office and the other to the Auditor.

THIS SLIP MUST BE KEPT ON FILE IN YOUR OFFICE

Agent's Copy for Filing.

N^o 11 A

LOS ANGELES INTER-URBAN RAILWAY COMPANY

Auditor: _____
I have this day received from General Ticket Department below mentioned tickets, which have been counted and found in order.

FORM	DESTINATION	CONSECUTIVE NUMBERS INCLUSIVE		QUANTITY
		COM NO.	CLOS NO.	

OFFICE _____ Agent

Agent must fill this out and forward to Auditor promptly upon receipt of tickets

STAMP _____

Agent's Receipt to Auditor.

N^o 11 A

LOS ANGELES INTER-URBAN RAILWAY COMPANY

General Ticket Department

I acknowledge receipt of below mentioned tickets, all of which have been carefully counted and found in order.

FORM	DESTINATION	CONSECUTIVE NUMBERS INCLUSIVE		QUANTITY
		COM NO.	CLOS NO.	

OFFICE _____ Agent

Agent must fill this out and return immediately

STAMP _____

Agent's Receipt to Ticket Department.

Pacific Electric and Los Angeles Interurban Tickets—Duplicate Forms Accompanying Ticket Shipments.

line on which they are sold. One such ticket is illustrated herewith.

Ticket Handling.

The entire stock of tickets for the system is kept at the traffic manager's headquarters. A special room has been set apart for the storage of tickets and this room has been equipped with sectional cases, a part of which are illustrated in an accompanying halftone engraving. It will be noted that the cases are so built that they may be adjusted to hold stocks of various sized tickets. Each one of the pigeonholes has a loose slide on which the tickets rest. Thus the stock kept in any pigeonhole can be withdrawn with facility. The

requisition. A "recall" order is used for tickets that are not available for immediate sale or are to be renumbered. Five copies of this recall order are made as in the case of the requisition and are distributed to the various offices as stated.

The ticket stock department keeps four stock ledgers as follows: Card tickets, commutation, special books, Interurban Railway Company.

In order that all ticket irregularities may be handled with facility there is an agent in the general passenger office. This agent makes refunds, extensions, exchanges, etc., from which duties the smaller offices are relieved. The general ticket office also handles all tickets for excursions and special

parties. When arrangements have been made for the sale of a number of tickets at a special rate a "special rate order" of the form illustrated herewith is used. The rates for private cars are based on handling 40 passengers at the full round trip rate, plus \$5.00 for the exclusive use of a car. When it is necessary to "deadhead" the car to a loading point an additional charge of 25 cents per mile is made.

CAR-MILE EARNINGS AND EXPENSES OF NEW YORK STATE ROADS.

H. M. Beardsley, secretary and treasurer of the Elmira Water Light & Railroad Company, Elmira, N. Y., has compiled figures of the gross earnings and operating expenses per car-mile for the year ended June 30, 1906, of street and inter-urban railways which are members of the Street Railway

thereafter. Series C, consolidated mortgage bonds, have been substituted for the collateral notes secured by 4 per cent sinking fund debentures as provided for in the former plan.

For the floating debt of the Chicago Union Traction Company, the North Chicago Street Railroad and the West Chicago Street Railroad Company, there will be issued \$4,390,126.58 in Series C consolidated mortgage bonds. The outstanding West Chicago Street Railroad certificates of indebtedness receive under the plan, \$298,200 of Series B bonds, and also \$198,800 of Series C bonds. The reserve holdings of securities comprise \$29,525 Series B bonds as planned in August, and also \$111,073.42 of the new Series B bonds.

The total of Series A remains at \$6,767,200. The consolidated mortgage bonds bearing 4 per cent interest until February 1, 1912, and 5 per cent thereafter, stand under the revised plan as follows: Series A, \$9,132,800, unchanged; Series B, \$16,900,000, unchanged; Series C, \$4,700,000, as compared with \$5,000,000 in the August plan.

The plan of distribution of the participation certificates representing the \$100,000 capital stock of the Chicago Rail-

Car-Mile Results in New York State, Year Ended June 30, 1906.

	Car miles.	Income from operation.	Maintenance track and roadway and electric line.	Maintenance buildings, steam plant, electric plant.	Maintenance cars and other maintenance.	Power plant wages and expenses, fuel, water, oil and waste, hired power.	Other transportation.	Damages and legal expenses.	Other general expenses.	Total operating expenses.	Taxes.
Albany & Hudson Railroad, Hudson.....	703,088	30.09	2.79	1.05	3.26	2.67	*8.31	1.81	4.15	24.04	2.48
United Traction Company, Albany.....	7,562,079	23.34	1.64	.18	1.03	1.43	7.34	1.08	2.06	14.75	1.15
Auburn & Syracuse Elec. Rd., Syracuse..	1,184,058	26.17	2.25	.23	1.04	3.00	4.76	.86	3.36	15.50	.99
Binghamton Railway, Binghamton.....	1,477,900	19.61	.64	.21	1.22	1.61	5.00	.13	1.40	10.21	.59
International Traction Company, Buffalo..	16,358,461	25.03	1.71	.35	1.77	1.79	6.69	1.31	1.11	14.73	1.18
Rochester & Eastern Rapid Ry., Rochester	730,656	31.34	1.41	.18	1.91	5.13	5.35	1.19	4.67	19.84	1.05
Cortland County Traction Co., Cortland..	237,496	28.68	1.15	.33	.99	3.44	5.76	.13	3.08	14.93	.78
Elmira Water Light & Rd. Co., Elmira....	1,229,683	16.66	2.16	.07	1.90	2.22	5.02	.40	.90	12.67	.59
Citizens' Rd. Light & Power Co., Fishkill.	202,259	23.33	2.13	.22	2.48	3.09	5.39	.01	1.67	14.99	.59
Dunkirk & Fredonia Rd., Fredonia, N. Y.	142,399	35.67	2.31	1.56	2.48	9.51	5.30	3.26	3.67	34.10	1.59
Hudson Valley Railway, Glens Falls.....	1,977,596	28.11	2.08	.30	1.66	2.21	6.73	.86	2.71	16.55	1.18
Ithaca Railway, Ithaca.....	408,481	24.13	.81	.18	1.17	2.69	6.32	1.01	2.86	13.25	.67
Hornellville Electric Railway, Hornell...	183,724	10.11	1.35	.11	1.47	1.83	3.82	.06	.84	9.48	.43
Kingston Consolidated Railroad, Kingston	563,316	23.17	.61	.11	1.67	2.49	5.39	.68	2.31	13.26	.76
Orange County Traction Co., Newburgh...	598,149	21.67	1.19	.25	1.71	2.46	3.58	.84	2.48	14.51	1.40
Ogdensburg Street Railway, Ogdensburg..	322,076	9.49	.22	.05	.72	.46	3.11	.11	1.17	5.76	.30
Oneida Railway, Oneida.....	150,706	9.26	.14	.02	1.06	2.30	4.03	.38	.95	8.88	.57
†Oneonta Cooperstown & Richfield Springs											
Railway, Oneonta.....	574,864	20.17	6.53	.63	6.04	1.89	†6.27	.10	2.44	26.72	.90
Peekskill Lighting & Railroad, Peekskill.	301,606	19.09	.48	.29	.70	2.58	5.02	.09	1.94	11.10	1.04
Plattsburg Traction Company, Plattsburg	133,146	17.88	1.46	.15	.79	1.50	4.70	.83	2.23	11.66	.89
Poughkeepsie City & Wappingers Falls											
Electric Railway, Poughkeepsie.....	491,867	21.15	2.04	.29	1.34	3.18	7.02	.47	2.97	17.31	1.08
Rochester Railway, Rochester.....	8,036,938	25.47	1.18	.10	1.02	4.08	6.54	.80	1.29	14.98	1.27
Schenectady Railway, Schenectady.....	3,241,573	26.80	2.25	.20	2.44	2.77	6.51	1.19	1.79	16.23	1.08
Syracuse Rapid Transit Railway, Syracuse	4,320,371	23.86	1.78	.54	1.03	2.38	5.60	1.23	.85	13.41	1.01
Syracuse & Suburban Railroad, Syracuse..	497,559	21.05	2.36	.79	1.27	.70	4.08	.47	2.69	12.36	.99
Utica & Mohawk Valley Railway, Utica...	3,545,233	25.33	1.65	.05	2.04	2.62	5.08	1.26	2.05	14.75	.80
Average all roads.....	55,195,284	25.41	1.69	.27	1.56	2.44	6.30	1.05	1.66	14.97	1.18

*Includes car per diem and mileage, 0.44. †Includes station service and supplies, 1.01. ‡Property operated beginning May 10, 1906, by Oneonta & Mohawk Valley Railroad Company.

Association of the State of New York. From the statistics as contained in the published proceedings of the twenty-fifth annual meeting of the association, held at Lake Champlain on June 25 and 26, 1907, we have compiled and publish herewith a summary which gives in brief form the principal results of operation per car-mile. The statement as published contains both the total figures and the car mileage, from which the car-mile results were computed.

PLAN FOR DISTRIBUTION OF CHICAGO RAILWAYS COMPANY SECURITIES.

In the Electric Railway Review of August 31, 1907, page 249, the plan for reorganization of the Chicago Union Traction Company properties was published. As the plan has now been modified, the committee of bondholders has issued a letter to depositors under the original call, urging them to signify their acceptance of the modified plan. The changes from the plan as published in our issue of August 31 may be shown as follows:

There will be one issue (Series A) of consolidated mortgage bonds of the Chicago Railways Company, bearing 5 per cent interest, as originally planned. The interest on the other issues of bonds under the same mortgage (Series A, B and C) will be 4 per cent to February 1, 1912, and 5 per cent

ways Company has undergone considerable change, and, as revised, is as follows:

Chicago Railways Company participation certificates.				
Present stock, each share—	Ser. 1.	Ser. 2.	Ser. 3.	Ser. 4.
North Chicago City Railway.....	2,625	....	....	....
Chicago West Division Railway..	3,875	....	....	....
Chicago Passenger Railway.....	....	.43	....	....
North Chicago Street Railroad....	....	1.00	....	....
West Chicago Street Railroad....	....	.625	....	....
Chicago Union Traction Company				
—preferred stock .....	....	.50	....	....
Chicago Union Traction Company				
—common stock .....	....	....	.25	....

The total number of Series 1 certificates will be 30,800; Series 2, 124,300; Series 3, 60,000; Series 4, 50,000.

The Harris Trust and Savings Bank, Chicago, depository under the plan, and the Farmers' Loan and Trust Company, New York, subdepository, announce that deposits may be made on or before November 25.

In the Los Angeles station of the Edison Electric Company a cooling tower used for a 6,000-kilowatt turbine unit is 73 by 150 feet on the ground with a fall of 27 feet, giving an area of 6,100 square feet per cubic foot of water per second. With a wind of six miles an hour and humidity 58 per cent the water temperature is lowered from 182 to 85 degrees F. The frame is of wood, 4 by 4 and 2 by 4 inches, the troughs and screen of galvanized iron.—The Engineer.

NOVEMBER MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION.

The Central Electric Railway Association held its last meeting of the year at the Claypool hotel, Indianapolis, Ind., on Thursday of the present week. Owing to the fact that the date of the meeting had been changed from the fourth to the third Thursday of the month, the attendance of railway officials was not as large as usual, but the programme presented and the discussions were of great interest. The next meeting will be held on January 24 at the Algonquin hotel, Dayton, O. At that time the annual election of officers will take place and the annual banquet, which has become an interesting feature in the association's existence, will be given.

At the morning session on Thursday a paper on "Analysis of the Cost and Methods of Electric Railway Maintenance" was read by Albert B. Herrick, electric railway expert of Ridgewood, N. J. This paper is printed in another part of this issue of the Electric Railway Review.

At the afternoon session a paper prepared by Fred Heckler, master mechanic of the Lake Shore Electric Railway, Fremont, O., was read, in the absence of the author, by S. D. Hutchins of Columbus, O., special representative of the Westinghouse Electric & Manufacturing Company. This paper, together with an abstract of the discussion which followed its reading, will be found in another part of this issue.

Long-Distance Travel.

An open discussion as to whether it pays to operate cars to cater to long-distance travel brought out many phases of interurban limited train operation. The discussion was participated in by the railway officials directing the operation of limited cars over the longest interurban electric routes yet established. The discussion was opened by S. R. Dunbar, Indiana Union Traction Company, who suggested that before the question was taken up in its entirety some decision should be had concerning what really constitutes "long-distance travel."

F. D. Norveil, general freight and passenger agent of the Terre Haute Indianapolis & Eastern, thought no definition could be given because the sentiment is constantly changing. What was considered long-distance travel by trolley a few years ago is now considered by some as a short distance. He thought, however, that before long nothing less than 250 miles would be considered a long haul. This transition is being brought about by extensions of old lines and the completion of new connecting railways. He said that the cars which make long runs cannot be prevented from showing fair earnings if they are carefully looked after. He would prefer having long-distance cars carrying one-third their load from terminals to terminals than cars loaded to their capacity at the outgoing stations and empty at the incoming stations. He did not favor "peddling" the passengers from cars scheduled for long-distance runs. Stops should be made only at town or city stations. Although it may be conceded that long-distance travel by electric railways is still very tiresome, Mr. Norveil said it has been demonstrated that the traveling public likes the service given on Indiana long-distance lines and is daily showing its appreciation by its patronage.

F. D. Carpenter, general manager Western Ohio Railway, Lima, O., said that his company runs cars from Toledo to Dayton, O., a distance of 164 miles. Twenty-five per cent of the receipts from limited cars is derived from through travel. In his opinion his company has demonstrated the fact that people who travel long distances like to ride on the electric cars. He predicted that before long improvements will be made in car equipment, and connecting links between existing railways will be built, until it will be practicable to carry passengers more than 500 miles. He thought it not unreasonable to expect that before long it will be possible to buy tickets from almost any steam railway point in the United

States to almost any destination in the country with electric railways included in the route. He figured that long-distance travel is "velvet," and yet he realized that with the present traffic arrangements it is not practicable to operate over many connecting roads for distances as great as 500 or 600 miles. However, he said, it is "up to" the railway men themselves to make this feasible. This could be done by providing better equipment and establishing a satisfactory system for the interchange of cars, thus doing away with the necessity of compelling passengers to change from the cars of one company to those of another at junction points.

F. J. J. Sloat, general manager Cincinnati Northern, said that long-distance travel will be more practicable when needed improvements are made in the electric equipment of cars or when increased voltage can be supplied to the trolley wire, enabling the operation of three or four car trains. Some change should also be made in car designs so that passengers can pass from one car to another without danger. By this arrangement it would be possible to pick up at a junction point a car from another railway and haul it without much trouble.

H. A. Nicholl, Indiana Union, said that, after listening to the testimony in favor of encouraging long travel, it was evident that a company makes a mistake if it does not cater to this traffic.

MEETING OF TRAFFIC OFFICIALS AT INDIANAPOLIS.

At an informal meeting held at the interurban terminal building, Indianapolis, Ind., on Wednesday of the present week, preliminary steps were taken for the adoption by the electric railways of Ohio, Indiana, Michigan, Illinois and Kentucky of a uniform form of making, filing and publishing tariffs of rates. The meeting was attended by 18 of the leading freight and passenger agents of representative electric railways in these states.

The gathering was called by F. D. Norveil of the Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind., at the request of several companies which are members of the Central Electric Railway Association. Mr. Norveil acted as chairman of the meeting and J. F. Starkey was secretary.

Since the electric railways in these states assumed their present traffic possibilities, the officials responsible for the development of traffic on the larger systems have endeavored to secure the adoption of routes and rates for passenger and freight traffic and a division of revenues on interline business which would be fair and equitable to all companies involved.

It was considered advisable at this time to have a meeting at which the difficulties in the way of uniform methods could be discussed. The various subjects suggested were discussed at length by those who attended the meeting, and it was proposed to compile joint tariffs in compliance with the rulings of the interstate commerce commission and the railroad commissions of the various states.

While the tariffs will necessarily be somewhat similar to those used by steam railways, they will have to be modified to fit the different traffic conditions applying to electric railways. As the varying passenger and freight rates and the baggage arrangements on the many electric roads in the five states named will have to be considered in connection with this subject and an uncertain period will be required for the compilation of necessary data, no definite time has been fixed for the next meeting. A committee was appointed, however, which will begin at once the work of drafting preliminary regulations, which, it is expected, after consideration, will ultimately be adopted by all the electric railways in these states which plan to interchange business with other roads.

While the electric roads of Indiana, Ohio and Michigan are at present more largely interested in arrangements of this character than the railways of Illinois and Kentucky it was

thought that the latter roads should participate in any arrangements that may be made, for the reason that lines connecting interurban centers in Illinois and Kentucky with the other states are rapidly nearing completion.

The following committee which was appointed represents, it will be noted, railways in the various states:

W. S. Whitney, Ohio Electric Railway, Columbus, O., chairman.

Charles Price, Western Ohio Railway, Lima, O.

George S. Henry, Indianapolis & Columbus Railway, Indianapolis, Ind.

R. L. Thompson, Indianapolis & Louisville Railway, Louisville, Ky.

A. G. Kelley, Ft. Wayne & Springfield Railway, Decatur, Ind.

B. R. Stevens, Illinois Traction Company, Springfield, Ill.

George M. Parker, Detroit United Railway, Detroit, Mich.

F. D. Norvell, Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.

J. O. Wilson, Cleveland & Southwestern Railway, Cleveland, O.

This meeting is considered the most important that has ever been held in the interest of the traffic departments of electric railways. While no definite action was taken toward a permanent organization, it is conceded that the foundation laid at this meeting will ultimately result in the perfection of an association for traffic men.

FOUNDATION BRAKE GEAR DESIGN FOR ELECTRIC RAILWAY CARS.*

BY FRED HECKLER, MASTER MECHANIC LAKE SHORE ELECTRIC RAILWAY.

Before dealing with the mechanical consideration of a proper foundation brake gear for electric cars, we have deemed it advisable to call your attention to the importance of the brake as a whole. Unfortunately the brake is usually looked upon as a safety device only, and we believe it is because of the prevalence of this idea that its installation and maintenance do not receive the consideration they merit. Considering the investment, there is no part of the railway equipment that will give greater material returns than the brake when properly installed, operated and maintained. If we could to some extent separate the brake from the idea or impression that it is a safety device only and show that it makes possible the hauling of heavier cars; in fact, makes the heavy car a possibility—that it makes possible faster and more frequent service—as much or more than does the high-power motor, the signal and the good roadbed, and that, if given the consideration it should have, it would increase the possibilities, profits and value of all these things—then we believe its importance would be more fully appreciated, and, therefore, at least the same consideration be given to its design and installation that is accorded to other parts of railway equipment. The brake is par excellence a safety device, but it has other reasons for its existence.

Magnitude of the Brake Problem.

The brake is often looked upon as a mere piece of mechanical apparatus which can be designed by rule of thumb, applied in any haphazard fashion to the vehicle it is intended to control, then operated by "go as you please" methods; whereas all these things call for the exercise of the highest intelligence if even approximate perfection is to be obtained. The magnitude of the problem can be seen when the thought is kept in mind that the brake has often to do in seconds what it has taken the motive power minutes to accomplish, and that it is far more important to be able to stop a car than to start it. From a speed of 60 miles per hour on a level track, it is possible to stop a car in about 1,000 feet; whereas, under the same conditions, the car would run 28,000 feet if there were no brakes used. Any difference between these two extremes may result according to the condition of the brake; and no matter how perfect and well maintained the apparatus may be a great part of the brake efficiency may be lost by improper design of foundation brake gear, which condition will undoubtedly continue to exist until the brake ceases to be looked upon as a necessary evil. When it is realized that the brake equipment is not merely an auxiliary apparatus, but a controlling element—not merely a necessary expenditure, but a dividend-earning asset—then sufficient pressure will be brought to bear on the car and truck designers and builders to induce them to consider the brake installation before it

becomes impossible to put one on that will even merit the name of a brake in the true sense of the word.

Perhaps the reason for so many monstrosities is lack of information on the part of the designer, and to this end it might be well to give a few reasons why the brake should be so designed that there is a proper proportion between air pressure, cylinder piston area and leverage.

1. As to pressure: If more than 2 per cent braking power per pound of cylinder pressure is attempted, a very high braking power for light cylinder pressures is obtained, and, therefore, the cars cannot be handled without shocks at low speeds, and either the range between maximum and minimum braking power obtainable must be very narrow or else wheel sliding will result when the maximum power is used.

2. As to area of brake piston: If the ratio of cylinder piston area to cylinder pressure is excessive, it means either a low leverage, which means great shoe movement, or higher leverage with low pressure, which means very narrow range between maximum and minimum braking power.

3. As to leverage: If the leverage is too low it means excessive air consumption and too much shoe movement; if too high (that is, brake cylinder too small for weight of car, and it is here that the principles governing brake design are violated most frequently) smooth and accurate handling of the car or train becomes impossible and the shoes are constantly grinding on the wheels, consuming the current, wearing out the shoe and causing loss of time, or else piston travel must be lengthened out, thus greatly increasing the air consumption, lengthening the time of application and release, and reducing both service and emergency braking power; not only this, but the high leverage makes necessary a frequent adjustment of piston travel or a constant and very rapid decrease of braking power will result; furthermore, high leverage, if made at truck levers, necessitates low hung brakeshoes, which, when suspended from a spring-supported part of the truck, results in great increase of piston travel and resultant decrease of braking power with the loading of the car; this always occurs at a time when readjustment of piston travel is impracticable and when, instead of a decrease of braking power, an increase is greatly to be desired. Nor is this all; the danger of the levers fouling is greatly increased—particularly is this true where the truck leverage ratio is high—and very frequent and careful inspection is required or the total loss of the brake—and this at a critical moment—may result.

All of the preceding statements could be very much elaborated upon, but it is thought that enough has been said to show that the braking problem has much reason from a profit standpoint to warrant careful consideration being given both to the kind of brake and to its proper installation, and that when to these reasons for consideration is added the one of safety, this part of the car equipment and its installation and care become paramount, and demonstrate that the methods so long pursued of building the cars and trucks with little or no thought for the brakes, and then "sticking on" just what will happen to go, and where it will happen to go, should be abandoned and a new method of giving the brake equal consideration with the other necessary points of design, for at all times much money will be made thereby, and there are times when not money, but life and limb, become the measure of this value.

Mechanical Requirements.

Coming now to the mechanical requirements of the foundation brake gear, the most desirable features in connection with this matter are a motor truck that will permit of a brake design providing a lower truck leverage ratio and a clear movement for the entire wearing out of the brakeshoes of, say, 1½ inches thick, and also provision in motor truck construction for the best location of the brakeshoes on the wheel and the suspension of the brakehead or beam hangers at a proper angle and at such a point on the truck as will maintain a standard location of the shoes on the wheel, regardless of whether the car is light or loaded. These recommendations should also apply to the car builders who in many cases design the car body portion of the foundation brake and in which very often the harmonious working of the hand and air brakes is not taken into account; in fact, it is seldom that a car and truck design can be found upon which even a passable brake installation can be made.

To the end that improvement be made in this direction we suggest for your consideration the following:

(1) That the brake be considered as much an asset as are the motors, etc., and as a part of the profit-making equipment instead of an expenditure and non-producer and be classed, for instance, with the color of the paint on the car.

(2) That, as we are all bound to admit that safety is a prime requirement in railway operation, the brake, being the most vital factor in this connection, should have consideration commensurate with its importance.

(3) That in the design of the car and truck ample space

*Read before the Central Electric Railway Association, Indianapolis, Ind., November 21, 1907.

be allowed for the application of the proper brake equipment and a suitable foundation brake gear right down to the brake-shoes.

(4) That sufficient clearance should be allowed to permit of the wearing out of the shoe and that in the event of piston travel adjustment being neglected, the piston should strike the head before the radius bar or levers foul.

(5) That while a total leverage of from 9 to 1 to 12 to 1 is proper, yet the total truck leverage ratio should not exceed 6 to 1, i. e., one pound exertion on truck pull rod should not give more than six pounds of force, distributed at the four wheel shoes. This, of course, would mean a ratio of 3 to 1 for each truck lever, but $2\frac{1}{2}$ to 1 would be even more preferable; this latter would mean a total truck leverage ratio of 5 to 1. This because when it is exceeded the travel of the top end of the lever becomes great as compared with shoe wear; also the shoe has to be placed very low on the wheel, besides the danger of the lever fouling on the shoe; also the lower the ratio the less change of angle for a given shoe wear.

(6) That proper provision be made for the maintaining as near a uniform piston travel as practicable, in order that (1) the air consumption may be kept low; (2) that uniform braking power may always be had, and (3) a brake of full power assured at all times.

(7) That all truck levers, brakebeams, clevises, pins and rods for truck should be made strong enough to safely withstand the stresses produced with a total braking power on the shoes equal in pounds to the maximum weight of car for which the truck is suitable. This also applies to car body pins, rods and levers.

(8) The following points should also be considered: Release springs of proper strength; brakeshoes as to thickness, area and friction; live and dead truck levers be of the same proportion when motor is used on each truck axle, otherwise provision to allow for motored and idle axles; ample provision for "take up" of shoe wear, slack, etc.; elimination as far as possible of lost motion in journal boxes, pin holes, center plates, etc., that car should have reasonably large truck centers to admit of proper connection of body levers to truck levers by means of pull rods; and that the hand brake be equalized and the multiplication made mostly in the cab by gears, i. e., so that a large force can be applied to the hand-brake chain with consequent small amount of chain to be wrapped up.

Accompanying are prints showing designs for truck with brake rigging. [Not received in time for reproduction.—Eds.] These are intended to give some idea of what should be considered in the design as well as to show that many things have not been considered, and for easy reference the defects and merits have been printed thereon. Some of them show that the efficiency of even a good brake may be reduced to a minimum and in many cases become a source of trouble, and, as far as ordinary service operations are concerned, of loss, others show that what the brake is expected to do is more nearly approximated, care and maintenance reduced to a minimum and troubles eliminated.

It is to be regretted that we do not have for your consideration more designs showing both desirable and undesirable truck designs, but the former are so scarce as to be practically unobtainable, while the latter can be seen under any car you may care to examine. As these problems are physical, mathematical and mechanical, it is certainly not beyond the range of possibility that they may be solved in a way that will be satisfactory to the car and truck builders, profitable to the railway companies and certainly more conducive to the comfort and safety of the public.

Discussion on Brake Rigging.

S. D. Hutchins, Westinghouse Air Brake Company, Columbus, O., opened the discussion. He spoke from the point of view of a manufacturer of air brakes and air brake equipment. He said that not enough attention was given in the design of trucks for the proper hanging of air brake equipments and recommended that, in order to obtain the largest possible braking efficiency from any air brake equipment, some standard be established whereby ample room would be given for an unobstructed installation of the apparatus. By doing this the brakes became more efficient, and on account of a free working latitude and room for adjustment, would better serve the purpose for which they were designed. It was a common practice to install the air brake equipment after the other apparatus had been placed. This made it necessary to hang the pump so that the piston was handicapped in the performance of its real function. By this plan the rigging often got fouled with the truck, to the detriment of its work-

ing efficiency. For the general preservation of life and the protection of property, he thought the truck should be designed and the car assembled only after due consideration had been given to the air brake apparatus that was to be installed. By doing this it would be possible to hang the apparatus as it should be hung and thereby provide a fair lever ratio for the free adjustment of the parts.

Mr. Hutchins thought much good could be accomplished by having the representatives of the many truck manufacturers meet with the standardization committee and work out braking factors according to the weight and length of cars. If this were done the air brake manufacturers, by being advised of a car's dimensions, could at once determine the type of brake equipment with which the car should be equipped. It was stated that by increasing the load of a car, mounted on trucks with the shoe head or brake hanger suspended from other than a substantial and permanently located support, the efficiency of the brake was decreased. As the load increased the position of the shoes was changed in relation to the lever and piston, and necessarily the advantage obtained by proper ratios was lost. It was stated that some change in truck design with this idea in mind should be considered by truck manufacturers.

R. C. Taylor, Indiana Union Traction Company, said the question of providing ample clearance for air brake apparatus should be taken up by the standardization committee. He agreed that much improvement could be made in the efficiency of air brakes. He suggested that possibly the most effective way for increasing the braking efficiency on high-speed cars would be found in the development of an automatic valve which would keep a proper proportion between the service application and the speed at which the car was running when the air was applied. This would obviate the skidding of wheels and the resulting bad effects. If such a valve could be developed for use on interurban cars an emergency stop could be made in less than one-half the distance now required under the same conditions.

Lee W. Jacques, Ft. Wayne & Wabash Valley, believed a valve like that suggested by Mr. Taylor would prove of great value on interurban lines, but would not be very effective in cities where the tracks were bad.

Operation of Pay-as-You-Enter Cars to Begin in Chicago.

The operation of pay-as-you-enter cars will be started by the Chicago City Railway on Sunday, November 24. All the old cars now in use on the Cottage Grove avenue line will be withdrawn from service with the close of Saturday and the operation of the new cars will be begun at 5 o'clock on Sunday morning. Small booklets showing views of the cars and the platform, with a diagram illustrating the entrances and exits, will be distributed among passengers on the Cottage Grove avenue line today. There will be 130 of the new cars placed in service. The booklet for distribution to passengers is attractively printed and contains a brief statement from T. E. Mitten, president of the company, enumerating the advantages of the car.

Based on the figures of last year on the Chicago City Railway, the management has estimated that 30 per cent of the accidents which took place were those of passengers who boarded or alighted from cars while they were in motion. The management believes that accidents will be reduced with the new car. The pay-as-you-enter car was described in the Electric Railway Review of September 21, 1907.

President B. S. Josselyn of the Portland (Ore.) Railway Light & Power Company has announced that plans are being prepared for two clubhouses for the employees, one to be built at Milwaukie and the other at the Piedmont car barns. They will cost \$10,000 each and will contain reading, billiard and card rooms, gymnasiums, baths, committee rooms and other conveniences.

ANALYSIS OF THE COST AND METHODS OF ELECTRIC RAILWAY MAINTENANCE.*

BY ALBERT HERRICK, ELECTRICAL ENGINEER, NEW YORK, N. Y.

The electric transportation interests today are forced to the position where a greater degree of economy in the maintenance departments has become a necessity. We only can locate the inefficient methods by carefully analyzing the different costs of maintenance and ascertaining along what lines they produce the most economical results. There is no inherent reason why the various manufactories of transportation should show such a great variation in the cost of their maintenance and also the marked difference of these expenditures in ratio to the total among the different departments.

It often has been held that grades, combined interurban and city service, and the number of stops per mile, were factors which increased the cost per car-mile maintenance. Careful investigation has conclusively proved that these do not affect the maintenance cost per car-mile, but are the conditions which enforce economical maintenance.

The broad question in this discussion is: what are the causes that lead to high maintenance cost; where is the weakness or extravagance, and where can the expenditures for maintenance be made to produce the greatest revenue possible for the plant.

An abnormal loss in any one part of an electric railway transportation system is not necessarily confined to the portion of the system in which it occurs, but the different parts of the system are so correlated that the secondary effects of the loss are reflected in increased cost in other parts of the system. Take, for instance, an abnormal drop of potential in the distribution system; this increases the current required per car-mile, raises the output on the station, decreases the percentage of useful energy to the total energy developed, increases the heating and depreciation of equipments operating under this low potential and decreases the schedule speed that can be obtained. It is so easy to advise the spending of money that the argument advanced for the increased economy, due to an improvement, is often more apparent than real, to the disappointment of the manager. The function of the maintenance engineer is to make the dollar already spent earn greater revenue, and keep the value of the dollar investment as near its original value as possible and adjust the plant within itself to reduce the maintenance. This may be accomplished by the adoption of labor-saving appliances found effective in other similar systems, by a record of the result of work by individual employes, by a division of labor, and by individualizing the work of each employe, placing him on a competitive footing with his co-laborers, thus introducing a spirit of working for results instead of payday.

Improving the Distribution System.

The distributing system has not kept pace with the improvements on the overload safety devices, and the load factors on the individual feeders are, as a rule, far below what they could be made by having the feeders interconnected through line circuit-breakers, which, in case of a short-circuit on any of the lines, would automatically disconnect it from the others, thereby preventing interruption of traffic on them. It has been found on averaging about 800 feeders for several years, when connected to a fairly well erected No. 00 trolley line, that the feeders average about eight minutes out of operation in 12 months' service, due to line troubles. This average is from feeders taken in different parts of the country. When feeders are properly connected together they are equalizing, and thus reduce the transmission losses between them. I have, in this way, by recommending the expenditure of a few hundred dollars for automatic circuit-breakers, provided with semaphores, which will indicate when they are open, obtained the feeding value, by means of these connections, of thousands of dollars in copper.

It would seem hardly possible that a constant could be derived from an electric railway feeder, but by putting an autographic recording ammeter in series with such feeders, we notice, after a time, a regular recurrence of current variations. Through these can be drawn a curve which will represent the periodicity of load on the feeder. If two adjacent feeders have their peaks coincident the gain from connecting these together is small, and in this case the trolley they feed has to be changed in length so as to put their periods of maximum out of phase, so to speak. Then their connection will mutually reduce the loss between them. It must be borne in mind that while the watt produced in the station is measured by the product of the volts and amperes, the watts loss in the distribution system is the square of the current multi-

plied by the resistance of the circuit through which it is transmitted, and as the standby and fixed charges of the power station are large, it can produce 50 per cent greater output at an advance of only 25 per cent in cost, especially if the load factor is improved, but the losses in the distribution system (if kept the same) have increased 125 per cent.

It is advisable to improve the economy of the distribution system by taking advantage of every possible method and by utilizing properly the conductors we now have to their utmost earning capacity. The easiest possible method is to buy more copper. This should only be done after using every endeavor to utilize the present expenditure to its greatest advantage, and right here is one of the greatest troubles in the electric railway transportation business. The railways have been overbuying for years; one system will scrap what another system has continued to use with economical and commercial success, and they have been led to this abandonment of property which still exists in the capital account of the company, and the arguments and conclusions which led to this change were often based on false and pernicious assumptions.

Locating the Losses.

In transmission losses it is essential to find the mean, average and maximum loads on feeders individually, where these losses occur in distribution under actual working conditions, what portion of the losses is in the copper and what portion is in the ground return system, and what is the cost per annum of these losses. In the station the loads are found by an autographic record of feeders taken during different periods of loading. On the line they are taken by the autographic test car. The data obtained by running over the line with this car give the actual variation of the voltage on the line while the system is in operation. In order to find the total transmission loss a load of 100 amperes is thrown onto the trolley. It is evident that this will produce a drop on the voltmeter. Suppose the voltage before the application of the load was 500, and after the application of the 100 amperes was 450, then the 50 volts difference divided by 100 amperes will give 0.5 ohm for the total transmission resistance. Again, suppose the lowest voltage observed at this point was 400 volts, then the drop on the system is equal to a load of 200 amperes at this point. So, knowing the transmission resistance and the lowest voltage readings, we can immediately determine the feeder load which is equal to all the losses on the feeder at this point of test.

We thus have combined the copper and the ground return losses. We can separate these two by several different methods: One, by figuring the copper resistance at the point of test, and another is by testing the system while out of service to find the copper resistance. This is done by loading the feeder to be tested, using any other feeder from the power station which has no load, as the pressure wire back to the positive bus. Then the difference in pressure between these two feeders, divided by the load on the feeder tested, gives the resistance of the copper feeder at the point of test.

By comparing one feeder with others on the same pole line it can be found which feeders can assist each other to the greatest advantage if they are equalized through an automatic circuit-breaker.

In analyzing the ground return circuit the problem was as follows: That the joint should be measured accurately in less than one-thirtieth of a second; that the sensibility of the instrument should be that of a Weston millivoltmeter; that this instrument should be protected by an automatic device working quicker than the instrument and cut it out of circuit when the potential exceeded that of the calibration of the instrument; that conditions should also be marked on the record; and that every movement of the hand of the instrument should be recorded on the record without any interference with the sensibility of the instrument.

Such results are obtained by my test car, which includes an autographic bond recording apparatus, which has made records of more than 11,000 miles of track and tested and recorded over 3,800,000 bonds. During the past year this car has run records on most of the electric roads in Pennsylvania and has just completed 100 miles in Baltimore, Md., and 200 miles in Rochester, N. Y.

A bond record is produced, giving the different types of track, and from the analysis of the bond record the defective bonding is located. The results show where improvement will produce the greatest revenue for the money expended. We can also determine from this testing method where the ground returns are located, what amount of current they are carrying from the rail, and whether they are properly connected. It is often found that outlying ground return feeders are so connected as not to be utilized to their full carrying capacity. These connections are sometimes broken by the

*Abstract of paper read before the Central Electric Railway Association, Indianapolis, Ind., November 21, 1907.

track repair gang, and often the load can be brought up on a ground return feeder by more frequent taps to the rail.

In case of a foreign connection, such as a water pipe, bridge or steam road track, the contact point of these connections can be located by the reversal of current or a sudden drop of current on the rail at the point of connection to the rail. In a rectilinear system of rails, some lines of rails become the arteries and the others tributaries for the circulation of the current back to the power station; also different power stations swap their ground return current where the overhead systems interfeed in each other's territory.

Some engineers consider that the cars have a cross-bonding effect and only employ cross-bond in the devil strip between tracks. The cross-bond afforded by cars is only very slight and none at all when the car is using current. As much as five volts can exist between rails while a car is rolling over them, and a recording voltmeter in the test car connected between two brushes, one located on each rail, will locate the cross-bonds equalizing the two tracks, and show where more cross-bonds will be effective. Open or defective bonds will cause considerable shuttling of current between rails.

There are inherent losses in rails, due to inductance set up against changes in the current demand; also there is a local counter electromotive force following a car, amounting to as much as 20 volts, depending upon the speed of the car and the amount of current it discharges to the rail.

The bonding record gives all the physical conditions of this ground return circuit, and the electrical resistance of

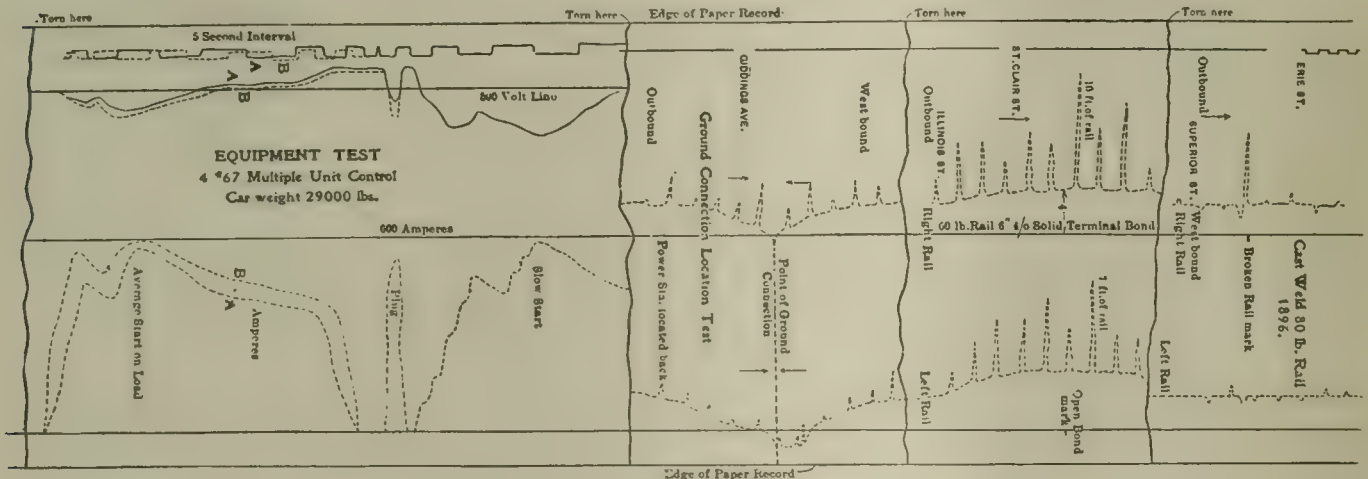
run upon a rail depends upon its resistance and the distance it has to carry the current. Manganese rails have a greatly reduced conductivity; 0.2 per cent manganese will reduce a rail from a 1,000,000 circular-mils copper equivalent to 680,000. As a joint in a rail determines its mechanical stability, so does the bond determine its electrical usefulness. The highest current density I have discovered was 3,100 amperes for a 90-pound rail cast welded. The cost of losses here would have paid 40 per cent per annum on a proper auxiliary feeder copper investment.

The test car earlier referred to runs two records at once, the bond record as explained and a continuous voltage record, while the test car is progressing over the system; and, also, on this same record sheet is taken the transmission losses, and, if desired, the continuous gauge of the tracks while the car is rolling over them, which reproduces the spring in gauge as well as any off gauge which occurs in the track under test.

Equipment.

In comparing the cost of the maintenance of the equipment we find a great variation in these costs throughout the country. There are several conditions that enter into the repair shop which make economical maintenance possible, and on the analysis of a great number of properties the following conditions are found to be essential in order that a low cost per car-mile maintenance can be obtained.

The first question that arises is, do we give the brains we employ on the car maintenance problem sufficient insight



Electric Railway Maintenance—Record of Track and Bond Tests.

each bond. Each half mile of record is given a figure of merit, which is the percentage of the sum of open and defective bonds to the total number of bonds in a half mile. The current density on the rail and its specific resistance determine the rating of the bond as defective. Generally any bond with a resistance greater than 12 feet of adjacent rail is defective, and any joint greater than 120 millivolts is shown as open.

A question I am always asked: "What is the best bond?" The answer is: "The best workman makes the best bond." The care exercised in putting in bonds may make them effective connections or so much junk.

The mechanical joints as electrical connections stand in the following order: The electrical weld gives the most uniform resistance, running about the same as the rail, depending upon the size of the splice bar used. The cast weld varies as the temperature of the metal, which determines the degree of amalgamation, the joints in succession gradually increasing in resistance as the temperature of the metal falls in one heat, and with more than one pouring in a joint increases its resistance. The thermit joints tested show up very well, but enough have not been tested to determine their exact location in the scale; but they are not ahead of electric weld. In regard to the mechanically placed bond, I can only say, generally, that when these bonds are installed by the line department they give better results than when installed by the track department, and when one man has charge of and is responsible for all bonding, its installation and testing show that markedly better results are attained than when done in a haphazard fashion by the track gang. The economy of a system of maintenance of bonding shows both a power saving and a reduced electrolytic hazard.

The economical limit that the current density can be

into the general methods of economical maintenance which have been developed on other systems? It must be borne in mind that the most successful men in car maintenance are those who have grown up with the work and do not necessarily receive their ideas from what they read, but gain their information from what they see in practical work, and it is undoubtedly true where the management allows its foremen to visit other repair shops, good, bad or indifferent, that they pick up certain methods in handling or the repair of the equipment that could be economically introduced in their own plants. A man who is, year in and year out, kept right down to his own proposition gets into a rut. It is not the man, it is human nature, and he continues to apply old methods to new conditions at a loss to his employers. This man could be broadened in his ideas and made a more valuable employee by the co-operation of his employers in allowing him to gain a broader view of the maintenance problem.

These are not ethical principles of street car maintenance, but are conditions actually found where high maintenance costs exist. Where broader methods are used with their employees we find not only lower maintenance cost, but greater life obtained from the equipment, and this is the outcome of the experience of over 100 repair shops throughout the country, and reflects in the cost per car-mile and in the possible earning capacity of a railway property.

There is also a condition of management which affects the conditions of these costs in some cases. Where a spirit of rivalry can be engendered between different repair shops on the same system, on the basis of maintenance cost, this will lead to a greater economy. But I have found that between the operating and maintenance departments in some systems there is not harmony in their relation. There is a tendency to relieve the responsibility in one department by

throwing the burden on the other, not realizing the fact that both departments are for the sole purpose of producing the greatest number of car-miles possible at the lowest cost. From this condition has arisen a movement to put the operating and maintenance departments under one head, this employee to be responsible in turn to the general manager for both the use and the abuse of the equipment.

Taking up the graphic method of investigation the electrical conditions of the equipment while in operation, we select a portion of the system where a large number of equipments pass a day, and preferably on a slight up-grade, and we cut the trolley wire on the up-grade tracks and put in two trolley breakers about 1,000 feet apart, and have only one feed tap to this trolley, which is independent of the other trolley. This tap to the feeder goes through a shunt which is connected to an autographic recording ammeter, a recording voltmeter also being used. The autographic instruments can be located in any building adjacent to the trolley line, so the number of the car can be seen when passing, and also a flagman, who will allow only one car on this section of the trolley wire at once.

The autographic recording apparatus will record the current taken by each step of the controller, the actual watts and time to run this distance, its acceleration and all the physical conditions necessary to obtain the information as regards what this equipment is doing in actual service, and we can discover the habits of the different motormen. I find this is an advantage over putting an autographic apparatus on the car, as then the motorman gets into his best controller habits, but under this method of test he is ignorant of the test being made and is under his normal habits, and by having the different motormen on the same equipment, it is easy to differentiate the defects of the equipment from the motorman's habits.

Apparatus is supplied in four forms, made for the purpose of inspecting the equipment, and the tests made by these inspection sets cover the following points: The division of the resistance as made by the controller, breakdown of any rheostat or its short-circuit, condition of the controller fingers and the contacts they make, resistance of the fields and armatures, their electrical condition, whether the fields are too high or wound with the proper size wire or whether they are too low, whether the insulations are carbonized or the fields short-circuited, and the condition of the armature, whether the bars have been short-circuited or whether the winding has been properly soldered to the commutator. The results also show the relation of the armature with regard to the pole pieces in per cent of clearance and will locate any foreign ground connection in this location; also any poor connections in the cable and controller leads.

I have found that the inspection should be made without in any way changing an equipment by the loosening of a bolt or connection, and would require the use of 500 volts and at least 2 amperes. Otherwise the current and potential, controller contacts and carbon brushes may show opens and insulation.

The details of this system of inspection have been published in all the technical journals, and also in my Electric Railway Note Book and in my book on American Electric Railway Practice, so I will not go further into the analysis of this system at present. I find that everything we can put into the hands of a repair man that will make as clear as possible the functions of the different parts of the equipment, both electrical and mechanical, leads to a clearer conception of the causes which tend to produce defects.

Again, a graphic analysis of the power station gives us an insight into the losses and where they are abnormal, and a diagram of all losses from the combustion of coal in the boiler until this heat appears in overcoming the friction between the equipment and the track, brings out clearly these relations and their relative values and the possible dollar value of economies effected in any one portion of the cycle. The full realization of these values leads to laying stress on those economies which will insure a return, and shows clearly, in this analysis, that there is a greater opportunity for economic improvements in the boiler room than in the engine room, as the nearer the original source you can effect an economy, the greater the economic effect on the whole cycle of energy transformation.

The numerous ways of testing and graphically showing losses in the electric transportation business are for the purpose of giving physical facts from which can be deduced the relative economies of the different maintenances and comparing them with other practices along similar lines and analogous conditions.

Discussion on Testing.

While reading his paper Mr. Herrick digressed from the written text and described his method of making tests of railways and railway equipments. He answered questions and

offered suggestions for the betterment of conditions on many electric railways in the central states. The discussion turned on the advisability and the value of increasing the capacity of feeder wires to aid in caring for fluctuating loads.

F. J. J. Sloat, Ohio Electric Railway, asked whether it would not be more economical to adopt the use of motors capable of standing up under a high voltage and to boost the voltage than to increase the capacity of the copper auxiliaries. For example, if motors could be built to operate both on a 600 and a 1,200 volt current the higher pressure could be used where it is now necessary to boost the voltage on the trolley by auxiliary feeders. He suggested that flexibility, in this respect, in the generating and motor equipment would be more economical than flexibility in feeders. By the adoption of the former plan there would be less roasting and other armature troubles and less trouble with other electric apparatus. Inasmuch as high-voltage lines can be constructed at less expense, and with the use of a smaller amount of copper, it will not be surprising if high-voltage lines are favored in future railway construction.

Mr. Herrick said the future salvation of railways lies in high voltages. If a motor capable of successfully handling 1,200 volts pressure cannot be obtained it may be that the desired relief will be obtained through the use of two 600-volt motors connected in series and operated by current at a 1,200-volt pressure. From tests made in the east he believed that when railways reach the higher amperage loadings they touched a point above which it is not practicable to haul freight and perform the heavy functions of a common carrier.

In answer to a question Mr. Herrick said that most motor troubles found in old equipments could be traced to the re-winding of fields with old wire. He thought that it would soon be the common practice to wind field coils with absolute rigidity, thus preventing the wires from rubbing and ultimately from short-circuiting. This type of field gave less trouble than the almost universal present free type of winding. He said that more armature troubles were found where the wire bands are used than with ribbon bands.

G. H. Kelsay, Indiana Union Traction Company, Anderson, Ind., asked whether anyone had tested the efficiency of different motormen in the use of power in car operation. He had recently installed a wattmeter on a car and taken careful readings after the car had made its daily run of 340 miles. He found that one motorman consumed daily 35 cents worth of power more than another who alternated with him on the same car and under exactly the same conditions.

Mr. Sloat said that on one division of the railway with which he is connected he had found by careful readings that there was a greater variation in the amount of power used by different motormen on comparatively level track than on stretches of track on grade. He had also determined that by instructing his motormen to run up grades on series the amperage used was less than one-half that used in operating with the motors in parallel. One case was mentioned where it required 18 minutes, with the motors taking 202 amperes, to ascend a given grade on series and 15 minutes time and 404 amperes to climb the hill on parallel. The saving in current load in this case on the slow schedule more than compensated for the time gained by the faster acceleration.

Mr. Herrick stated that a railway with many light grades could be operated with greater power economy per car-mile than a railway with no grades.

The question of efficient bonds and wire returns was discussed at length, but no conclusions were reached.

In order to increase the facilities for handling the rapidly growing business of the United States Express Company over its lines, the Ft. Wayne & Wabash Valley Traction Company will in the near future attach an express trailer on one of the early morning westbound cars. The trailer will make one trip daily, relieving the load, to an extent, on the passenger cars. Much of the express matter to Indianapolis is now handled by the United States company.

THE YOUNGSTOWN & SOUTHERN RAILWAY.

The Youngstown & Southern Railway Company of Youngstown, O., has recently begun operating through cars from Youngstown to Lisbon, O., a distance of 28 miles. The road was opened this spring between Youngstown and Columbiana, 16 miles, and service was given over this portion of the road only for several months. The road has since been extended from Columbiana to Leetonia and a traffic arrangement has been made with the Youngstown & Ohio River Railroad whereby through cars are operated over the latter company's tracks between Leetonia and Lisbon. The Youngstown & Ohio River Railroad is building north from East Liverpool and when its line is completed through service will be extended to that point.

The Youngstown & Southern Railway Company was incorporated in May, 1903. Following closely on the incorporation of the company came a consolidation with the Youngstown & Salem Railway Company, and in the summer of 1903 the first work of construction was commenced near Youngstown. At the outset the road was equipped for steam operation, but with ultimate electrification in view. In October, 1904, the roadbed was completed and the road opened for traffic as a steam line between Youngstown and Columbiana. In December of the following year the company secured from the city of Youngstown a municipal franchise for the operation of an electric line for a period of 25 years. Steam service was continued until the equipment of the road for the use of electric power had been installed, when the locomotive gave way to the trolley. J. G. White & Co. of New York were consulting electrical engineers during the work of electrification.

At the present time the terminals of the company are at Front and Market streets, in Youngstown, where the passen-

ger and freight station, illustrated herewith, has been erected, and on Mill street, Leetonia, where another handsome station is to be erected.



Youngstown & Southern Railway—Terminal Station at Youngstown.

mean importance. Leetonia is equally important, bringing the population of the section traversed by the road up to 80,000.

The line is built almost entirely upon private right of way, one-half mile only within the city of Youngstown being



Youngstown & Southern Railway—Standard Passenger Car.

ger and freight station, illustrated herewith, has been erected, and on Mill street, Leetonia, where another handsome station is to be erected.

The new road traverses the rich farming section of eastern Ohio, touching a number of important shipping points and settlements from which is received such a volume of traffic as to augur well for the future of the system. Youngstown, the northern terminus of the line, has a population of about 70,000, and in industrial operations is the most prosperous city between Cleveland and Pittsburg. Eleven miles to the

over public thoroughfare, where paving between tracks and one foot outside is a franchise requirement. For the rest of the distance the private right of way has a width of 50 feet. In its construction it was necessary to make a number of cuts, the deepest being 16 feet, while the heaviest fill was 12 feet.

Outside of the city 70-pound rails, in 33-foot lengths, are used, with Weber and Duquesne joints. The ties are of white oak and are ballasted to a depth of eight inches. Inside the city 90-pound girder rails are used. On culverts and bridges a

concrete foundation has been laid. The maximum grade is 2.8 per cent. There are only three curves.

For the overhead construction the 35-foot poles of cypress and cedar, treated with carbolineum and set six feet in the ground, were spaced 100 feet apart. The two trolley wires, No. 000, were furnished by the J. A. Roebling's Sons Company, Trenton, N. J. The hangers are of H. W. Johns-Manville manufacture. The feeder lines are 300,000 circular-mils stranded and No. 0000 solid wire.

Car Equipment.

The car equipment consists of two coaches, two combination passenger and baggage cars and one express car, furnished by the Niles Car & Manufacturing Company and built according to the railway company's specifications. The dimensions of the two passenger coaches are: 51 feet 9 inches over buffers, 40 feet 8½ inches over end plates; length of main passenger compartment, 28 feet 1¼ inches; length of smoking compartment, 11 feet 11⅞ inches; width of bodies over sills, 8 feet 5 inches; width over all, 8 feet 9 inches; width of aisle, 20½ inches; height from under side of sill to

and side sills, consisting of one piece of yellow pine 2 by 6 inches and one piece of yellow pine 5 by 8 inches with a steel plate ⅝ by 7¾ inches, bolted between the entire length of car body. The floor is double, with heavy building felt between. The needle beams are of 6-inch steel I-beams. The trussing and bracing of the bodies is in conformity with Pullman standard practice. The bolsters are of heavy steel plates.

These cars are equipped with four Westinghouse 75-horsepower motors, Westinghouse air brakes, Van Dorn drawbars, Nichols-Lintern air sanders, the Lintern system of electric signals, furnished by the Ohio Brass Company, and are heated with Peter Smith hot water heaters.

The two combination passenger and baggage car bodies are of the same general design, construction and fittings as the passenger coaches. They have a 10-foot baggage compartment at the forward end of the car and have a seating capacity of 42.

The 50-foot express car is of Niles standard design, the bottom framing consisting of two center sills of 6-inch steel I-beams, outside sills of yellow pine, 8 by 5 inches, reinforced with a steel plate the entire length of the car and interme-



Youngstown & Southern Railway—Concrete Crossing Under Highway.

top of roof, 9 feet 5 inches; height from track to top of roof, 12 feet 9 inches. The seating capacity is 54; weight of body, 28,000 pounds.

The interior of these coaches is finished in cherry, having all panels flush and outlined with neat marquetry lines. The ceiling is of full empire style, is painted, decorated in gold and varnished with gloss finish. The seats, made by the Hale & Kilburn Manufacturing Company, are of high head-roll type and upholstered in plush in the main passenger compartment and in genuine leather in the smoking compartment, having arm rests and corner grab handles. The windows are of Pullman style, the lower sashes being glazed with polished plate glass and the gothic and deck sashes with cathedral art glass. The window shades are made of "Pantasote" and are fitted with the latest fixtures. The trimmings are of polished bronze. The toilet room is located in the rear left-hand corner of the car. The parcel racks are of an independent type of neat design.

The bottom framing consists of two center sills of 6-inch steel I-beams, two intermediate sills of 6-inch steel I-beams

and side sills of long-leaf yellow pine, 6 by 3¾ inches. The trussing and bracing of this car is the same as the Pullman steam road baggage cars. The interior is finished with tongued and grooved yellow pine, oiled and painted, with carlines showing in the roof. The roof is of the full length monitor deck style with steam coach type of hood and the outside of the car is made to look as much as possible like the passenger cars. The car is fitted with M. C. B. couplers, automatic air brakes, arc headlight, Nichols-Lintern air sanders, alarm gongs, signal bells, etc.

The cars are all mounted on Baldwin heavy interurban trucks having 6-foot 10-inch wheel base, Standard solid forged rolled steel wheels, 36 inches in diameter, 5½-inch hammered steel axles with 4¼ by 8 inch journals, Symington journal boxes and triple elliptic bolster springs, each truck weighing without motors about 10,000 pounds.

The car house and shops occupy a building 60 by 150 feet just outside the city limits of Youngstown.

At present the company purchases a part of its power from the Mahoning & Shenango Railway, and the remainder

from the plant of the Cherry Valley Iron Company at Leetonia. Power is to be furnished later by the Youngstown & Ohio River Railroad, which is building a large power house at West Point, which is expected to be completed this year. Three-phase current for the operation of the line will then be supplied at a voltage of 22,000 and transmitted to a substation at North Lima, where it will be converted to 600 volts direct current.

Terminal Building.

The company has an especially neat and convenient passenger, freight and office building at the Youngstown terminal. Two frame buildings at the rear of the property were remodeled to serve as a freight station and an employees' room and the handsome 2-story building shown in the illustration was built for offices, waiting room and ticket office at a cost of about \$10,000. The first story is of buff pressed brick and the second is finished in cement plaster. The general offices occupy the second floor and are finished in an especially attractive manner.

The officers of the Youngstown & Southern Railway are: John Stambaugh, president; S. J. Dill, vice-president and general manager; David Tod, secretary and treasurer; W. F. Bass, auditor and assistant treasurer; E. H. Raupp, assistant superintendent; J. McCloskey, roadmaster; and Otto Lind, master mechanic, with offices at Youngstown.

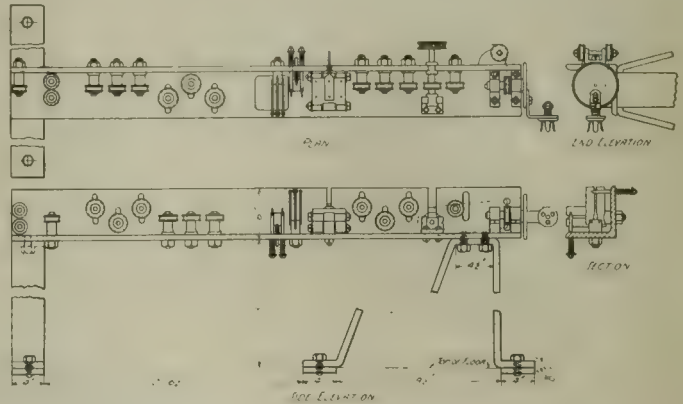
According to an exchange there have recently been placed on the market in Vienna, Austria, brushes made of glass, which are to replace emery cloth for cleaning and polishing the commutators of dynamos and motors. These brushes are said to clean the commutators without scoring the metal, and their use avoids the inconveniences and dangers of emery cloth.

The Lehigh Valley Transit Company has recently installed on its main line and branches a private telephone system, by means of which remote as well as nearby points will be afforded immediate connection with the operating center of the system. A switchboard with 10 lines, which later may

WIRE CLEANING AND RETAPING DEVICE.

The accompanying illustrations show the details and general appearance of a wire cleaning and taping machine which is used in the shops of the Oakland Traction Company, Oakland, Cal. By the use of this machine the copper wire in burned-out or otherwise defective coils is cleaned and retaped ready for second use. The machine automatically takes wire from the old coil, scrapes off the old insulation, straightens and cleans it and then retapes the wire with new adhesive insulating tape.

One of the illustrations shows the general dimensions



Wire Cleaning and Retaping Device—Plan, Elevations and Section.

of the device and the other affords a general view of the wire cleaning and taping device in service.

Wire to be cleaned and retaped is fed into left-hand end of the machine, passing over and under the sets of straightening wheels shown in the illustration. At the center of the machine are sets of knives which scrape off the old insulation. Immediately to the right of the scraping knives are two hinged rubbing surfaces of felt, which complete the cleaning



Wire Cleaning and Retaping Device—Wire Being Cleaned and Retaped.

be increased to 25, as the service demands, has been installed in the offices of the company and wires have been strung to the car barns, substations, power house and general offices. The lines are carried on the company's poles to the termini of all trolley lines and have connections at every switch. Each car will be equipped with a portable telephone set connected with a plug to be fitted into jack boxes on the poles.

of the wire. A second set of guide wheels then completes the straightening of the wire and it passes out through the hollow shaft of a revolving arm carrying a ball of adhesive tape, which is wound on to the cleaned wire with an even lap, the taping part of the device being driven according to the speed of the wire by one of the straightening wheels. The illustration shows a wire being cleaned.

THE DETERMINATION OF THE CORRECT BRAKING POWER TO BE APPLIED TO ELECTRIC CARS AND LOCOMOTIVES.

BY H. M. PREVOST MURPHY, MECHANICAL ENGINEER.

Up to within the last few years the problem of stopping trains by the use of power brakes has involved merely the question of destroying the kinetic energy of translation of the various cars and locomotives used, together with the comparatively small energy of rotation of the wheels, which amounts to so slight a per cent of the total and is so nearly the same for the various classes of cars and steam engines in service that its effect is very closely offset by the resistance of the wind, journal friction, etc., and consequently it is always negligible in computations. Because of these uniform conditions, long experience and extensive experiments have led to the adoption of certain standard percentages of braking force, based on the weight of the vehicle, for various kinds of service. The limiting conditions are, of course, the relation between the adhesion of the wheels to the rail and the coefficient of friction existing, under different conditions, between the tire and the brakeshoe, as the skidding of wheels not only ruins the rolling stock, but also, as has been frequently demonstrated, detracts materially from the efficiency of a properly installed brake. Thus the recommended practice has been to so design the brake rigging for freight cars that when the brake is fully applied the total force with which the brakeshoes are forced against the wheels is from 70 to 85 per cent of the weight of the car, whereas, for passenger service, where the speeds are higher and consequently the coefficient of friction between the shoes and wheels is lower, it is customary to use a braking power of 90 per cent, and so on.

Recently, however, the developments in electric railway equipment have complicated the braking problem by the fact that the energy of rotation of the large armatures employed must also be destroyed before the trains can be stopped. In order to solve this question satisfactorily it is evident that the additional braking force applied to the wheels connected to an armature must be of such an amount that it will destroy the kinetic energy of rotation at the same rate that the car or locomotive would be retarded if its dead weight alone had to be considered and the brake were properly designed. That is, the increase in braking power must be of such an amount that its retarding effort on the driving wheels exactly offsets the propelling force of the revolving armature, and this regardless of variations of speed, dead weight braking power and changes in the coefficient of friction, for otherwise the additional braking effort would either exert less force than that required to stop the rotation of the armature in the proper time and consequently the stop would be drawn out, or an excess of braking force would result and there would be a greater retarding effort exerted on the wheels than is desirable in order to prevent skidding.

In order to determine this exact amount of additional braking effort, the outside diameter and weight of the armature, the diameter of the driving wheels and the gear ratio must be known, in addition to the total amount of dead weight on the axle concerned and the recommended braking power that should be used if there were no rotative energy of armature to be destroyed in making stops.

Development of Formulæ.

The necessary formulæ may be developed as follows:

Let T = Total (dead) weight on the axle geared to motor.

S = Weight of armature complete.

W = Diameter of driving wheels on axle.

A = Greatest outside diameter of armature.

N = Gear ratio, i. e., the number of teeth in axle gear, divided by the number of teeth in motor pinion, or the number of revolutions of the armature for one revolution of driving wheel.

R = Radius of gyration of armature, i. e., the radius of the circle in which the concentrated mass of the armature would have the same kinetic energy as in reality if rotated at the same number of revolutions as is actually done in any case considered.

V = The velocity of the car or circumference of the driving wheel, with reference to its center at any instant considered.

U = The velocity of the moving end of the radius of gyration with respect to its center corresponding to the velocity, V , of the driving wheel.

F = The coefficient of friction existing between the wheel and shoe at the instant considered.

p = The recommended per cent of braking power for the axle, considering the dead weight alone.

P = The total actual per cent of braking power that should be used for the axle, considering both the dead weight and the energy of rotation of the armature.

B = The total actual braking force that should be used for the axle, considering both the dead weight and energy of rotation of the armature.

L = The distance in feet covered by the car during the infinitesimally short period of time that its velocity is decreased from V to v , and the velocity U reduced to u . This distance should be considered as being very short indeed, so that the value of F remains practically constant while it is passed over.

We may now proceed to develop the desired formulæ by the following method:

We know that:

$U = 2 \times 3.1416 \times R \times$ number of revolutions of armature per second, and $V = 3.1416 \times W \times$ number of revolutions of driving wheels per second; whence,

$$\frac{U}{V} = \frac{2 \times 3.1416 \times R \times \text{revolutions of armature}}{3.1416 \times W \times \text{revolutions of drivers}} = 2 \times \frac{R}{W} \times N;$$

$$\text{therefore, } U = 2 \times \frac{R}{W} \times N \times V \dots \dots \dots \text{Equation I}$$

$$\text{also, } u = 2 \times \frac{R}{W} \times N \times v \dots \dots \dots \text{Equation II}$$

At the beginning of the instant considered the energy of translation of the entire mass carried by the axle is,

$$\text{Energy of translation} = \frac{1}{2} \times \frac{T}{32.16} \times V^2, \text{ and at the end of the instant we have similarly,}$$

$$\text{Energy of translation} = \frac{1}{2} \times \frac{T}{32.16} \times v^2, \text{ whence,}$$

$$\text{The loss of energy of translation} = \frac{1}{2} \times \frac{T}{32.16} \times (V^2 - v^2) \dots \dots \dots \text{Equation III}$$

$$\text{also, } \text{The loss of energy of (armature) rotation} = \frac{1}{2} \times \frac{S}{32.16} \times (U^2 - u^2), \text{ or by substituting for } U \text{ and } u \text{ the values given by Equations I and II,}$$

$$\text{The loss of energy of (armature) rotation} = 2 \times \frac{S}{32.16} \times \frac{R^2}{W^2} \times N^2 \times (V^2 - v^2) \dots \dots \dots \text{Equation IV}$$

But the work done by the brake in reducing the energy of translation is $(p \times T \times F) \times L$ = retarding force \times distance, whence, by Equation III and the law of conservation of energy,

$$p \times T \times F \times L = \frac{1}{2} \times \frac{T}{32.16} \times (V^2 - v^2) \dots \dots \dots \text{Equation V}$$

Also the work done by the brake in reducing the energy of rotation of the armature is,

$(P - p) \times T \times F \times L$ = retarding force \times distance, whence, by Equation IV and the law of conservation of energy,

$$(P - p) \times T \times F \times L = 2 \times \frac{S}{32.16} \times \frac{R^2}{W^2} \times N^2 \times (V^2 - v^2) \dots \dots \dots \text{Equation VI}$$

By dividing the members of equation VI by those of Equation V, we get,

$$\frac{(P-p) \times T \times F \times L}{p \times T \times F \times L} = \frac{2 \times \frac{S}{32.16} \times \frac{R^2}{W^2} \times N^2 \times (V-v)}{\frac{1}{2} \times \frac{T}{32.16} \times (V-v)}$$

$$\frac{P-p}{p} = 4 \times \frac{S}{T} \times \frac{R^2}{W^2} \times N^2, \text{ whence,}$$

$$P = p \times (1 + 4 \times \frac{S}{T} \times \frac{R^2}{W^2} \times N^2) \dots \dots \dots \text{Equation VII}$$

But the radius of gyration for a solid cylinder is equal to $\frac{1}{\sqrt{2}}$ the outside radius and extensive experiments with armatures have shown that this is very close to the actual

value, consequently, $R = \frac{1}{\sqrt{2}} \times \frac{A}{2}$ and $R^2 = \frac{1}{2} \times \frac{A^2}{4}$, and by

substituting this value of R in Equation VII, we get,

$$P = p \times (1 + \frac{S}{T} \times \frac{A^2}{W^2} \times \frac{N^2}{2}) \dots \dots \dots \text{Equation VIII}$$

and the total braking force to be applied to the axle is,

$$B = P \times T \dots \dots \dots \text{Equation IX}$$

That is, Equations VIII and IX give the correct per cent of braking power and actual braking force for all conditions, no matter what the weight and diameter of the armature and the gear ratio may be. It will also be noted that neither formula involves the coefficient of friction nor the speed, which simply means that both are always applicable to any case, no matter what the particular conditions may be. These formulæ, if used correctly, will, therefore, insure that at each and every point of a stop the motor will be retarded at the proper rate, that is, that its rotation will never tend to urge the car forward nor will there ever be an excess of braking force tending to skid the drivers. Consequently the stop will be made in exactly the same distance as it would have been if there had been the same dead weight but no rotating armature, and no increase in braking force for that reason.

To illustrate the use of these equations, we will give the following examples:

Example 1.

Find the proper per cent of braking power and the braking force to apply to the wheels of an electric locomotive weighing 100,000 pounds complete, the weight being evenly distributed on four axles equipped with 48-inch diameter drivers and each geared to a motor having an armature weighing 3,000 pounds, with 30-inch outside diameter, and making two revolutions for one of the drivers. For the class of service required the per cent of braking power would be 90, if there were no rotative energy of armatures to be destroyed.

From the above we have,

$$p = 90, S = 3,000, T = \frac{100,000}{4} = 25,000, A = 30, W = 48, N = 2,$$

then by substituting,

$$P = 90 (1 + \frac{3,000}{25,000} \times \frac{30 \times 30}{48 \times 48} \times \frac{2 \times 2}{2}) = 90 \times 1.094 = 98\frac{1}{2}$$

$$\text{per cent; also, } B = P \times T = \frac{98\frac{1}{2}}{1,000} \times 25,000 = 24,625 \text{ pounds}$$

(for each axle).

Example 2.

Find the proper per cent of braking power and the braking force to be applied to the wheels of an interurban car weighing 50,000 pounds complete, the weight being evenly distributed on the four axles of the two trucks, the wheel having a diameter of 33 inches and each being geared to a motor having an armature weighing 800 pounds, with an outside diameter of 15 inches. The gear on the axle has 66 teeth and the motor pinion 22. For the class of service required

the per cent of braking power would be 95 if there were no rotative energy of armatures to be destroyed.

From the above we have:

$$p = 95, S = 800, T = \frac{50,000}{4} = 12,500, A = 15, W = 33,$$

$$N = \frac{66}{22} = 3; \text{ whence, } P = 95 (1 + \frac{800}{12,500} \times \frac{15 \times 15}{33 \times 33} \times \frac{3 \times 3}{2})$$

$$= 95 \times 1.0595 = 100.6 \text{ per cent; also, } B = P \times T = \frac{1,006}{1,000} \times$$

$$12,500 = 12,575 \text{ pounds (for each axle).}$$

Example 3.

Find the proper per cent of braking power and the braking force to be applied to a street car weighing 40,000 pounds complete, and having two 4-wheel trucks, each truck having one motor, which is geared to one of its axles. The axles having motors carry a weight of 12,000 pounds each and the non-motor axles each carry 8,000 pounds. The weight of each armature is 1,200 pounds, and its outside diameter is 16 inches. The motor pinions have 30 teeth and the gears on the axles 75 teeth. The diameter of the driving wheels is 32 inches, and the conditions of service require 85 per cent braking power on the non-motor axles.

From the above we have:

$$p = 85, S = 1,200, T = 12,000, A = 16, W = 32, N = \frac{75}{30} = 2.5;$$

$$\text{whence, } P = 85 (1 + \frac{1,200}{12,000} \times \frac{16 \times 16}{32 \times 32} \times \frac{2.5 \times 2.5}{2}) = 85 \times$$

$$1.078 = 91.6 \text{ per cent; also, } B = P \times T = \frac{916}{1,000} \times 12,000 =$$

$$10,992 \text{ pounds (for each motor axle), and for each non-motor}$$

$$\text{axle the total braking force is, of course, } \frac{85}{100} \times 8,000 = 6,800$$

pounds.

Example 4—Modification of Example 3.

Find the proper per cent of braking power and the braking force to be applied to a street car weighing 40,000 pounds complete, and having two 4-wheel trucks, each truck having one motor, which is geared to one axle, but both axles of each truck being coupled together by connecting rods attached to the driving wheels (as is the case with some of the Pittsburg Railway's cars). The axles geared direct to each motor carry a weight of 12,000 pounds and the non-motor axles each carry 8,000 pounds. The weight of each armature is 1,200 pounds, and its outside diameter is 16 inches. The motor pinions have 30 teeth and the gears on the axles 75 teeth. The diameter of the driving wheels is 32 inches and the conditions of service would require 85 per cent braking power if there were no rotative energy of the motors to be destroyed.

This problem may obviously be solved correctly by applying the same braking force to the motor and non-motor axles as in the case of Example 3, in which event there will be no strain whatever on the connecting rods while the stop is being made (and this is probably the best method) or the work of destroying the rotative energy of the armature (on each truck) may be divided between the two axles in proportion to the weight carried by each, so that the connecting rods will be performing work while stops are being made. This may, of course, be done as follows: From Example 3, the braking force necessary to retard the armature rotation at the proper

$$\text{rate is } (\frac{916}{1,000} - \frac{85}{100}) \times 12,000 = 792 \text{ pounds. Then the brak-}$$

ing force on the motor axles would be,

$$\frac{85}{100} \times 12,000 + \frac{12,000}{12,000 + 8,000} \times 792 = 10,675 \text{ pounds,}$$

and the braking force on the non-motor axles would be,

$$\frac{85}{100} \times 8,000 + \frac{8,000}{12,000 + 8,000} \times 792 = 7,117 \text{ pounds.}$$

MASSACHUSETTS STREET RAILWAY ASSOCIATION.

The regular monthly meeting of the Massachusetts Street Railway Association was held at Young's hotel, Boston, Mass., on Wednesday, November 13. After the dinner and the transaction of routine business, Lee H. Parker, railway engineer of the Stone & Webster Engineering Corporation, Boston, presented a paper, an abstract of which follows:

The general tone and scope of the large number of ably written papers read before the American Street and Interurban Railway convention at Atlantic City recently were along the line of economies in railway construction, operation and maintenance. This is a good time for managers to look into matters like the redistribution of feeder copper, the study of power requirements, the revamping of power stations, renewal of track bonding, cutting off of dead car mileage, readjustment of car resistances and many others of equal importance.

There is no question but that, in most cases, a careful study would reveal the possibilities for great economies, which would, in a short time, considerably more than pay for the expense incurred in making the same. A great many roads, for some time, have found it to their advantage to employ continually the services of some of the representative engineering firms for the purpose of keeping their equipment in good condition and of advising the management from time to time on matters of operation, maintenance, etc.

Power Economies.

In this connection, therefore, I take the liberty of calling your attention briefly to some methods in vogue for studying these various requirements and economies. Taking up first the question of power requirements: Most of you are well aware that during some times in the history of many of our electric railway systems throughout the country there have been shortages of power. This is always very embarrassing to the manager of the road. He has to shut down shop motors, turn off car heaters and when snow plows are on the road he may have to take off a few cars here and there. In general, he has to economize on power wherever possible. At the power station the dynamos and often the complete equipment are subject to dangerous overloads. If this deficiency requires the frequent taking off of cars, or what results in the same thing, prevents the addition of cars to the service when there is demand for them, the public and the press take a hand in the matter without loss of time and we hear of applications for relief to the state commission and the disciples of municipal ownership increase their membership for the time being. Most of the manager's intimate friends announce to him that they have turned socialists on account of the fact that they have to hang on to straps in his cold and badly ventilated, infrequently run cars. Every one of you managers will concede that it is the best policy to foresee, so far as possible, the demand for additional power. We believe that on account of the present state of the electrical art it is impracticable to estimate the growth of load of any system for more than five or six years into the future. The estimates for future requirements for any road can be best studied by taking as a basis the growth of the load in the past for as many years as statistics are available. A fairly complete analysis of total yearly load can be obtained from these statistics and it is possible to analyze the load into the following elementary factors:

1. Population.
2. Revenue passengers per capita.
3. Revenue miles run per revenue passenger carried.
4. The average weight of cars.
5. Watt-hours per ton-mile, or, in other words, the energy expended per ton-mile measured at the direct-current switchboards.

It is possible to plot curves of these elementary factors for the past years and we are then able to determine the trend and consequently the probable future increases or decreases in their values. After determining separately the values of these various factors for, say, the future five or six years, we are then able to combine them into the resulting total yearly outputs for any time during this future period. In other words, the product of these five factors, i. e., the watt-hours per ton-mile times the average weight of car times revenue miles run per revenue passenger, gives you the energy expended per revenue passenger. Multiplying this by the revenue passengers carried per capita per year and then by the population for that year, we have the final product as the total kilowatt-hour output from the direct-current switchboards for that particular year. In conjunction with the study of the future peak loads and the determination of the load factor of the system for these various years we are then able to de-

termine what the maximum total kilowatt load should be at any time for the future period.

It must be borne in mind, however, that in determining the future trend of the values of these elementary factors, one must take into consideration the conditions and influences which tend to produce variations in their values. For an illustration, take the elementary factor of revenue passengers carried per capita, or what might be well called the "riding habit" of the community; this will be largely controlled by the following conditions:

Area served.

General character and condition of service.

General business activity.

Wealth per capita.

Attractions furnished by the company.

Foreign business handled over the company's tracks.

Competition from other transportation companies.

Other elementary factors have a great many conditions which have to be taken into consideration in carrying out this study. After having determined what the future power requirements are, of course, the next step is to design the power station, substation distribution equipment, etc., so that the power capacity at all times will be at a comfortable margin greater than the possible demands. I believe that you will all agree with me that such a careful study will give much better results and save a great deal more money in the long run than any "rule of thumb" or "hit or miss" method could possibly accomplish. I believe I have already mentioned the fact that a great deal of money can be saved by redistributing feeder copper or equalizing the pressure over the system.

Where roads have two or three old-fashioned and inadequate car houses it generally requires quite a little study to determine whether these could be replaced by one new, up-to-date, central car house. On the face of it this would appear to be a foregone conclusion, but perhaps a careful study of the matters affected, such as insurance, taxes, dead mileage, relative economy in labor account, facilities for getting cars or snow plows on the line on short notice and several other matters, might prove that it would be better to revamp or completely rebuild the existing old houses. The manager should not take too much for granted along these lines, but should be very sure he is right before he goes ahead to do any car house building.

I have so far in my remarks attempted to give an idea of the importance of making economies and before doing so to have a careful study made of the particular conditions by some reputable engineering firm.

There is one more point in this connection that I should like to call your attention to and that is the matter of making appraisals either for adjustment of taxation rate, for sale of property, or in connection with the applications for additional issues of stock. Any one who has ever done any work of this kind realizes what a long and laborious task it is to inventory the equipment of an electric railroad, and after it is inventoried there is a lot of time and trouble required in putting prices to the detailed equipment. I would only say regarding this matter that our larger constructing engineering firms throughout the country are usually well equipped with purchasing departments, through which they are continually in touch with prevalent market prices. This will be found to be of great value in the expeditious handling of an appraisal job.

Interurban Railway Projects in Texas.

I shall conclude my remarks by giving you some idea of what is being done in the way of interurban railway projects in Texas. You have doubtless heard of these various projected roads. There is one now being built between Dallas and Sherman, a distance of 63 miles. This road will have an equipment practically the same as most of the existing interurban roads in Ohio, Indiana, Illinois and Michigan; that is to say, it will be a single-track road with turn-outs, using 80-pound rail, standard section, creosoted pine ties, gravel ballast, overhead No. 00 trolley wire with pine poles and will operate single cars (but having multiple-unit control) at a schedule speed of about 24 miles per hour and a maximum speed of 45 miles per hour. The equipment for such cars is generally, as it is in this case, four 75-horsepower motors. The total cost of this road will be about \$36,000 per mile, including engineering, contingencies and interest during construction.

The projected road between Galveston and Houston will be nearly 45 miles long between the city limits of Galveston and Houston. In the cities the trains of two cars will run over the tracks of the existing city systems, using direct current from the regular 500-volt trolley. Between the city limits, however, it is expected to make the run of 45 miles in one hour, with about seven or eight stops. This will mean maximum speeds up to 65 or 70 miles per hour. As a consequence the rolling stock will be rather heavy, that is, it will approxi-

mate regular steam service conditions, such as are obtained on the West Jersey & Seashore branch of the Pennsylvania Railroad between Camden and Atlantic City. It is proposed to operate between the city limits with single-phase alternating current, having 6,600 volts on the trolley wire, which will be of the standard No. 0000 grooved section.

For the purpose of comparison I shall mention that the cost for the single-phase section only of this latter road will be about \$40,000 per mile. Of course, these figures are all based on prices available some few months back and, if they were revised on the basis of the present market prices for copper and other commodities, they would no doubt be reduced substantially.

I wish merely to call your attention to the excess of cost per mile for the single-phase road over that for the direct-current road between Dallas and Sherman, as being due to the difference in schedules and size of equipments. That is to say, the single-phase road will have 50-ton motor cars equipped with four 125-horsepower motors and will haul 25-ton trailers; while on the direct-current road above mentioned the equipment is much smaller. If this smaller equipment were put on the single-phase road the difference in cost per mile between the single-phase and direct-current systems would be considerably in favor of the single-phase system. There are several other 30-mile interurban lines projected or in process of construction, namely, the Dallas & Terrell, Dallas & Waxahachie, Austin & Lockhart and Ft. Worth & Denton.

BOOK TABLE.

Electric Railways. By James R. Cravath and Harris C. Trow, S. B. Published by the American School of Correspondence, Chicago, 1907. Book, 153 pp., 6½ by 9½ in., 114 illustrations. Cloth, price, \$1.00.

In accordance with the plan of a development of a technical library by the American School of Correspondence this book has been written with the idea of furnishing a practical view of electric railway apparatus. The fundamental theories of design have not been considered, but the various pieces of apparatus which go to make up the complete equipment of an electric railway have been described in words that will be understood by those not favored with a technical education.

The reading matter is illustrated by halftones and zinc etchings showing apparatus of standard manufacture and various diagrams of connections. It would seem that this new book should be of especial value to those who desire to obtain a general working knowledge of electric railway apparatus without undertaking the study of the fundamental principles.

Pocket Book of Electric Lighting and Heating. By Sidney F. Walker, R. N. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York, 1907. Book, 438 pp., 4 by 6½ in., 272 illustrations, 266 tables. Flexible leather, price, \$3.00.

As outlined by the author in the preface this electric lighting handbook is divided into eight sections. The introductory section deals with definitions, the different units employed, the laws of electric circuits, the differences between the working of continuous and alternating currents, the laws of electro-magnetic and electro-static induction, etc. Succeeding sections deal respectively with electric generators, accumulators, switchboards, switches, circuit-breakers, etc.; cables, their sizes and methods of insulation; measuring and testing instruments; lamps and fittings; and a final section discussing apparatus for heating by electricity.

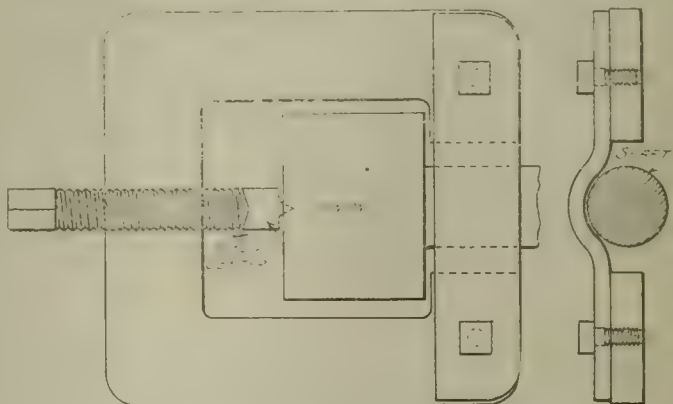
It is evident that throughout this well-printed handbook the author has endeavored to provide as much information regarding sizes, weights, efficiencies, dimensions and similar quantities for the apparatus described as could be included within the space available. It also is evident that he has so classified the various data as to make the book a valuable ready reference for those who require in handy form the fundamental information of electric lighting engineering.

The report of the Illinois state board of equalization issued on November 13, shows an aggregate assessment of the 31 electric roads in the state, with a total mileage of 889, at \$7,852,520, as compared with \$6,763,321 for 1906.

SCREW DEVICES FOR STARTING PINIONS AND STRAIGHTENING ARMATURE SHAFTS.

The master mechanic of the London (Ont.) Street Railway has devised and put into use in the company's repair shops the two devices herewith described and illustrated.

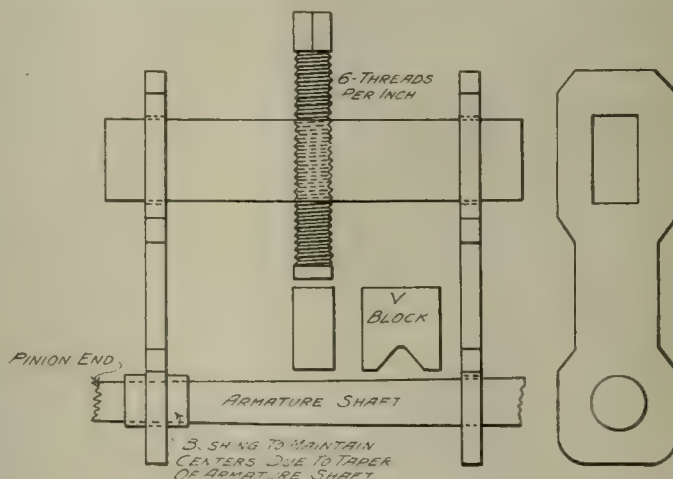
For starting pinions off armature shafts the device shown is placed centrally with the pinion, the screw point engaging the lathe center in the end of the shaft. The ends of the device are placed behind the pinion, being held in position by the ½-inch band passing over the shaft. By this means the pinion can be quickly and easily started without injury



Screw Devices—Pinion Puller.

to any of the parts, the screw point being made separately to maintain the true center of the armature shaft. The device is made in two or more sizes to accommodate the various pinions and shafts.

The device for straightening bent armature shafts is intended for use in connection with armature lathes. It consists of separate parts made adjustable to use at any point on the shaft. Where the bend occurs at the end of the armature a strong metal band is placed around the armature



Screw Devices—Armature Straightener.

and used in place of one of the side members as shown. The device is so simple that a detailed explanation is hardly necessary. It is made in more than one size.

The Omaha & Council Bluffs Street Railway Company last week paid the wages of all of its employees, except the office forces, in nickels. It was proposed to pay the men in bank certificates, but many of them objected. When an officer of the company called the men together and explained that the company was short of currency someone asked, "What do you do with the nickels?" Whereupon it was decided to pay the men with 5-cent pieces.

THE PITTSBURG & WESTMORELAND RAILWAY.

The Pittsburgh & Westmoreland Railway, Irwin, Pa., has been completed and is now in operation from McKeesport to Irwin, Pa., a distance of 8½ miles. The section just completed forms a connection between the West Penn Railways system at McKeesport and the Pittsburgh McKeesport & Greenburg lines at Irwin. The company is just beginning the construction of a 4-mile extension from Hahntown to Herminie and is about to purchase material for this work. This extension was financed entirely by local capital through President Manning Stires. It is the intention of the company to continue this extension through Blackburn and West Newton to Donora, 16 miles from Hahntown. At Donora it will connect with a line to Monessen, a city with a population of some 20,000, two miles

rails and 9 feet 2 inches in height. They are built with steam coach type of roof and full vestibules. The accompanying illustration shows one of these bodies as a closed car.

The electrical equipment comprises four Westinghouse 101-B 40-horsepower motors to each car, K-28-B controllers, double trolleys, Climax combination arc and incandescent headlights. Westinghouse straight air brakes, Peacock hand brakes and Van Dorn couplers are used. The curtains are Pantasote, the seats spring cane upholstered, Hale & Kilburn walkover type, and the fare registers are the latest model of the Recording Fare Register Company.

In addition to the above-mentioned cars the company is at present operating three 18-foot closed cars and one freight car. The officers of the company are: President, Manning Stires, McKeesport, Pa.; manager, Thomas M. Evans, McKees-



Pittsburg & Westmoreland Railway—New Convertible Car Body.

distant, and in the other direction with Charleroi and Monongahela City. The system as now planned will have about 35 miles of road when completed and will serve a city and town population of about 130,000, besides a large and very excellent farming interest.

The company is at present purchasing power from the West Penn Railways Company, but is planning to build a power plant with sufficient capacity to operate 35 miles of road.

As the road will serve a very populous and prosperous section President Stires is giving especial attention to the construction throughout, with the view of having it classed with the best and most up-to-date. The rails used are 70-pound T-section and 73 and 90 pound girder section. The roadbed is ballasted with stone and slag. All culverts are built of concrete, with I-beam steel stringers. On the section just completed there is one steel bridge 630 feet long, built to avoid a heavy grade. No. 0000 grooved trolley wire will be used throughout. A combined car barn and machine shop, 40 by 260 feet, has just been completed.

Rolling Stock.

The company has just added to its rolling stock three new convertible cars built by the Southern Car Company, from specifications furnished by R. W. Marshall & Co., New York, and mounted on Standard Truck Company's 0-50 interurban double trucks. The car bodies are finished in maple, are 41 feet 3 inches in length over bumpers, 9 feet wide over sash

port; vice-president, T. Frank Wolf, Irwin, Pa.; treasurer, Alan S. Evans, McKeesport; secretary, Thomas P. Herron, Irwin, Pa.

Common Carriers Must Provide Seats.

The Georgia state court of appeals at Atlanta, in a decision given on November 17, holds that a common carrier is liable for injuries to a passenger caused by its failure to provide him with a seat. In affirming a judgment of \$1,000 awarded to Dr. Lyndon, who had brought action against the Georgia Railway & Electric Company because he had been unable to obtain a seat and had been thrown from his feet by a sudden jerk of the car, the court says:

"There can be no question that it is one of the duties of a common carrier to furnish its passengers with seats, and that such failure to furnish a seat may be proximate cause of an injury. It has been held in other jurisdictions that a carrier cannot enforce the payment of fare from a passenger who has not been provided with a seat; and that such carrier is not authorized to eject such passenger for non-payment of fare until a seat has been provided.

"It cannot be said that the carrier is exercising extraordinary care for the protection of a female passenger, or a sick male passenger, who is compelled to stand; and even a strong man may be subjected to severe strain if compelled to stand in a crowded car for a long distance. The increased danger of injury resulting from a sudden jerk, either in the starting or stoppage of a car, would, of course, be undeniable."

THE PENNSYLVANIA RAILROAD TESTS OF LATERAL RAIL PRESSURES.

The effect of differences in the wheel arrangement and in the location of the center of gravity of electric locomotives as compared with steam locomotives with regard to the lateral pressure on the outer rail of curves is as yet not well understood, and present knowledge of it is based on quite limited experience. Before purchasing any large number of electric locomotives, the Pennsylvania Railroad has determined to ascertain just what this lateral rail pressure is, with different types of electric locomotives having various wheel arrangements, and also with different types of steam locomotives.

The place selected for the tests is on the electrified portion of the West Jersey & Seashore division near Clayton, N. J., at a 1-degree curve just below the Franklinville station. At this point a stretch of track, about 166 feet in length, has been equipped with cast-steel ties and rails designed especially for testing purposes. Eighty of these special cast-steel testing ties were made at the Juniata shops. The inside rail is fixed, but placed on blocks which allow of some vertical adjustment; the outer rail rests on roller bearings, which consist of a grid containing quite a number of $\frac{3}{4}$ -inch tool steel rollers. This roller bearing is carefully finished and has packing and a top plate to prevent the dust from working in. The outer rail is thus free to move laterally so far as its bearing on the tie is concerned, but it is held in position horizontally by a plunger carefully fitted into a bushed bracket, which is cast integral with the steel tie. The end of this plunger is fitted with a 1-inch hardened steel ball, and this ball has a bearing against a finished steel plate $\frac{1}{2}$ inch thick, about 3 inches wide and 14 inches long. This plate has a bearing against another bracket cast integral with the steel tie and is fitted up tightly against the steel ball by finished wedges. The plate is divided up by rectangular lines, which are numbered, so that as many as 10 tests can be had on one plate. The pressure required to indent the steel plates by the steel ball, and the foot-pounds of work required to produce indentations of various depths, have already been determined in the testing laboratory at Altoona. It will be possible therefore by measuring the depth of indentations in the test plate to ascertain the lateral pressure on the rail obtained from various types of locomotives at different speeds and at different portions of the curve.

The tests were commenced on October 11 and are still in progress. They have included the new Westinghouse-Baldwin electric locomotive, which has a 4-wheel front truck and two pairs of drivers arranged like the American type 8-wheel locomotive. This locomotive, No. 10003, attained a speed of 85 miles an hour during the test, and only lack of sufficient current prevented it from running up to 100 miles an hour. Tests have also been made with the electric locomotives 10001 and 10002, which have no small wheel trucks, but the eight drivers are disposed in two large 4-wheel trucks. The tests have also included various types of steam locomotives, which have attained speeds exceeding 90 miles per hour. The speed is accurately obtained by means of a clock in the Franklinville station, which is electrically connected with trippers along the test track.

The elaborate and accurately finished testing apparatus which the Pennsylvania road has provided for these experiments, and the careful manner in which they have been conducted, should result in valuable data which will be useful in determining the wheel arrangements of electric locomotives, and the conditions under which steam locomotives are working so far as their effect on the outer rail of curves is concerned. It will be interesting to compare these data, which are actual measurements of the shearing effect of the outer rail on spikes, with the elaborate calculations which were made by a number of experts early in the year.

PIPING AND POWER STATION SYSTEMS—LXIII.

BY W. L. MORRIS, M. E.

Class R 6—Oil and Drip Lines for Hand Devices.

On account of the numerous places around the engine room where engine oil is required it is necessary to provide several oil taps. If the plant consists of large units, it would be well to locate an oil tap at each machine. Such taps could be attached to the regular piping system of the unit, in some easily accessible spot, preferably over some drip pan of the machine.

The quantity of oil used daily is easily accounted for with the system as shown in Figure 361; the records show just how much cylinder oil has been used, also how often a barrel of engine oil is added to the oiling system. With the system shown in Figure 362 it is not so easy to keep the record from day to day, as the size of the cylinders makes accurate readings impossible. By the use of one or two small tanks, as shown in Figure 362, it is possible to keep a very

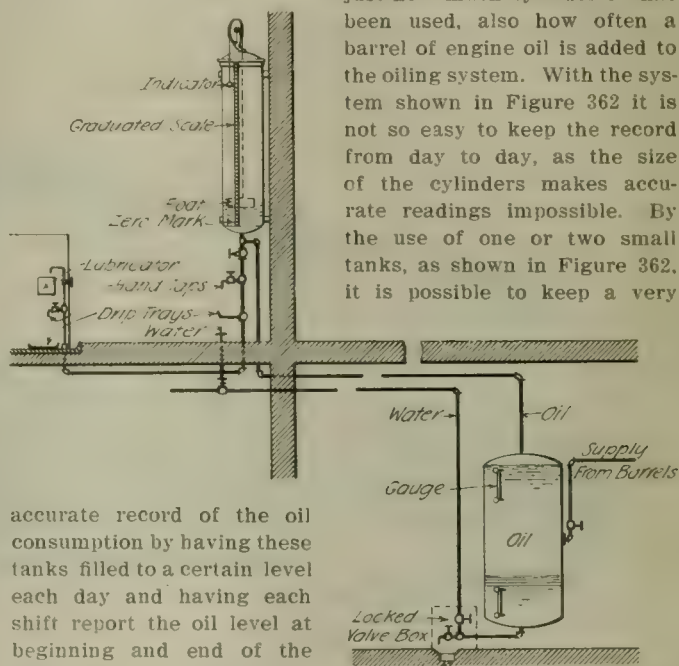


Figure 363 (R 6-1).

accurate record of the oil consumption by having these tanks filled to a certain level each day and having each shift report the oil level at beginning and end of the watch. Whatever method is employed to supply the measuring tanks should be safeguarded against the possibilities of any manipulation.

The small measuring tank shown in Figure 363 (R 6-1) has a float tell-tale instead of gauge glass. The tell-tale is somewhat less liable to injury and derangement, as there is neither a packing nor glass tube to keep in order. The tank should be of small diameter, say 8 inches, and 5 feet long if not over 8 gallons of oil is used each day. In considering the use of air

and water to raise oil, it must be noted that the storage tank may require a large volume of air to raise possibly one cubic foot of oil into the measuring tank. Water would be quicker to act, but if water were used special care would have to be taken to avoid the possibility of destructive pressure being put on the storage tank. The use of water introduces a feature which might cause serious oil loss due to the fact that water used to raise the oil must be run to the sewer whenever the storage tank is to be filled. Unless closely watched the water might all run out and considerable oil waste to the sewer. The use of air eliminates the possibility of oil losses from this cause.

The system shown in Figure 363 would serve for both the high and low pressure cylinder oils. There would be little or no object in having a separate tank for new engine oil.

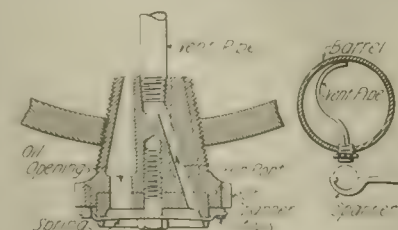


Figure 364 (R 6-2).

The operators would not use it if their shift were to be charged with it—they could get oil from the return drip system. The use of oil in the boiler room for feed pumps, stoker engines, etc., can be best accounted for by making the engineer in charge of the shift accountable. The usual method of recording at the end of a shift is for the engineer quitting and the one coming on to go to all the lubricators and other devices that hold a quantity of oil and see that the oil is brought up to the established "quitting line." When tanks are restocked the engineer in charge and the stockkeeper take readings together and the tank is then filled.

To facilitate the emptying of the barrels and to avoid putting vent holes in them there should be a barrel valve used, as shown in Figure 364 (R 6-2). This barrel valve is

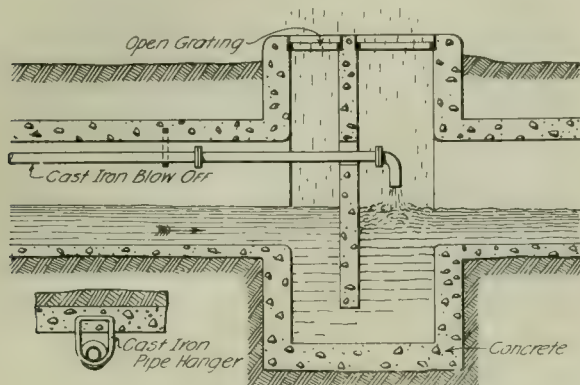


Figure 365 (S 1-1).

screwed into the bung hole by a spanner wrench. The vent pipe is made curved and of small pipe so that if it strikes the side of the barrel it will not prevent the valve from being screwed in. The valve is of the register type, with two or three oil openings and one air opening. Pin stops are quite necessary to insure that the valve will be fully opened or closed. By turning the spring upside down it is possible to grind the valve to its face. When the barrel is placed over the sink the valve can be readily reached and opened by hand. In drawing oil from the barrel the valve can be so set that it will not discharge any faster than the sink can take care of the oil. It is probable that in cold weather it would be found necessary to use a heater coil around the sink to permit the handling of cylinder oil.

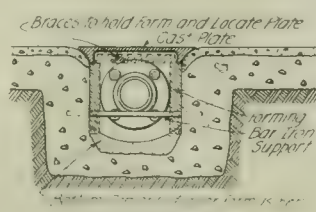


Figure 366 (S 12).

Class S 1—Blow Off Main.

The service performed by a blow-off main is exacting. The pressure and temperature variations are such as to cause much movement of the lines. It is neither customary nor necessary to install two blow-off mains. In Figure 45 is shown a duplicate blow-off main which is arranged more to suit the requirements of condenser discharge than for any other service.

Figure 365 (S 1-1) is a detail sketch of the blow-off basin shown in Figure 45. The blow-off pipes and the pipe hangers are of cast iron, made necessary on account of the moisture in the waterway. The gratings at the top of the basin are made very open to allow steam to escape freely. The volume of water that this basin should hold is dependent upon the amount passing through from the condensers. A basin 5 feet square will be found of sufficient size in most any case. If the blow-off main is open to the free circulation of air and is hot constantly, it should be of standard wrought-iron pipe.

The main, back of the boilers, should be in an open

trench. The portion of the trench between the boilers should have a cover plate to make the floor continuous. The form of cast plate shown in Figure 366 (S 1-2) is suitable for such work, as it does not require a frame. The round corner support does not let the plate damage the cement work. The plate is secured on the forms and the cement finished against it. The pipe line should be completed before the cement work is finished, thus saving time and insuring a better location of the pipe and less damage to the concrete. A brick trench can, in many cases, be constructed more quickly, but concrete is better for this work, as it is more permanent.

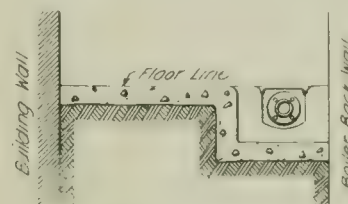


Figure 367 (S 1-3).

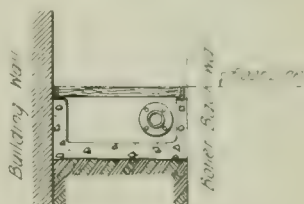


Figure 368 (S 1-5).

The cover for the trench is in some cases of plank or it may be of flagging. In laying out the trench care should be taken that sufficient room is provided so that the lower bolts of the main shown in Figure 366 may be reached. Figure 367 (S 1-4) shows a wide, open trench back of the boiler which gives ample room around the fittings. Figure 368 (S 1-5) shows a similar space back of the boiler made into a pit with a plank covering. These planks should be of oak and surfaced, possi-

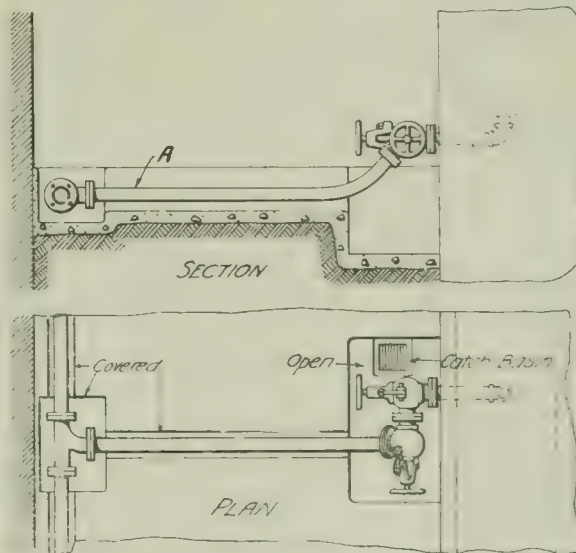


Figure 369 (S 2-1).

bly 4 inches wide with a 1-inch space between and all the planks fastened to angle irons placed at the ends. The pits back of the boilers should have a sewer drain and the wide trench, Figure 368, may be pitched to the center and one catch basin serve many boilers. If the main is of considerable length and there are short, stiff branches connected to it it may be necessary to use a U-bend to provide the necessary elasticity. The importance of elasticity should constantly be kept in mind in laying out blow-off connections. If cast iron is used for the main it may be necessary to allow for the movement in the boiler branches. Rather than strain boiler connections it would be better to use a slip-joint in the main and anchor the two parts of main at about their center.

Class S 2—Blow-Off Branches from Boilers.

It may be necessary to place the blow-off main close to the wall to secure elasticity. As shown in Figure 369 (S 2-1) the pipe, A, provides practically all the elasticity between the

boiler and the main and should be made of standard weight pipe. The space shown back of the boiler is wider than that usually found and if the passage is narrow similar to that shown in Figure 368, then all the connections would be very stiff. The connections shown in Figure 370 (S 2-2) require a rather elaborate bend, but by making it in the form shown the necessary elasticity is obtained. It will be noted that the valves in Figure 369 close against the pressure and the valves shown in Figure 360 close with the pressure. These are the two principal types of blow-off valves.

Figure 371 (S 2-4) shows a valve which closes against the pressure with the bonnet and stuffing box on the line side. Figure 372 (S 2-5) shows a valve with the pressure on the stuffing box and bonnet. It will be noted that both valves have a plug which shuts off the flow before the valve closes on its seat, the plug serving to hold back the heavier scale from the seat. Each valve has a soft disc. The disc in the valve shown in Figure 372 is run into the plug and then machined. The disc of the valve shown in Figure 371 is a loose ring of soft metal which can be replaced quickly by separating the two parts of the valve. The thread connecting the two parts of the valve is the reverse of that on the stem so that pressure tends to keep the valve parts together. The valve shown in Figure 372 has two large standard machine bolts

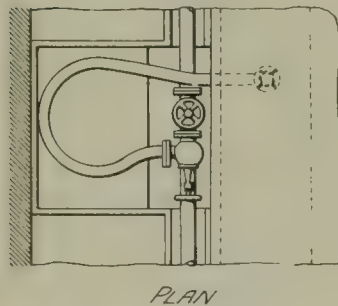
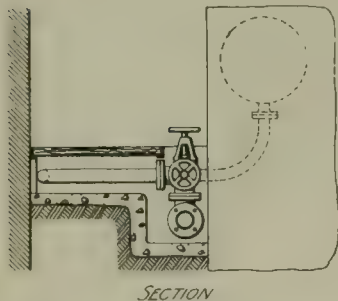


Figure 370 (S 2-2).

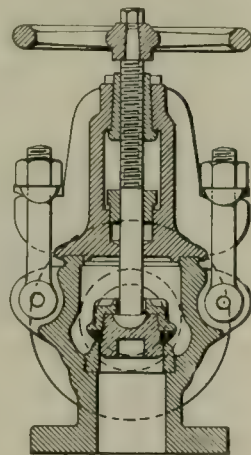


Figure 371 (S 2-4).

which slide sidewise in T-slots, and the valve shown in Figure 371 is held together by two heavy eyebolts.

One of the best forms of blow-off connections is shown in Figure 373 (S 2-6). The blow-off main is shown as being in the engine room basement, an excellent arrangement when it can be so placed, as it requires no trench work, is always open to inspection and may easily be repaired. The branches to the boilers are long and provide the necessary elasticity. The only branch that is required is for the connection to the boiler. The trench can be quite narrow—just wide enough to allow for the movement of the pipe. Y-fittings should be used in the main, as they offer the least resistance and cause the least water hammer. The valve next to the boiler should be left open while the boiler is in operation, using the second valve as the regular operating valve. Any scale that may pass the valve plug will drop away from the seat and fall out.

Duplicate valves are necessary in the blow-off connection. The second one permits of the operating valve being shut off from the boiler whenever a leak occurs, affording an opportunity for repairs while the boiler is under pressure. A second reason is to insure the safety of a man at work inside of the boiler. When washing the boiler the second valve should be

shut and the bonnet or center piece of the first valve removed to allow water to discharge into the pit under the valves.

The wash-out sink as shown in Figure 373 should be deep enough to hold the scale that will accumulate. The pit shown in Figure 367 is well adapted to keep scale out of the sewer, and with two or more catch basins a considerable distance apart it is possible to shut off the valve close to the boiler and allow the scale to accumulate in the pit. The pit can be made as shown in Figure 369, four feet wide and full width to the wall, covered as shown in Figure 368. The pit should be about 18 inches deep and the trenches 10 inches,

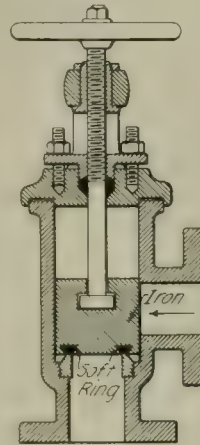


Figure 372 (S 2-5).

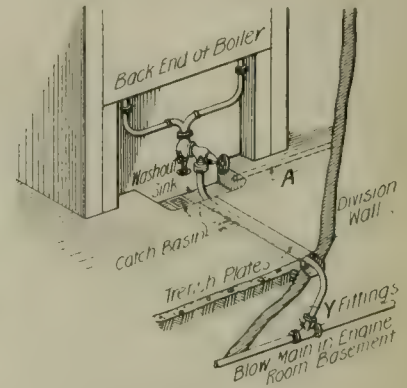


Figure 373 (S 2-6).

allowing eight inches for the accumulation of scale at the end of the pit.

Instead of the first valve many boilers are fitted with a "washout T" and but one blow-off valve, with the blind flange or cap removable. This provides one advantage sought in the use of two valves, but fails to provide means of insuring a tight valve at all times. A small leak of but one-half pint a minute would, in a year's time, pay for an extra valve.

Instead of using a sink 3 by 4 feet with each boiler it will be better to make one continuous sink, past all the boilers, provided with a plank cover. If the boiler sets low and the blow-off runs out below the floor line, the blow-off connections

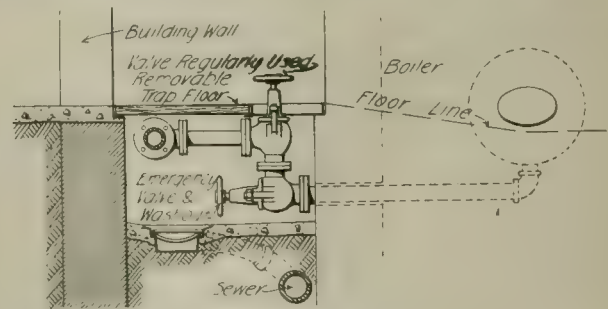


Figure 374 (S 2-7).

may satisfactorily be arranged as shown in Figure 374 (S 2-7). The blow-off connection shown would be quite impracticable if the wash water had to be discharged into the blow-off line, because the drum would not drain freely and the lower connection would soon fill with scale. This trouble, however, would not present itself when blowing out under pressure. If the bonnet of the valve next to the boiler were removed there would neither be a pocket to fill with scale, nor would it be difficult to drain the drum.

(To be continued).

The Pittsburgh chamber of commerce on November 14 adopted resolutions urging the city councils to grant a franchise to the Pittsburgh Subway Company immediately and approving the form of grant applied for by the company.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Action for Transfer Penalty Barred by Starting New Action.

Harkow v. New York City Railway Company, 105 New York Supplement, 689.—The supreme court of New York, appellate division, second department, holds that an action to recover a penalty under Section 104 of the New York railroad law for refusal to give a transfer ticket is barred by the institution of another action.

Passenger Stumbling Over Baggage on Floor of Car—Care Required—Evidence as to Racks.

Pitcher v. Old Colony Street Railway Company, 81 Northeastern Reporter, 876.—The supreme judicial court of Massachusetts says that the woman plaintiff in the act of leaving a car stumbled over a bag or satchel which another passenger had placed upon the floor, and pitched forward, striking her head against the door. She had been seated near the middle of the car, which was of the ordinary street passenger car type with a seat running lengthwise of the car on each side. The jury also found, in answer to questions specially submitted to them, that the accident was not caused by the conductor's negligence, and that the plaintiff was not in the exercise of due care, and returned a general verdict for the defendant.

Explosion of Controller Does Not Alone Create Liability.

Beebe v. St. Louis Transit Company, 103 Southwestern Reporter, 1019.—The supreme court of Missouri, division No. 2, says that in this case a motorman was injured by the explosion of a controller. The evidence showed that any one of numerous causes might have brought about the explosion, among which causes was the accumulation of dirt in the controller. Such dirt might have gotten into the controller at any time while the latter was in charge of the plaintiff while on the track without any fault or negligence on the part of the defendant, and the explosion have occurred before the defendant had any opportunity to inspect the controller, so that the cause of the explosion was purely theoretical and conjectural, and no judgment should be permitted to stand with no foundation whatever for its support. If the cause of the explosion was the defective condition of the controller, or the want of necessary inspection, these were facts which it devolved upon the plaintiff to prove, or to prove a state of facts from which they might reasonably be inferred.

Liability for Injury from Shock to Painter of Iron Poles.

Smith v. Twin City Rapid Transit Company, 112 Northwestern Reporter, 1001.—The supreme court of Minnesota holds that a street railway company which contracts with an individual for the painting of the iron poles used by it to support the wires connected with its overhead trolley system, the wires being so arranged and insulated as, when in proper repair, to prevent the iron caps on tops of the poles from being charged with electricity, is liable for injuries occasioned to an employe of the contractor who, while engaged in painting the cap on one of the poles, receives a charge of electricity from the cap, which had become charged because of the negligent failure of the company to maintain its appliances in proper condition and repair. The dangerous condition was not due to any act of the contractor or his employe, but to the negligence of the company alone, and it was immaterial whether or not the contractor was an independent contractor.

The questions of contributory negligence and assumption of risk were for the jury. If the man knew that the cap was charged with electricity, he attempted to paint it at his peril. But danger from electricity is not one of the ordinary risks which a person who undertakes to paint such poles assumes.

If the electrical apparatus is properly insulated and kept in repair, the painting of the pole may be done with perfect safety. The danger of the cap being charged is an extraordinary risk, which is not assumed unless it is fully understood and appreciated.

Lurching of Cars—Criterion as to Negligence—Opinion of Witness.

Partelow v. Newton & Boston Street Railway Company, 81 Northeastern Reporter, 894.—The supreme judicial court of Massachusetts says that there was in this case evidence that the car was run at an excessive rate of speed over a somewhat sharp curve on a down grade, and that this caused an unusually severe jolt or lurch of the car, which threw the plaintiff off and caused the injury complained of. There was also much evidence that the car was running only very slowly, and that there was no unusual or extraordinary lurch or jolt, and it might be that this was the weight of the evidence; but the question was for the jury.

The criterion of the negligence of the defendant's servants was not whether they ought to have realized before the accident occurred that the car was likely to lurch more violently and dangerously than was incident to an ordinary operation of cars upon curves in the track, but whether they were running the car at a rate of speed which under the circumstances and at that place involved unnecessary dangers. Moreover, there was evidence that a rule of the defendant limited the rate of speed at a place like the one in question to three miles an hour. If this was so, and if the jury found that this rule was violated, that would be a circumstance to be considered in passing upon the negligence of the defendant's servants.

The defendant rightly contended that it is a matter of common knowledge that from inequalities of surface and necessary curves, switches and guard rails, street cars in their ordinary and proper operation frequently and unavoidably lurch or jolt, and that such occurrences must be considered to be "fairly incidental to the mode of travel, and must be held to have been contemplated by the passenger." Nor was it enough to use strong or violent language in describing the jolt. To furnish ground for an action against the company, it must appear that the lurch or jolt was more than is ordinarily to be expected, and that it was due to a defect in the car or track, a negligent or dangerous rate of speed, or some other cause for which the defendant could be held responsible.

The conductor answered the question as to how much of a swaying or lurch of the car there had been before the plaintiff fell by saying: "Well, I should say not more than any of these single-track cars would make." No objection was made by the plaintiff to this answer; and it seems to the court to have been a proper one. It was of course impossible to measure accurately the lurch of the car, or to describe it so as to enable the jury to determine its amount with exactness. It naturally would be described according to the standard of everyday experience. This was one of the many cases in which a witness might state the result of his observation, although it involved in some measure his opinion or judgment.

Car Dispatchers Not Fellow Servants of Conductors and Motormen—Fellow Servant Act Applicable—Interurban Not "Street Railroad."

Edge v. Southwest Missouri Electric Railway Company, 104 Southwestern Reporter, 90.—The supreme court of Missouri, division No. 2, holds that car dispatchers who have absolute charge, control and supervision of the conductors and motormen, and the cars and their movements and operation, are not fellow servants with the conductor and motormen, but are vice principals, representing the company when telephoning and receiving orders regarding the operation of the cars. The court also says that it is of the opinion that the fellow servant act of 1897 applied to the defendant company. It was contended that it did not because it did not

apply to street railways. But the court says that the evidence showed that the defendant was a corporation, engaged in the operation of an electric railway between the city of Carthage, Mo., and the city of Galena, in the state of Kansas, and that the length of the road was 30 or 35 miles and passed through some 12 or 15 towns or stations, with but little of the track inside of the city limits, merely passing through as any railroad does. The court was not cited to any law which would authorize the defendant to construct and operate a street railroad through a rural district connecting one town or city with another and extending from a point in one state to that in another, nor does it know of the existence of any such law, nor can it presume that such a line of road was constructed and was being operated without any legal authority.

Considering the character and description of the car it could not be ruled as matter of law that it was negligent for the conductor to suffer the bag to be put and to remain on the floor, and the jury must have found under the instructions of the court that it was not so placed as to obstruct the free passage of the plaintiff out of the car, or to render the passage-way dangerous to a person in the exercise of due care. The defendant was not bound, as the plaintiff asked the court to instruct the jury, "to exercise toward her the utmost care and diligence in providing against those injuries which can be averted by human foresight," but, as the court instructed the jury, it owed to her "the highest degree of care which was consistent with the practical carrying on of its business." It would have been error to instruct the jury as requested "that under all conditions the aisles, entrances and exits shall be kept free from all obstructions by the use of the highest possible degree of care and caution on the part of * * * street railway companies" engaged in the transportation of passengers.

Evidence that it was customary not to have racks for baggage or parcels in street cars, and that there was a custom allowing passengers to put hand baggage and dress suit cases on the floor was admissible, not for the purpose of proving a custom as such, but as bearing upon the question whether the defendant exercised the degree of care required of it. It would not follow that, if the defendant did as others did, it was necessarily exercising the degree of care required of it. The ordinary methods might be careless and therefore furnish no excuse. But it was not to be presumed that they would be, but rather the contrary. As bearing upon the defendant's case, the court can have no doubt that the plaintiff would be entitled to show, if it was a fact, that it was customary to have racks in street cars for hand baggage and satchels and not to allow passengers to put them on the floor in the aisles. No good reason could be given why the defendant should not be allowed to show the converse of that proposition.

Power to Acquire Rights of Way by Condemnation or Purchase—Requirements and Priority of Rights.

In re Milwaukee Light Heat & Traction Company v. Milwaukee Northern Railway Company, 112 Northwestern Reporter, 663.—The supreme court of Wisconsin says that this was a contest between two corporations, each seeking to acquire the same strip of land for railway purposes; the one first named, or petitioner, by condemnation, and the other, or respondent, by purchase. It is held that the second, or respondent, corporation, having been organized under the provisions of Chapter 86 of the Wisconsin statutes of 1898, as an electric railroad running from city to city, it had the power to acquire lands for its legitimate purposes by purchase or by the exercise of the power of eminent domain. And the petitioner's articles stating that its business, among other things, was to construct and operate street railways in the city of Milwaukee and elsewhere in the state, and to extend its lines into or through any village or town of the state, that seemed to the court to constitute a sufficient compliance with the requirement that the articles state the business of the corporation, and it is held

that the petitioner had power to extend its lines, and for that purpose to condemn the property in question.

Taking up the question of the relative rights of the companies in the disputed strip, the court says that the general principle, doubtless, is that priority is acquired by that company which first makes a completed location over the property, and that the relative dates of the organizations or charters of the rival companies is immaterial. The difficulty, however, lies in determining what acts amount to a completed location, especially in view of the varying statutes upon the subject in the different states.

It is frequently said that, as to third persons and rival corporations, a valid location is made by a survey and staking out of the line and the adoption of such line by the directors. But a mere tentative survey, made to ascertain the feasibility of a route, cannot be considered a completed location, though every measurement be made, and every stake driven with mathematical accuracy. There must necessarily be some decisive act on the part of the ultimate corporate authority which commits the corporation to the route surveyed, before the location can be said to be completed. On the other hand, the corporate determination to build upon the route surveyed need not be an irrevocable determination, for the corporation may, at its election, discontinue condemnation proceedings prior to the appointment of commissioners, and with the consent of the court may do the same after commissioners are appointed and before the award is made. It is plain, however, that it must be a determination made with the present intention in good faith to locate the line upon that route and construct the same with reasonable diligence. It cannot file a mere caveat upon the route and await future developments.

The Wisconsin statute requires the petition for railroad condemnation to state, among other things, that the corporation has surveyed its route over the lands sought to be condemned, has actually staked out its center line, and that the route has been located by the board of directors upon the line so staked out. There can be no doubt that in Wisconsin these acts, taken together, constitute a complete location in the sense here under consideration, and that, in case of a contest between two companies for the same location, that company which has in good faith first taken all of these steps must be considered as having made the prior location.

A railroad corporation may acquire its necessary real estate or right of way by purchase, as well as by condemnation. The Wisconsin statute requires location of the route by the board of directors as a preliminary to condemnation proceedings, but the court finds no such requirement as a preliminary to purchase.

The fact that a railway company, proceeding to acquire a right of way to purchase, adopts a survey already made or partially made, by another company or by promoters, cannot in reason be held to affect its rights.

In this case it appeared that the respondent company had made or adopted a fully completed survey over the disputed lands, and determined in good faith to build its railroad thereon, had secured all the necessary franchises and crossing privileges from towns and villages, and had obtained option contracts on all but a very small fraction of said lands, and intended in good faith to utilize such options and take deeds of the lands at an early date. The essential requirement was not that there should be a completed purchase, but that there should be a decisive corporate action taken in good faith locating the route and committing the corporation to that route, though not necessarily irrevocably. The securing of option contracts over practically the whole line surveyed, with the bona fide intention of utilizing them and completing the purchases and building the line, must be held to be such a decisive act, and the court therefore holds that the petition of the first-named company for condemnation was properly denied.

News of the Week

Recent Accidents.

A serious accident occurred on the Luna Park line of the Seattle Electric Company, near Georgetown, Wash., on November 11. Two cars collided on a long trestle in a fog and about forty passengers are said to have been injured to some extent, many of them seriously. Both cars were badly wrecked but remained upright on the trestle. The accident was caused by the failure of the inbound car to stop at Palmer siding until the other car had passed. This siding is an absolute passing point and there are no block signals on this portion of the line, therefore the outbound motorman had no way of knowing the block was occupied and on account of the dense fog was unable to see the other car until they were almost together. Both cars were running at a speed of about 15 miles per hour. The outgoing car reared slightly and tore away the vestibule of the other car.

A motorman was seriously injured and two cars were telescoped and badly wrecked on November 16 in a collision between a passenger train and an empty train on the Third avenue elevated line of the Interborough Rapid Transit Company, New York City.

On November 12 a street car of the United Railroads of San Francisco collided with the rear end of a freight train that was backing over the crossing at Sixteenth street and Railroad avenue. The conductor of the street car was fatally injured and five passengers were injured.

New York Public Service Commission.

Messrs. Joline and Robinson, receivers for the New York City Railway Company, have sent to the commission a letter asking that body to approve an ordinance proposed by President Shonts of the Interborough-Metropolitan to limit the number of passengers to be carried on any of the pay-as-you-enter cars to 65 and to forbid standing on the rear platforms.

The commission on Monday issued orders to the Brooklyn Union Elevated Railroad and the Brooklyn Heights Railroad providing for large increases in the Cypress Hills service. The order to the Brooklyn Heights road provides for a 20 per cent increase in the number of cars operated between Cypress Hills and Jamaica.

The Brooklyn Union Elevated Railroad has been ordered to show cause, at a hearing on November 27, why it should not make various improvements in its platforms and stations as specified in six complaints made to the commission.

A communication has been received from the Dutch Kills Citizens' Association asking that the commission order a 1-cent fare during rush hours on the Thirty-fourth street ferry to Long Island City and the Ninety-second street ferry to Astoria. This is the first action the commission has been asked to take in the matter of fixing rates or in the matter of supervision of ferry companies.

At a public hearing held by the commission on November 15 acute differences of opinion were expressed in regard to the operation of the Belmont tunnel under the East river at Forty-second street. Many residents of Queens contended vigorously that the tunnel should be put into operation at once, regardless of the fare charged, while others insisted that the commission should not consent to its operation until the company agrees to a 5-cent fare from any point in Queens to Manhattan. It has been announced that it is proposed to operate a shuttle service only, with a 3-cent fare for the trip through the tunnel. It has not yet been decided by the courts whether the company has a franchise for the tunnel or not. Chairman Wilcox stated at the hearing that no application for permission to operate the tunnel has been received.

The Cleveland Franchise Controversy.

At a special meeting on Thursday, November 14, the Cleveland city council rejected two plans offered by the Cleveland Electric Railway, in a communication from President Andrews, for a settlement of the street railway controversy as requested by Mayor Johnson immediately after the election. Under the first plan the company proposed to surrender its existing grants calling for a 5-cent fare and 11 tickets for 50 cents in return for a new 25-year franchise providing for a six months' test of Mayor Johnson's plan, 3-cent fares within the city and the existing rate outside of the city, the test to be under the supervision of an impartial commission. If at the end of the test it was found that this rate of fare would yield 6 per cent on the investment and an allowance for depreciation, etc., the rate should be made effective throughout the life of the grant. If not, the company agreed to accept such rate of fare as the commission

found would yield 6 per cent. During the test the city was to have access to the books and have control of the routing and operation of the cars. The alternative proposition was for a lease of the property to a holding company, as suggested last spring at a price to be determined by arbitration as to the valuation of the property.

The second proposition only was considered. Mayor Johnson claimed that the time for arbitration had passed and insisted that the company should set a price it would accept under the holding plan. The council then passed unanimously a resolution rejecting the company's proposals and requesting it to inform the council at once at what price it would accept the holding plan and what plan it had to suggest for a continuation of public service after the expiration of existing grants.

The resolution was considered by the Cleveland Electric directors on Friday, and President Andrews replied to the mayor that the board considered the method of arbitration eminently fair and in its belief the only way of reaching a price that can be justified. With reference to the latter part of the resolution, that the company suggest a plan for a continuation of service, he said the company had no suggestion to make at this time.

This communication was taken by many of the councilmen as a declaration of war and a resolution was passed censuring the company for its attitude. Another resolution, instigated by Mayor Johnson, was then adopted, which requested the company to send representatives to confer with the council and take up at a public hearing the question of the value of the property, with a view to agreeing on as many items as possible, the advice of a competent expert to be taken on the items on which there is a disagreement.

Chicago-Kankakee Line Opened.—The Chicago & Southern Traction Company has begun operating cars over its line from Chicago to Kankakee, Ill. Heretofore the cars have been run only as far as Crete, pending negotiations for a terminal franchise in Kankakee.

Missouri Electrical Association.—The Missouri Electric Light, Gas and Street Railway Association has recently been organized with the following officers: President, J. D. Porterfield; vice-presidents, W. B. Hays, R. Irvine, N. H. Leadford; secretary and treasurer, Charles Z. Pierson, of the St. Charles Electric Light & Power Company.

Increase of Wages on the Lake Shore Electric Railway.—The Lake Shore Electric Railway, Cleveland, O., has increased the wages of its conductors and motormen. The new scale is 21, 23 and 25 cents an hour for the first, second and following years of service. The old rates were 19, 22 and 24 cents, the last only after five years' service.

American Institute of Electrical Engineers.—At the November meeting of the Toledo section of the American Institute of Electrical Engineers, R. D. Tomlinson, supervising operating engineer of the Allis-Chalmers Company, Milwaukee, Wis., read a paper on "Power Station Design, Construction and Operation," illustrated by lantern slides.

Will Transport Mail Carriers Without Fare.—The Chicago City Railway Company has announced that it has completed arrangements with the postoffice department for compensation for the transportation of mail carriers in uniform and that after Thanksgiving day these men will be carried without fare. The company formerly had an agreement to carry the postmen for \$10,137 a year, but when the number increased it demanded tickets.

Work on the Technolexicon Suspended.—Announcement is made by the Society of German Engineers that it has resolved to discontinue work on the "Technolexicon" because the expense involved has been found to be beyond all expectations and to attempt the completion of this work within the allotted time would exceed the pecuniary means available for the purpose. Hereafter letters and postal matter concerning the "Technolexicon" should be addressed to Theodore Peters, director Verein Deutscher Ingenieure, Charlottenstrasse, 43, Berlin, N. W., 7.

Rapid Progress on Boston Subway.—H. A. Carson, chief engineer of the Boston rapid transit commission, has announced that the construction work on the Washington street subway will probably be finished and the tunnel turned over to the Boston Elevated Railway for the laying of tracks and placing the wires by March 1. The subway itself is practically completed except for the finishing work at the stations, tiling, ventilation, etc. To connect the new subway with the elevated structure a short stretch of track will be built from the southerly entrance of the subway upon inclined trestle across the Boston & Albany tracks. The stations have been designed on a large scale. The platforms are wide and are long enough to permit of 9-car trains. It is reported that the

plan is being considered of finishing each station in a different color, so that passengers may the more easily recognize their own destinations.

McAdoo Tunnel Nearing Completion.—The work of track-laying in the Sixth avenue tunnel of the New York & New Jersey Tunnel Company's line has advanced to such a point that the company announces its completion in time for the operation of trains under the North river from Jersey City to Christopher street and Eighteenth street by January 1 next. It is expected that the Eighteenth street and Sixth avenue station, Manhattan, will also be ready by that date. Work is being pushed on the remaining section to Thirty-third street, where excavation is being made for the large station to be erected at that point.

Elevated Road May Condemn Land for Stairways.—Justice Newberger of the New York supreme court on November 18 handed down a decision that the Manhattan Railway Company may erect additional stairways along the Third avenue and other elevated lines at certain stations where congestion exists. The condemnation proceedings for this purpose were opposed by property owners on the ground that the elevated road did not come under the provisions of the general railroad law which permits condemnation of property for public purposes, but the court holds that it is a "railroad corporation" in the meaning of the statute.

Geary Street Road Asks Easier Terms.—President Platt of the Geary Street Park & Ocean Railroad, San Francisco, Cal., has petitioned the board of supervisors to reduce the percentage of gross receipts which the road is required to pay the city from 10 to 3 per cent. The company's franchise has expired and it is operating under a permit from the city. Mr. Platt reminded the board of an agreement, made at the time the rate was raised from 5 per cent, that it should be reduced if the charge proved confiscatory. He states that whereas the receipts in May of this year were \$24,806, in October they had fallen to \$17,112, and that during October there was a loss of \$7,694.

First Trip Through Brooklyn Tunnel.—A car carrying a number of officials of the Interborough Rapid Transit Company made a trip through the north tube of the Brooklyn tunnel on November 16, from Bowling Green to a point about halfway across the river. The tunnel extends from the Battery to Joralemon street in Brooklyn. Both tubes are completed except for the high-tension cables and the third rail and the north tube is expected to be ready for operation throughout its length in a few days. Regular service will not be started, however, until the work in both tubes is completed. Power is to be received from the Interborough power house at Fifty-ninth street and transmitted to a transformer station at Wilcox street, Brooklyn.

Erie Railroad Opposes Electric Line.—What promises to be a long-drawn-out legal battle has been started between the Western New York & Pennsylvania Traction Company and the Erie Railroad over the construction of the new lines from Bardonia, Pa., to Salamanca and from Salamanca to Little Valley, N. Y. The trolley lines when completed will parallel the Erie almost the entire distance and, of course, will be strong competitors for the business. The traction company intends to cross the Erie's tracks at several points and at a preliminary hearing before F. W. Stevens of the New York public service commission the steam road's attorneys held that the electric roads are new lines, not extensions, and consequently require additional grants from the state.

New York Commission Asks Reports on Improvements.—All the railroads under the supervision of the public service commission of the second district are ordered, in a circular issued by the commission on November 13, to file at the earliest practicable date complete information of all permanent additions and betterments to their tracks, bridges, buildings and terminals, as well as any increase to their equipment, and in each case the cost of the changes and improvements is to be stated. The precise form in which these reports are to be made is left to the railroads for the present, although later a definite system may be adopted to insure information being uniform. These reports will be made public, and are primarily desired to show just what the railroads are doing toward improving their service. The railroads are particularly urged to have their reports of improvements now under way filed in time to be included in the annual report of the commission, which will be made to the legislature on January 1.

Contests "No Seat, No Fare" Ordinance.—The Public Service Corporation of New Jersey has taken steps to contest the ruling of the New Jersey supreme court, as reported in

last week's issue of the Electric Railway Review, upholding the validity of the "no seat, no fare" ordinance passed by the street and water board of Jersey City. The company has obtained a writ of error and has taken the case to the court of appeals. The ordinance imposes a fine of \$50 for failure to provide seats for each passenger who pays fare on cars running from the Erie and Pennsylvania railroad terminals between 5 and 7 p. m. Following the decision of the supreme court the company's conductors had a great deal of trouble with passengers who thought the order applied to all cars and who refused to pay fare unless provided with a seat. The city's attorneys take the position that the appeal of the case does not act as a stay and the police have been ordered to enforce the ordinance. It is planned to take one case of violation to the police courts each day and demand payment of the fine.

Strike at Louisville.—The strike of the conductors and motormen employed by the Louisville, Ky., Railway, which was declared last week Thursday, has continued throughout the present week without material change in the situation. The strike was declared because of alleged discrimination against union men by the company, which had discharged a number of men for cause. About 600 men struck, but the company secured men from Chicago and Indianapolis to man the cars and since Sunday has been able to run most of its cars nearly on schedule time. Many riots occurred on Sunday, following meetings of the strikers on Saturday night and cars were attacked and damaged by the strikers and their sympathizers several times on Sunday. In several places wires have been cut, obstructions have been placed on the tracks and the rails have been covered with soap, but during the latter part of this week the protection of the police has been sufficient to prevent serious disorder. The police have been generally successful in preventing the gathering of crowds and have arrested large numbers of the disturbers. The men have voted in favor of arbitration and on Tuesday their attorneys presented to the company a plan for the appointment of a committee of three to arbitrate the present difficulties or any that may arise within a year. President Minery of the company, however, refused to consider the proposition, saying that he would deal only with individuals who applied for positions.

Grand Jury Investigates New York Franchise Deal.—The New York grand jury has begun an investigation of the purchase of the franchises for the Wall & Cortlandt Street Ferries Railroad by the Metropolitan Securities Company in 1902, in regard to which Anthony N. Brady testified before the public service commission in October. Mr. Brady said he had sold the franchises to W. C. Whitney for \$250,000 and had received a check for \$965,507 from the Metropolitan Securities Company with instructions to deduct the purchase price and to send personal checks for the remainder to W. C. Whitney, T. F. Ryan, Thomas Dolan, P. A. B. Widener, W. L. Elkins and Moore & Schley. The total amount of the check was entered on the company's books as the cost of the road. The investigation was directed by District Attorney Jerome and the following witnesses were examined: Paul D. Cravath, H. H. Vreeland, Thomas P. Fowler, George G. Haven, A. D. Juilliard, E. J. Berwind and Mortimer L. Schiff, all of whom except Mr. Vreeland were directors of the Securities company. The results of the hearing before the grand jury were not given out. Another hearing was called on Tuesday of this week, at which Mr. Brady and Thomas F. Ryan were examined.

Gas Power Number of Cassier's Magazine.—The November issue of Cassier's Magazine is a special gas power number containing over 200 pages and is of the greatest importance to the engineer, manufacturer or corporation using power. The articles have been secured from some of the ablest engineers and writers in America and Europe. It makes a reference book on the internal combustion engine and gas producer. The number contains a historical review of the "Internal Combustion Engine," by H. H. Supplee; discussions on the "Design of Large Gas Engines," by E. T. Adams, W. H. Booth and F. E. Junge; "The Utilization of Waste Furnace Gases," by B. H. Thwaite and M. Leon Greiner; "Gas Power on Shipboard," by A. Vennell-Coster, while C. T. Wilkinson examines the work of the "Fuel Testing Board of the Geological Survey," showing the possibilities of using low-grade fuels in the gas producer. "Gas Power Applications" are discussed by J. R. Bibbins. "The Generation of Power Gas" is covered by H. A. Humphrey, E. A. Harvey, F. J. Rowan and G. M. Tait. Other papers round out the treatment of the whole subject of gas power, from the selection of the fuel, through the generation of the gas, its purification and the recovery of by-products to the conversion of heat into power in the gas engine.

Construction News

FRANCHISES.

Albany, N. Y.—A preliminary application has been filed with the public service commission by the Troy Rensselaer & Pittsfield Railroad for permission to extend its line from Brainerds to a point on the Albany & Hudson Railroad in East Schodack. It is understood that the line will enter Pittsfield, Mass., over the Pittsfield Electric Traction Railway, which is being extended westward to Lebanon Springs. It is stated that traffic arrangements will be made with the Albany & Hudson Railroad so that the cars of the Pittsfield line may enter Albany over the third-rail line. The new road will be double-tracked and about 35 miles long. If the formal application is granted work on the project will be started in the spring.

Babylon, L. I.—The South Shore Traction Company has secured a franchise for the operation of its interurban line in Cooper and James streets and Deer Park avenue, Babylon, which it is stated will be in operation by next spring. The tracks of the company later may be removed from James street to Main street, provided the necessary consents are obtained from the residents. The company will build and operate an electric line from Brookhaven west to Blackwell's Island bridge.

Brazil, Ind.—The matter of granting a new franchise to the Terre Haute Indianapolis & Eastern Traction Company in this city is under consideration by the city council. In purchasing the property of the Terre Haute Traction & Light Company in this city the traction company obtained a franchise which does not expire for several years, but the legality of this franchise has been questioned. The Terre Haute Indianapolis & Eastern asks for a 25-year franchise, and the right to string high-tension wires from its power plant at Terre Haute through the streets of Brazil to its substation.

Cobalt, Ont.—A syndicate of Ottawa business men has secured a franchise from the municipal councils of the Cobalt district for the construction of an electric railway between Cobalt and Haileybury, Ont., with an extension later to New Liskeard. It is planned to run the line up the Montreal river valley through Cobalt, Haileybury, Argentite, North Cobalt and New Liskeard to Quinze Rapids and possibly to Larder lake, serving extensive mining and agricultural districts. It is expected to complete the line by July, 1909. Those interested in the project are: Frank Latchford, Ottawa; Judge C. M. Stone, Cleveland; W. J. O'Brien, Renfrew; J. W. Fitzpatrick, Ottawa; T. Fitzpatrick, New Liskeard.

Faribault, Minn.—The Minneapolis St. Paul Rochester & Dubuque Traction Company has applied for a franchise to enter Faribault from the north with its interurban line and to use some of the streets of the city. The application has been referred to the street committee.

Frankton, Ind.—The Indiana Union Traction Company has secured an extension to its original franchise, which gives it five years in which to build its line in Frankton. The new franchise is for 50 years.

Lima, O.—After several weeks of negotiations President W. Kesley Schoepf of the Ohio Electric Railway and the Lima city council have agreed upon an ordinance for the extension of the company's franchise to 1932, which provides for the payment to the city of \$115,000 in annual instalments, the erection of a \$50,000 terminal station within two years, the construction of 1½ miles of additional city track, the completion into the city of the Lima & Toledo, Lima & Bellefontaine and Lima & Defiance interurban lines. Twenty-five tickets are to be sold for \$1.00 after the first 10 years. Other provisions provide for sprinkling the streets, arbitration with regard to extensions and trackage rights for interurbans, etc. The present franchise does not expire until 1917, but the company desired an extension for bonding purposes. The franchise was passed by the council on November 18.

Owosso, Mich.—J. A. Thick, representing the Saginaw Owosso & Lansing Electric Railway, has applied for a franchise.

Paris, Ill.—At an adjourned meeting of the city council on November 12 a franchise was granted to the Terre Haute & Western Railroad, permitting the extension of its line to the west limits of Paris, on Washington street. This line is owned by the McGowan interests of Indianapolis, and the new franchise is believed to be preliminary to an

extension to Charleston and other points west, with St. Louis as the ultimate objective point.

South Bend, Ind.—Samuel S. Perley of this city has petitioned the county commissioners for a franchise for the Indianapolis Logansport & South Bend Traction Company.

West Chester, Pa.—Thomas E. O'Connell, representing a company which proposes to build an electric railway between West Chester and Wilmington, Del., has secured a franchise to lay tracks on Rosedale avenue and Walnut street.

RECENT INCORPORATIONS.

Bristol & Kingsport Railway, Bristol, Tenn.—Incorporated in Tennessee to build from Kingsport to Bristol via Blountville, about 25 miles. It is planned to let contracts in about six months. Capital stock, \$10,000. Officers: President, J. I. Cox; vice-president, S. L. King; secretary and treasurer, F. Powell; chief engineer, F. H. Cothran; general counsel, J. B. Cox, all of Bristol.

Co-operative Realty Selling & Development Company.—Incorporated in Ohio to build electric and belt lines through southern, central and southeastern Ohio, with an outlet to Pittsburg, Pa., by way of Waynesburg, crossing the Ohio river at or near Sardis, O. Capital stock, \$100,000. Incorporators: Albert E. Bonne, Zanesville, O.; Harry Axtine, Columbus; John C. H. Cobb, Wellston; Charles L. Bowers and William E. Hatfield, Centerberg, O. The headquarters of the company will be at Zanesville, O.

Intermountain Railway, Denver, Colo.—Incorporated in Colorado to take over the old Denver Lakewood & Golden Railroad, now known as the Denver & Intermountain Railroad. This line at present is operated to Barnum, Colo., by electricity and from there to Golden by steam. The Golden division will be converted for electrical operation by the new company and many improvements made on the roadbed. All of the rolling stock and other equipment of the Denver & Intermountain company has been purchased by the new company. Capital stock, \$1,000,000. Incorporators: Daniel Chase, Willow Lakes, S. D.; Thomas B. Dean and T. J. Milner, Denver; H. Chase, Willow Lakes; Judge Caldwell Yeaman, Frank W. Loveland and others.

Murphysboro Electric Railway Light Heat & Power Company.—Incorporated in Illinois to build an electric line in Murphysboro and to Carbondale, Ill. It is stated by the promoters that the line will be in operation in Murphysboro by the middle of January, 1908. Capital stock, \$36,000. Incorporators: A. B. Minton, Willard Wall, J. G. Hardy, W. C. Alexander, P. H. Eisenmayer and John Alexander, all of Murphysboro, Ill.

TRACK AND ROADWAY.

Allentown & Reading Traction Company, Allentown, Pa.—It is stated that this company is planning to build a branch line from East Texas to Macungie and Emaus, Lehigh county, Pennsylvania. I. S. Ruth, superintendent, Allentown.

Baltimore Halethorpe & Elkridge Electric Railway.—Right of way has been secured for this proposed road and financial arrangements completed for its construction. The line will be 2¼ miles long and it is expected to have it in operation by July 1 next. The line will be operated by the Maryland Electric Railways Company, which will furnish the current and the cars. The new road to Halethorpe will connect in Southwest Baltimore with the Wilkens avenue line of the United Railways & Electric Company, with which the Maryland Electric Railways is affiliated. It was originally intended to run the line directly to St. Denis, but on account of the prohibitive prices asked for land this project has been temporarily abandoned.

Bluestone Traction Company, Graham, Va.—The rails, ties, poles and wires for this company's South Bluefield extension to Ghent have been purchased and construction work will be started in the near future. The company also has completed surveys for an extension to Princeton, 12 miles. P. M. Wallizer, general manager and purchasing agent.

Buenos Aires, Argentine, S. A.—Bids are wanted and will be received before May, 1908, by the municipal intendente, Buenos Aires, for constructing two of the principal lines of the proposed system of the Metropolitan Subway Electric Railways; also for the lease of the two lines now under construction. Further information can be had by addressing the Argentine legation, Washington, D. C.

Canyon City & Royal Gorge Electric Railroad, Canyon City, Colo.—Frank D. Heath has been appointed superintendent of the construction, operation and traffic departments of this company, which proposes to build from Canyon City to the

Royal Gorge, and will soon call for bids for the grading and construction work within the city.

Centralia & Sandoval Railway, Centralia, Ill.—This company has been formed by the owners of the Centralia & Central City Traction Company for the purpose of building a 4-mile extension from the present terminus of the line to Sandoval, Ill., serving the mining region between these points. We are advised that work will probably begin about the first of next April. E. R. List, president, Centralia, Ill.

Charleston & Paris Interurban Railway, Charleston, Ill.—W. R. Patton, president, Charleston, Ill., writes that this company will build an interurban line 28 miles long, connecting Charleston, Ashmore, Kansas, Grandview and Paris, Ill. The company has secured most of the franchises and right of way and will let contracts for construction within the near future. The company's headquarters are at Charleston. U. S. Cook, chief engineer, Newcastle, Ind.

Charlotte (N. C.) Electric Railway.—Rapid progress is reported on the West Trade street extension of this company to the Chadwick and Hoskins mills, and it is expected that the work will be completed within 30 days. Work also is being pushed on the bridges on this extension.

Chippewa Valley Construction Company, Ashland, Wis.—This company is reported to be planning the construction of an electric railway from Ashland to Washburn, Wis. The company is now building a 3,000-horsepower hydro-electric plant at Copper Falls, near Mellen, Wis. A. E. Appleyard of Boston is the promoter.

Clinton, Ind.—The citizens of the towns between Clinton, Ind., and Danville, Ill., are making vigorous efforts toward the construction in the near future of an electric railway between these points, which would connect the Illinois and Indiana systems and complete the link necessary for a through passage from St. Louis to Buffalo. Meetings of the Terre Haute, Danville and Clinton commercial clubs have been held to further the project and arrangements have been made for donating the right of way and otherwise assisting the company which builds the line. It is desired to induce either the Illinois Traction System or the Terre Haute Indianapolis & Eastern Traction Company to build the road, and it is reported that President McKinley of the former company has promised to build from Danville to the state line if the remainder is built.

Connecticut Railway & Lighting Company, New Britain, Conn.—It is reported that this company may build an extension from Elmwood to Hartford, Conn. L. S. Risley, superintendent.

Corn Belt Traction Company, Bloomington, Ill.—This company, which proposes to build from Bloomington to Champaign, Ill., has been reorganized and is now said to be preparing for beginning construction. It is stated that the capital stock of \$100,000 has all been subscribed and that franchises have been secured in Champaign, Mansfield and Farmer City. The officers are: President, John J. Pitts, Bloomington; vice-president, W. D. Fairbanks of Mansfield; secretary, Edward Hope of Chicago; treasurer, A. J. Keenan of Leroy. Offices are to be opened in Bloomington.

Eldorado Springs Tiffin & Monegaw Springs Electric Railway.—This company has been organized to build an electric railway from Eldorado to Tiffin and Monegaw Springs, Mo. It is stated that power from the Osage river will be used to operate the line. Dr. C. A. Edgar, Eldorado, and John Harrison, Tiffin, Mo., are president and general manager, respectively.

Elkader, Ia.—The Turkey River Power Improvement Company, it is reported, will construct three water power dams and proposes an interurban line from Elkader to Oelwein and Dubuque.

Ft. Smith, Ark.—The Nelson Investment Company has been organized at Ft. Smith, with a capital stock of \$100,000, which has as its object the taking up of the franchise once issued to Governor Haskell of Oklahoma and Will Reeves of Ft. Smith, to build an interurban road between Ft. Smith and West Ft. Smith, a distance of 10 miles.

Hanford Electric Railroad.—Surveys have been completed for this road, which will connect the Hanford irrigation tract on the Columbia river with the Chicago Milwaukee & St. Paul and the Northern Pacific railroads at North Yakima, Wash. The line will traverse the Moxee valley, opening up a large territory of valuable farm lands in the Black Rock and Cold Springs districts, and will connect the towns of Hanford and North Yakima. Power to operate the road will be furnished by the large power plant of the company at Priest

Rapids. Grading is to be started early in the spring. The headquarters of the company are at Seattle.

Illinois Traction System, Champaign, Ill.—It is expected that the work of ballasting 3½ miles of this company's tracks between Champaign and Decatur, Ill., will be completed within two weeks. The company also will have its track near the new Wabash bridge straightened within a short time. This work has been delayed owing to the grading being done on the Wabash company's roadbed.

Indianapolis Huntington Columbia City & Northwestern Railway, Syracuse, Ind.—Judge McMaster of the United States superior court at Indianapolis has ordered a sale of the assets of this company on February 8, 1908. The company is in the hands of a receiver, William L. Self of Syracuse, and has completed about twenty miles of grading and laid about five miles of track on its proposed line from Indianapolis to Huntington, Ind.

Las Vegas-Mora-Taos Electric Railroad, Las Vegas, N. M.—Final surveys for the location of this proposed electric line in New Mexico will be started next week. It is announced that \$80,000 of the \$100,000 necessary to insure the construction of the road has been subscribed and that work will be begun in the near future. President W. A. Buddecke of the Las Vegas Railway & Power Company is interested in the project.

Logansport & Marion Traction Company, Marion, Ind.—This company, it is reported, will soon ask for bids for the construction of an electric road from Marion to Logansport, Ind. A. G. Jenkins is chief engineer.

Manistee, Mich.—It is reported that the R. G. Peters Salt & Lumber Company of Manistee is considering the construction of an interurban electric railway between Manistee and Cadillac.

Marshalltown, Ia.—Surveys have been started on the proposed Marshalltown-Melbourne interurban line, one of which takes in Luray, Ia. Another survey will be made by way of La Moille, which is a more thickly populated district. Hamilton Browne, 181 La Salle street, Chicago, is interested.

Memphis, Tenn.—An electric road is projected to connect Memphis with Olive Branch, Miss., a distance of 18 miles.

Milwaukee-Northern Railroad, Port Washington, Wis.—Grading for the extension of this company's line northwest of Cedarburg, toward Fond du Lac, Wis., has been started and it is stated that this portion of the road will be in operation by January 1, 1909. This branch will take in the city of West Bend and the towns of Kewaskum, Campbellsport and Eden, as well as Lake de Neveu, a summer resort about five miles southeast of Fond du Lac. It is expected that the line from Port Washington to Sheboygan will be in operation by May 1, 1908, or soon after. Ernest Gonzenbach, general manager, Sheboygan, Wis.

Mt. Vernon, Ill.—It is reported that Illinois capitalists have under consideration the building of an electric line from Mt. Vernon, Ind., to Mt. Vernon, Ill., connecting with the St. Louis lines at the latter point and with the Evansville system at Evansville, Ind. The proposed route will include Fairfield, Grayville, Albion and New Harmony, Ind.

Montreal Street Railway.—President L. J. Forget, in his annual report to the stockholders, states that right of way has been secured from the present terminus of the Back river route to a point outside the village of St. Vincent de Paul, a 50-year franchise has been secured for an extension through Notre Dame de Grace, and additional right of way has been purchased on the Cartierville line, in order to permit the continuing of the double-tracking of this division.

New York & Stamford Railway, Port Chester, N. Y.—Permission has been secured by this company from the public service commission to double track its railway in Larchmont, Rye and Port Chester, N. Y. The company operates an electric line from New Rochelle to the Connecticut line, where it connects with another electric road extending to Stamford, Conn. It is planned eventually to double track the entire distance. The road is a subsidiary of the Connecticut Company. J. B. Potter, manager, Port Chester, N. Y.

Northern Ohio Traction & Light Company, Akron, O.—C. F. Moore, secretary, is quoted as saying that all proposed extensions of this company's lines will be temporarily abandoned on account of the financial situation. The company has been making surveys for an extension of the Barberton-Wadsworth line to Seville, but work has been stopped.

Norwalk, O.—Announcement is made that construction work on the proposed electric line from Norwalk to Sandusky,

by way of Monroeville, O., will be started in the spring. Sherman S. Culp, vice-president of the Sandusky Norwalk & Mansfield Electric Railway, is interested in the new line.

Oregon Electric Railway, Portland, Ore.—With the exception of about six miles just south of the city limits of Portland, tracklaying on this line from Portland to Salem, 53 miles, has been completed and ballasting is now in progress. The cars and locomotives are expected by December 1 and it is stated that the road will be opened for traffic not later than January 1. G. W. Talbot, general manager.

Orrville Doylestown & Barberton Electric Railway.—J. B. Meach, Barberton, O., in company with Dr. Ottman, treasurer of the Cleveland Brooklyn & Elyria Railway, which is financing the Orrville Doylestown & Barberton project, is securing right of way between Barberton and Orrville, O. It is announced that construction work on the line will be started about December 1.

Pacific Electric Railway, Los Angeles, Cal.—Announcement is made that passenger service will be established on the Glencoe extension of this company's line on or before December 1. The line has been double-tracked from Los Angeles to a point about halfway between the San Gabriel river and Azusa, whence a single track has been laid to Azusa. The first car over this extension reached Azusa last week.

Reno Power Light & Water Company, Reno, Nev.—It is announced that service on this company's extension to Manoa Springs will be started within a few days.

Richmond & Tottenville Electric Railway.—This company, which proposes to build an electric railway from Richmond to Tottenville, Staten Island, by way of Rossville and Kreischersville, 10 miles, has filed maps and plans with the commissioner of public works. The road will be single track and will cost approximately \$400,000. Thomas B. McGovern of McGovern & Donnell, Broad Exchange building, and Cornelius G. Kolff, 50 Broadway, New York City, are interested.

Rochester Scottsville & Caledonia Electric Railroad.—Surveys for this line, which will extend from Rochester to Portage Falls, by way of Scottsville, Le Roy and Perry, N. Y., 56 miles, are being made by Le Grand Brown, chief engineer, 16 State street, Rochester, N. Y. The next step will be the securing of right of way and the financing of the road. D. C. Salyerds, president, Scottsville.

St. Joseph Excelsior Springs & Lexington Railway, Excelsior Springs, Mo.—G. P. Lingenfelter of Denver, Colo., president, states that contracts probably will be let about January 1 for the construction of the line from Excelsior Springs to Vibbard, Mo., about six miles. Edgar Main, chief engineer, Liberty, Mo.

St. Tammany & New Orleans Electric Railway.—Work has been started on this company's proposed line, which will connect Covington and Abita Springs with Mandeville and thence by boats with New Orleans. Right of way is being cleared at Ponchatoula bayou and from this point, which is about half way between Covington and Mandeville, work will proceed in both directions. Preston Herndon, engineer.

Sangamon Valley Electric Railway, Springfield, Ill.—Satisfactory progress is reported on the construction of this company's extensive system of interurban lines connecting Springfield, Ill., with various surrounding towns. The company controls the Springfield Clear Lake & Rochester Interurban Railway, which has under construction an 18-mile line from Springfield to Rochester, Ill. The Sangamon Valley company is now constructing a line from Springfield to Hillsboro, Ill., 53 miles, and controls the Hillsboro city line, which was placed in operation on November 9. With the completion of the road from Hillsboro to Rochester and the 3-mile gap between Springfield and Rochester, Hillsboro will be afforded direct communication with Springfield, at which point the tracks of the Springfield Consolidated Railway will be utilized for entrance into that city. The United States Construction Company, Springfield, has the construction contracts for both the Sangamon Valley and the Springfield Clear Lake & Rochester railways. J. E. Melick is president and chief engineer.

Sapulpa (I. T.) Interurban Railway.—Construction work has been started on this electric line, which will extend from Sapulpa to the Glen oil field and operate in the city of Sapulpa, I. T. Upon the completion of this work it is thought that the line will be built through Broken Arrow to Muskogee, with a possible future extension to Ft. Smith.

Selma, Ala.—Construction of an electric railway between this place and Marion and other points in Perry county is under consideration. According to advices from Selma preliminary surveys may be started shortly. J. T. Slater, secretary Commercial and Industrial Association, is interested.

Southern Cambria Railroad.—Satisfactory progress is reported on the construction of this road, which will connect Johnstown and Ebensburg, Pa., by trolley. A force of 300 men is at work and the line has been cleared to a point three miles beyond Conemaugh. The foundations for a long bridge, which will span the valley over Woodvale, are nearing completion and the work will be pushed as far into the winter as the weather will permit. Tennis Brothers, Cincinnati, O., have the contract for the construction of the line.

St. Louis Electric Terminal Railway.—The plans for the proposed bridge across the Mississippi river by which this road will enter St. Louis from Illinois have been submitted to the board of public improvements for approval. The structure was designed by Ralph Modjeska, Chicago, to meet the requirements of the government engineers regarding its effect on the deep waterway plans, and if approved as submitted will have three spans. The St. Louis Terminal Railway is a subsidiary of the Illinois Traction System.

Texas Traction Company, Dallas, Tex.—A tract of land on White Rock creek, eight miles from Dallas, has been purchased by this company to be operated as an amusement park in connection with its interurban line now building from Dallas to Sherman, Tex. The park will have a summer theater and other amusement features and a dam will be built across the valley of the river, which will provide a lake for boating. Construction work on the line is reported to be progressing rapidly. J. F. Strickland, president, Dallas, Tex.

Utah Light & Railway Company, Salt Lake City, Utah.—The work of relaying the Waterloo line of this company's city tracks with 65-pound rails has been completed and the management now has a large force relaying the tracks of the Wandamere line with heavy rails. It is expected that this work will be completed within two weeks, when reconstruction will be suspended until spring.

Vallejo & Northern Railway, Vallejo, Cal.—Melville Dozier, Jr., president and chief engineer, 1115 Broadway, Oakland, Cal., writes that this company will build an electric line from Vallejo to Sacramento, Cal., 58 miles, via Napa Junction, Creston, Cordelia, Suisun and Winters, with a branch from Suisun to Vacaville via Fairfield and Cement and a branch from Winters to Woodland, which will bring the total up to 130 miles. Surveys have been completed and grading is to begin in the spring of 1908. Maximum curvature, 3 degrees; maximum grade in mountains, 1½ per cent. The other officers are: Vice-president, C. F. Kinsey, Oakland; secretary, T. T. C. Gregory, Fairfield; treasurer, George S. Lackie, Oakland.

Washington Baltimore & Annapolis Electric Railway, Washington, D. C.—It is reported that an additional force of 200 men has been employed by this company to complete the unfinished section of its line near Baltimore in order that the entire road may be placed in operation at the earliest possible date.

POWER HOUSES AND SUBSTATIONS.

Cedar Rapids & Iowa City Railway & Light Company, Cedar Rapids, Ia.—It is reported that this company contemplates additions to its boiler room and equipment, including coal and ash handling apparatus, chain grates, conveyors and possibly economizers. W. J. Greene, manager.

De Kalb-Sycamore & Interurban Traction Company, De Kalb, Ill.—This company, which will build a 23-mile interurban line from Sycamore to Belvidere, Ill., is reported to have placed contracts for the following power house equipment: Two 1,000-horsepower boilers and coal bunkers of 250 tons capacity to the Rockford (Ill.) Boiler Works; induced draft apparatus for 1,000-horsepower boilers to the Green Engineering Company, Chicago; the installation of a coal and ash handling system to the Economic Engineering & Construction Company, Chicago. D. Thomson, general manager and purchasing agent.

El Paso (Tex.) Electric Railway.—This company is increasing its power house equipment by the installation of a 520-horsepower Aultmann & Taylor boiler and is rearranging its old boilers to use coal instead of gas.

Northern Texas Traction Company, Ft. Worth, Tex.—This company has placed a contract for a 1,000-kilowatt turbine, together with additional boilers, condensing apparatus, pumps, etc.

A new brake has recently been invented in the offices of the Leeds City Tramways. The chief feature is that it is impossible for the motorman to skid his wheels on applying the brake. The brake has proved very effective in several tests and three equipments are now being operated on the company's cars.

Personal Mention

Mr. A. H. Bowman has resigned as superintendent of the Carbon Street Railway, Mauch Chunk, Pa.

Mr. Robert H. Sherman has resigned as superintendent of the Los Angeles-Pacific Company at Los Angeles, Cal.

Mr. W. T. Guy has been appointed chief engineer of the St. Louis Hillsboro & Southern Railway, St. Louis, Mo., and Mr. Henry Rohner has been appointed consulting engineer.

Mr. Warren S. Hall, for the past three years vice-president and general manager of the Lehigh Valley Transit Company, Allentown, Pa., has resigned; effective on December 1.

Mr. W. J. Wilgus, who resigned as vice-president of the New York Central & Hudson River Railroad in October, has been retained as consulting engineer by the Detroit River Tunnel Company.

Mr. E. J. Dickson has been appointed general manager of the Milford Attleboro & Woonsocket Street Railway and the Uxbridge & Blackstone Street Railway, with headquarters at Franklin, Mass.

Mr. C. M. Cory has resigned as auditor of Ford, Bacon & Davis, New York City, to become treasurer and auditor of the Birmingham Railway Light & Power Company, succeeding Mr. Elmer M. White, resigned.

Mr. W. B. Moorman, superintendent of the Southern Light & Traction Company, Natchez, Miss., has been appointed manager of that company and the Vicksburg Railway & Light Company, with office at Vicksburg, Miss.

Mr. F. H. Talbot, heretofore assistant to President C. H. Davis of the Interurban Railway & Terminal Company, Cincinnati, O., has been appointed general superintendent of the company, in place of Mr. B. E. Merwin, resigned.

Mr. Harry Inwood, superintendent of the city lines of the Michigan United Railways, has been transferred to the company's lines at Battle Creek, Mich., succeeding Mr. G. F. Bartlett, who will take the place of Mr. Inwood at Lansing.

Mr. A. J. Purinton has resigned as general manager of the Fairmont & Clarksburg Traction Company, Fairmont, W. Va., and has returned to his home in Lynn, Mass. Mr. Purinton was formerly general manager and treasurer of the Springfield & Eastern Street Railway, Springfield, Mass.

Mr. Thomas McCaffery, heretofore assistant division superintendent of the Southern Pacific Company at Los Angeles, Cal., has been appointed master of transportation of the Pacific Electric Railway and the Los Angeles Interurban Railway of Los Angeles, effective on November 15. The duties of this office have heretofore been filled by J. McMillan, traffic manager.

Mr. Harro Harrsen, who has been superintendent and acting general manager of the Mexico Electric Tramways Company since last April, has been appointed general manager of the company. Mr. Harrsen has been connected with Mexican street railways and industrial enterprises for a number of years, his first appointment having been as assistant superintendent of the Aguascalientes Electric Light Company at Aguascalientes, Mex.

Mr. S. Matsumo, mechanical engineer of the Imperial Government Railway of Japan, has been visiting the Westinghouse works at East Pittsburg during the past week, with a special view to inspecting the Westinghouse single-phase alternating-current railway system. He was also taken on a trip over the Pittsburg & Butler Street Railway in order to examine the system in practical operation, and inspected some of the other large local industrial plants. Mr. Matsumo expected to depart for England at the end of this week.

Mr. B. E. Merwin, who has succeeded Mr. Joseph O'Hara as superintendent of transportation of the Aurora Elgin & Chicago Railroad, was formerly connected with the Lake Street Elevated Railroad of Chicago (now the Chicago & Oak Park) and the Northwestern Elevated Railroad, serving in various capacities for a period of nine years under Mr. Frank Hedley, now general manager of the Interborough Rapid Transit Company of New York City. In 1902 Mr. Merwin resigned as superintendent of the Interurban Railway & Terminal Company at Cincinnati, O., where he remained until his present appointment.

Mr. E. R. McDowell, heretofore general manager of the Ashtabula (O.) Rapid Transit Company, has resigned, effective at once, to become general manager of the water-

works plant in Ashtabula, O. Mr. McDowell has been in street railway work since 1875, starting as conductor of a horse car line in Philadelphia. After 10 years of service in Philadelphia he became connected with the Widener-Elkins syndicate, having charge of the installation of electric lines in various cities, including Philadelphia, New York, Chicago, Baltimore and Pittsburg. He has been connected with the Ashtabula lines since 1897. Mr. Karyl Wright has been appointed superintendent of the Ashtabula city lines to succeed Mr. McDowell.

Mr. Thomas J. Brennan, whose portrait is presented herewith, was recently appointed assistant superintendent of the Dayton Covington & Piqua Traction Company at West Milton, O.



Thomas J. Brennan.

He has been connected with this company since the road was first placed in operation, five years ago, serving consecutively as conductor, car barn foreman and train dispatcher. Mr. Brennan's electric railway experience covers a period of seven years, the first year of which was obtained on the lines of the Dayton & Xenia Transit Company. From there he went to Massachusetts to become connected with the Middleboro Wareham & Buzzard's Bay Electric Railway, where he remained for one year, returning to Ohio in 1902 to take a position on the Dayton Covington & Piqua traction lines, which at that time had just been placed in operation. Mr. Brennan was appointed assistant superintendent on the retirement of Mr. R. D. Colburn, who resigned to engage in the lumber business.

Mr. Charles Gibson, Jr., vice-president of the Pittsburg & Butler Street Railway, Pittsburg, Pa., was born in Lynn county, Iowa, on October 19, 1870. While a boy he went to live with his grandfather, Charles Gibson, of Gundakers, Pa., who was one of the organizers, and at that time president, of the Pittsburg & Western Railroad, and consequently he was virtually brought up railroading. At the age of 12 years he became station agent for the Pittsburg & Western Railroad and he was connected in various capacities with that road and the Baltimore & Ohio, which acquired it, until 1897. He then became connected as financial man and chief accountant with a large manufacturing concern in Pittsburg, but he kept in close touch with railroad affairs and conceived the idea of building a high-speed electric railway between Pittsburg and Butler, to be built as nearly as possible on steam railroad principles. After working out the preliminary details he associated with him Mr. Hudson F. Layton, who for 14 years had been connected with the engineering department of the Pittsburg & Western and Baltimore & Ohio roads, and they organized the Pine Creek Street Railway Company, which secured the franchises and right of way. This was merged in 1905 into the Pittsburg & Butler Street Railway Company, which built the line and placed it in operation under the personal supervision of Mr. Gibson as vice-president and general manager, and Mr. Layton as chief engineer. The new single-phase line, which was placed in operation in April of this year, was fully described and illustrated in



Charles Gibson, Jr.

the Electric Railway Review of April 27, 1907, page 547. Mr. Gibson is a director and large stockholder of the company and now holds the title of vice-president.

Mr. F. W. Coen, recently appointed general manager of the Lake Shore Electric Railway and its subsidiary companies, was born on a farm near Rensselaer, Ind., in 1872.



F. W. Coen.

His early schooling was in the country schools of the neighborhood and he later attended high school in Rensselaer, from which he graduated in 1890. Mr. Coen went to Vermilion, O., in the spring of 1891, and with his brother opened a bank in that city. Two and one-half years later he became connected with the Sandusky Milan & Norwalk Railroad, now a part of the Lake Shore Electric Railway system, as cashier and agent at Sandusky. After two years' service with that company he associated himself with the Everett-Moore interests of Cleveland, with whom he has been connected ever since.

He has been secretary of the Lake Shore Electric Railway Company since its organization and in January, 1906, the treasurership was added to his duties. Since assuming the duties of general manager he has relinquished the title of secretary, but continues the office of treasurer. Mr. Coen's headquarters will be at Norwalk, O.

Mr. R. G. Stewart, whose photograph is presented herewith, has recently been appointed superintendent of the railway department of the Texarkana Gas & Electric Company, Texarkana, Ark.-Tex. Mr. Stewart has been foreman of the repair shops of the Memphis Street Railway, Memphis, Tenn., for the past 14 years and has been engaged in street railway work for 17 years.



R. G. Stewart.

Mr. Elmer M. White, for the past year and a half treasurer and auditor of the Birmingham (Ala.) Railway Light & Power Company, has resigned, effective at once. Previous to his connection with the Birmingham company he was associated for 20 years with the accounting department of the Hartford & Withersfield Horse Railway and its successor, the Hartford Street Railway. When this property was acquired by the Consolidated Railway of New Haven, in 1905, Mr. White resigned to become assistant treasurer and secretary of the Birmingham Railway Light & Power Company, and in July, 1906, was appointed treasurer and auditor, succeeding Mr. C. M. Cory, which position he has held until the present time. Mr. White is now in New York superintending the publication of the 1907 proceedings of the American Street and Interurban Railway Accountants' Association, of which body he has been secretary since January, 1904. He will be succeeded at Birmingham by Mr. C. M. Cory.

Obituary.

Dr. Thomas B. Shumway, president of the Plymouth & Middleboro Street Railway, died at his home in Plymouth, Mass., on November 5.

Since the electric railways of Michigan have been placed under the jurisdiction of the state railroad commission many of them have been ordered to protect their crossings with steam roads by a bell in the daytime and by a light at night.

Financial News

Manhattan Railway, New York.—E. T. Jeffery and John F. Dillon have been elected directors to fill vacancies.

Tampa (Fla.) Electric Company.—The semi-annual dividend of 2 per cent, paid on November 15, is a reduction of one-half of 1 per cent from the last semi-annual dividend.

York (Pa.) Railways Company.—This new company has acquired the properties of the York Street Railway, the York Haven Street Railway, the York & Dover Electric Railway, the York & Dallastown Electric Railway, the Red Line & Windsor Street Railway, the Hanover & York Street Railway and the York & Wrightsville Electric Railway. The new company has \$2,500,000 common stock and \$2,000,000 preferred and will issue \$3,400,000 of 5 per cent bonds. New lines will be built in York county and eventually a road from Harrisburg to Baltimore is planned. The officers of the new corporation are: W. F. Bay Stewart, president; A. H. Haywood, vice-president; George S. Schmidt, secretary and treasurer. The directors are: Messrs. Stewart, Haywood, Schmidt, Grier, Hersh, Lewis C. Mayer, David Young, Jr., York; John C. Dawson, Philadelphia; and David Young, Sr., Newark, N. J. The property is owned by a syndicate of which Brown Brothers & Co., Philadelphia, are managers.

ELECTRIC RAILWAY EARNINGS.

Aurora Elgin & Chicago Railroad.

	1907.	1906.
October—		
Gross receipts	\$122,930.01	\$109,737.93
Operating expenses	67,554.45	59,153.42
Net earnings	55,375.56	50,584.51
Fixed charges	27,074.26	26,158.32
Surplus	28,301.30	24,426.19
July 1 to October 31—		
Gross receipts	\$564,973.25	\$502,820.61
Operating expenses	288,260.74	250,070.43
Net earnings	276,712.51	252,750.18
Fixed charges	106,223.87	100,809.04
Surplus	170,488.64	151,941.14

Duluth Street Railway.

	1907.	1906.
October—		
Total earnings	\$74,507.55	\$66,422.16
Total operating expense	41,460.59	38,002.61
Net earnings	33,046.96	28,419.55
Total deductions	17,919.18	17,848.80
Surplus	15,127.78	10,570.75
January 1 to October 31—		
Total earnings	\$700,179.80	\$636,892.14
Total operating expense	351,084.36	335,928.81
Net earnings	349,095.44	300,963.33
Total deductions	177,726.70	176,494.11
Surplus	171,368.74	124,469.22

Montreal Street Railway Company.

	1907.	1906.
October—		
Total earnings	\$311,898.38	\$281,822.28
Operating expenses	164,575.14	157,689.47
Net earnings	147,323.24	124,132.81
Total charges	43,288.77	40,609.90
Surplus	104,034.47	83,522.91
Expenses—per cent of earnings.....	52.77	55.95

United Railways of St. Louis.

	1907.	1906.
October—		
Gross earnings and other income.....	\$971,322	\$933,613
Expenses, taxes and depreciation.....	607,450	558,915
Net earnings	363,872	374,698
Charges	231,483	231,984
Net income	132,389	142,714
January 1 to October 31—		
Gross earnings and other income.....	\$9,087,659	\$8,566,571
Expenses, taxes and depreciation.....	5,906,466	5,344,588
Net earnings	3,181,193	3,221,983
Charges	2,315,214	2,318,131
Net income	865,979	903,852

Dividends Declared.

American Railways Company, Philadelphia, quarterly, 1½ per cent.

Citizens' Traction Company, Pittsburg, 3 per cent.

Columbus (O.) Railway, common, quarterly, 1½ per cent.

Grand Rapids (Mich.) Railway, common, quarterly, 1 per cent.

Tampa (Fla.) Electric Company, 2 per cent.

Manufactures and Supplies

ROLLING STOCK.

Hornellsville & Canestoe Railway, Hornell, N. Y., it is reported, will soon be in the market for cars.

Dayton Covington & Piqua Traction Company, Dayton, O., has built a 50-foot freight car in its own shops.

People's Street Railway, Nanticoke, Pa., has purchased one double-truck car from The J. G. Brill Company.

Cincinnati Georgetown & Portsmouth Railroad, Cincinnati, O., is completing the third of four cars which it is building in its own shops.

Camden Interstate Railway, Huntington, W. Va., has placed an order with the Cincinnati Car Company for two double-truck cars.

Spokane & Inland Empire Railroad, Spokane, Wash., has placed an order with the Westinghouse Electric & Manufacturing Company and the Baldwin Locomotive Works for six electric locomotives.

Coney Island & Brooklyn Railroad, Brooklyn, N. Y., which was reported in the Electric Railway Review of November 16 to be in the market for 10 double-truck cars, has placed this order with The J. G. Brill Company.

Mahoning & Shenango Railway & Light Company, New Castle, Pa., is reported to have purchased 10 single-truck 30-foot cars from the G. C. Kuhlman Car Company for January delivery. These cars will be used for city service.

Corry & Columbus Street Railway, Corry, Pa., which was reported in the Electric Railway Review of November 2 to be in the market for one double-truck combination passenger and baggage car, advises that it has been figuring on buying this second-hand.

Windsor Essex & Lake Shore Rapid Railway, Kingsville, Ont., has placed an order with the Ottawa Car Company, Limited, for five 55-foot double-truck cars. They are to be 8 feet 6 inches wide, equipped with Brill trucks, Westinghouse S. M. E. schedule 10-inch cylinder air brakes, Sterling brakes, two Westinghouse 132 motors and spring-operated pantagraph trolleys. The same company has also purchased six cars of the Manhattan Railway, New York, which are being overhauled. Four of these will be equipped as passenger trailers and two as baggage cars.

TRADE NOTES.

W. R. Lyall has been appointed manager of the street railway sales department of the Stuart-Howland Company, Boston, Mass.

Railway Steel-Spring Company has declared the regular quarterly dividend of 1½ per cent on the preferred stock, payable on December 20.

Raymond Concrete Pile Company, New York and Chicago, has removed its New York office to 140 Cedar street, in the West Street building, where larger quarters are available.

J. A. Fay & Egan Company, Cincinnati, O., has declared quarterly dividends of 1¼ per cent on the preferred stock and 1¼ per cent on the common stock, both being payable on November 20.

Northern Engineering Works, Detroit, Mich., reports that the new power station of the Columbia Improvement Company, Seattle, Wash., will be served by a 50-ton 3-motor electric Northern traveling crane.

Heywood Brothers & Wakefield Company, Wakefield, Mass., has declared the regular semi-annual dividend of \$3.00 per share on the common stock, payable on December 2, to stockholders of record November 14.

American Blower Company, Detroit, Mich., has recently received a contract from the Washington Baltimore & Annapolis Electric Railway for heating apparatus to be installed at Odenton, Md. The General Electric Company has placed an order with this company for a 3-compartment lumber dry kiln.

Schoen Steel Wheel Company, Pittsburg, Pa., is constructing a structural steel building, 217 by 240 feet, at its plant at McKees Rocks, Pa. This building, which will contain four 30-ton open-hearth steel furnaces, designed by the Schoen company's consulting engineer, the Garrett-Cromwell Engineering Company of Cleveland, O., will be built by the Riter-Conley

Manufacturing Company, Pittsburg. The latter company also has the contract for a steel addition, 83 by 115 feet, to the No. 2 mill building. The open-hearth plant will be served by one 50-ton and one 10-ton Shaw electric traveling crane, with 46-foot 6-inch span. The scrap yard will have two 5-ton cranes of the same manufacture and type. The plant will be equipped with the most approved type of electric machinery for the economical and satisfactory handling of all products of the furnaces. The boiler capacity will be increased with Babcock & Wilcox Company A & T type of boilers. The open-hearth gas supply will be secured from 12 Foster-Miller gas producers, 15 of which will then be in continuous operation at the Schoen plant. At the present time the output is from 375 to 450 wheels a day, but after the improvements we have outlined are made and the contemplated slabbing mill is in operation, the capacity will be 1,000 Schoen steel wheels each day. J. T. Milner has recently been appointed western sales manager of the company, with offices at 1407 Fisher building, Chicago.

A. L. Whipple, who for nine years has been in the employ of the Curtain Supply Company of Chicago, has resigned his position as eastern manager of that company, to take effect November 25. Mr. Whipple will become second vice-president of the Telharmonic Securities Company, financial agent for the Eastern Cahill Telharmonic Company of New York, with offices at the corner of Broadway and Thirty-ninth street, New York City. Mr. Whipple became interested in telharmonic music as a result of investigations which he made last spring when negotiations were under way to transmit music over the wires from New York to Atlantic City for the benefit of the June conventions.

Allis-Chalmers Company, Milwaukee, has been awarded the gold medal for electric generators and motors, issued by the authorities of the Jamestown exposition. A second gold medal has also been granted for the good judgment and taste shown in the design and erection of the exhibit, which has been one of the most attractive features of Machinery Hall. Gold medals have previously been taken by electrical apparatus of this company's build at the Louisiana Purchase exposition, Paris exposition and other exhibitions where there was international competition.

ADVERTISING LITERATURE.

Allis-Chalmers Company, Milwaukee, Wis.—A bulletin on "Compound Corliss Engines" contains many facts of interest to power users. Illustrations of each type are included.

General Electric Company, Schenectady, N. Y.—Bulletin No. 4542 describes the concentric light diffuser and illustrates many of its applications. Some important data on the subject of arc lighting are included.

H. W. Johns-Manville Company, New York, N. Y.—Recently issued leaflets are devoted to J-M asbestos lead joint runner; to Noark fuse plugs, and to asbestos papers, roll board, sheet board, building felts, etc.

General Electric Company, Schenectady, N. Y.—Bulletin No. 4545 is devoted to single-phase motors. It illustrates various sizes, describes the details of construction and operation, shows forms of starting boxes, and gives a large amount of general information, useful and important to power users.

Electrical Trades' Directory and Handbook for 1908.—The Electrician, Salisbury, Fleet street, London, has issued its announcement for the "Electrical Trades' Directory and Handbook for 1908" (otherwise known as the "Big Blue Book"). This publication contains carefully compiled lists of British, colonial and foreign electrical engineers; electric light, power and railway engineers and contractors; electric railway telegraph, telephone, lighting, manufacturing and supply companies; and data relating to electric light, traction, power transmission and allied industries. A biographical section is also included. The 1908 issue, which is to be ready in January next, is the twenty-sixth edition of the book. The subscription price is 9s 3d postpaid in Great Britain, 10s 6d in the British colonies, 11s 6d in the United States. After publication the prices are 15s 9d postpaid in Great Britain, 17s in the British colonies and 18s 6d in the United States.

General Electric Company, Schenectady, N. Y.—The electrification of the West Shore is quite completely described in Bulletin No. 4546, an attractively bound pamphlet of 24 pages. It is profusely illustrated with views of the trains, interior of the cars, transmission lines, exterior and interior of substations, plans of the buildings and wiring diagrams, and details of the track construction. An interesting feature of the pamphlet is a comparison of two train sheets, one showing the operation before electrification and the other after, where the increase in traffic with the same track capacity is very striking.

ingly shown.—"The Electric Locomotive in Heavy Passenger and Freight Work" is the title of Bulletin No. 4537, recently issued by the same company, in which are described a large number of its present and proposed representative types of electric locomotives. Sketches are given of locomotives ranging from 17 to 150 tons for all classes of service, including mining, high-speed passenger, slow-speed freight, mountain-grade trunk lines, etc. Electrical and mechanical data are given and characteristic curves for each locomotive shown.

BITULITHIC PAVING IN EL PASO, TEX.

The contributions for the November issue of the Stone & Webster Public Service Journal cover a wide range of subjects of general public interest, and from the section entitled "News from the Companies" the following extract is taken:

"The new street paving in paving district No. 1 of the city of El Paso has turned out to be such a tremendous improvement to the city that there is great activity at the present time in connection with the extension of the paving to other streets. The pavement used heretofore has been the bitulithic, which is also the kind of pavement to be used in the extensions now planned. The new work now under consideration comprises about three miles of streets and the track work in connection with this paving, together with its share in the paving, will cost the El Paso Electric Railway Company about \$75,000.

"In the first paving district the street railway work consisted of 9-inch 90-pound grooved rail set in a concrete sub-base 12 inches in depth and 8 feet wide, the top of the concrete base being flush with the top of the ties. The track construction for the proposed paving extensions will consist of 7-inch 70-pound T-rail and the concrete will be brought up between the rails within 2 inches of the pavement surface. With the grooved rail the bitulithic pavement was brought up flush with the side of the rail, both inside and out, but in the new construction block liners will be placed along the inside and outside of the rail, three rows of liners being used for this purpose."

ANOTHER MANUFACTURER OF LARGE GAS ENGINES.

As an indication of the rapid development in the manufacture of gas engines of large size and of the importance of the field for this type of prime mover, it is of interest to note that another manufacturer of large Corliss steam engines has actively taken up the manufacture of gas engines, and is bidding strongly for engines in medium and large sizes. The Wisconsin Engine Company, with works at Corliss, Wis., which has built some very large and successful Corliss steam engines, is building gas engines for all services in sizes from 400 to 5,000 brake horsepower. The engines utilize natural gas, producer gas, coke oven gas or blast furnace gas in the Otto cycle (4-cycle), and are of the horizontal tandem and twin tandem double-acting types.

This company controls the Sargent patents on internal combustion engines and has employed Charles E. Sargent as the engineer of its gas engine department. Mr. Sargent has a wide reputation as an engineer and in 1898 designed, it is claimed, the first horizontal tandem double-acting gas engine, a wide departure from the accepted practice of those days, when the most prominent manufacturers of gas engines declared such a type was impracticable and doomed to failure. However, the largest and most successful gas engines are of the horizontal twin tandem double-acting 4-cycle type, and with one exception this is the only type in which large units are being built in this country today.

The gas engines built by the Wisconsin Engine Company bear some of the distinctive features of the company's large Corliss engines, and utilize in design most of the Sargent patents. The design is simple and embodies features which are of considerable interest to the engineer and power user; for example, there is but one poppet valve for each explosion chamber, and this is located on the bottom of the cylinder; provision is made for preventing the dangerous pressures caused by possible preignitions, and the engines are started automatically.

Tests of even small Sargent engines show a heat consumption of less than 9,000 British thermal units per brake horsepower-hour.

The company reports that it has recently shipped some large steam engines to such concerns as the Illinois Steel Company, the Jones & Laughlin Steel Company, the Packard Motor Car Company, American Sheet & Tin Plate Company, Amoskeag Manufacturing Company, New Hampshire Spinning Mills, National Tube Company, city of Milwaukee, Carnegie Steel Company, American Woolen Company, United States Envelope Company and the Carnegie Natural Gas Com-

pany. The company has built up an enviable reputation for shipping on time and promises to do as well on gas engine orders.

THE TELEGRAPH SIGNAL SYSTEM.

The crucial tests to which the telegraph signal system of emergency semaphore control has recently been subjected have attracted much attention from railway officials, and its merits in the prevention of accidents, both on suburban electric roads and trunk railways, are coming to be fully appreciated.

The telegraph signal is essentially an emergency appliance which supplements other systems of railway signals and places the control of semaphores in the hands of train dispatchers. Railway men have denominated it a reminder of orders, a phrase which aptly describes an important function of the system.

The operation of the telegraph signal, as well as the appliance itself, is extremely simple, but none the less accurate in its operation. It is of especial value in suburban railway practice, as it enables the dispatcher to enforce his orders,



Telegraph Signal System.—Figure 1. View of Booth and Semaphore.

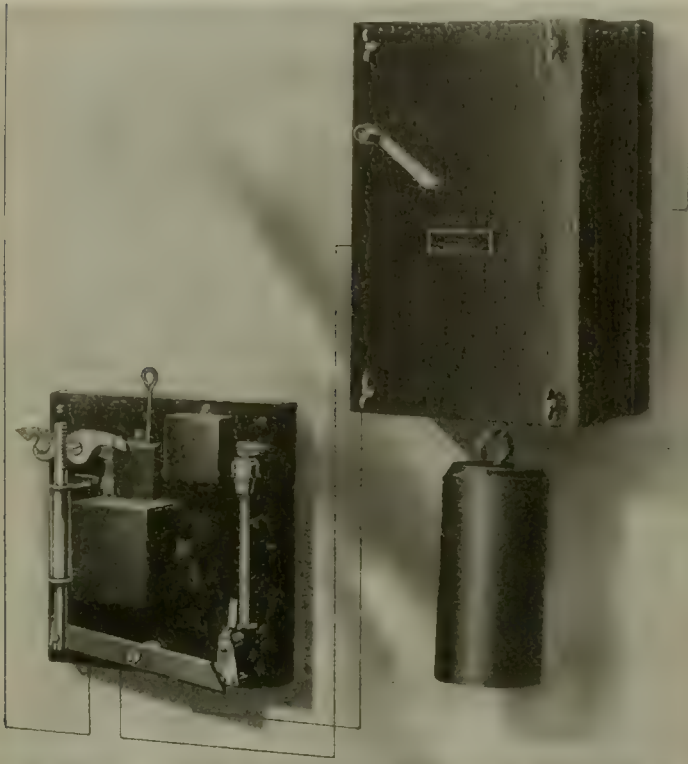
thus avoiding the terrible results involved in head-on collisions. The appliance and its operation are easily described.

At each siding or meeting point a booth with a single blade semaphore is placed in position. The semaphore movement is controlled by a simple but reliable mechanism, which is operated by the dispatcher at his office. Figure 1 is a view of the booth, semaphore and the appliances within the booth; there is also a telephone by which communication is had with the dispatcher. Figure 3 shows the semaphore control device inclosed. Figure 4 is a view with the case removed. Figure 2 is a view of the master machine in the office of the dispatcher.

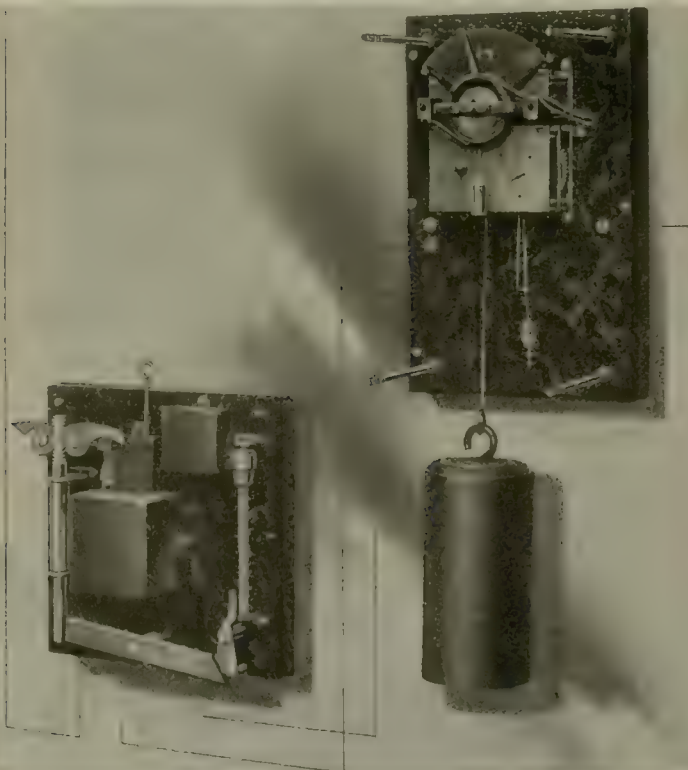
When an order is given to the crews of trains or cars to meet at a given siding, for instance, at switch No. 6, the dispatcher places a plug in his master machine dial at No. 6. Inside of 10 seconds the semaphore blade will be thrown to stop position at switch No. 6 and the number of the station will be recorded on the dispatcher's tape register. This can only be done by the blade going to stop position.

When the first of the two trains or cars reaches the meeting point it is the duty of the conductor to open the booth and communicate by telephone with the dispatcher. After complete understanding of orders the conductor draws the semaphore to clear and closes the booth, after which the cars proceed. The entire operation occupies less than a minute.

This situation is clearly illustrated in Figure 1. In case new orders are to be given for the meeting of trains at a given station the operation is fully as simple and insures accuracy and prevents the misunderstanding of orders, not only preventing



Telegraph Signal System—Figure 3. Semaphore Control Device Inclosed.

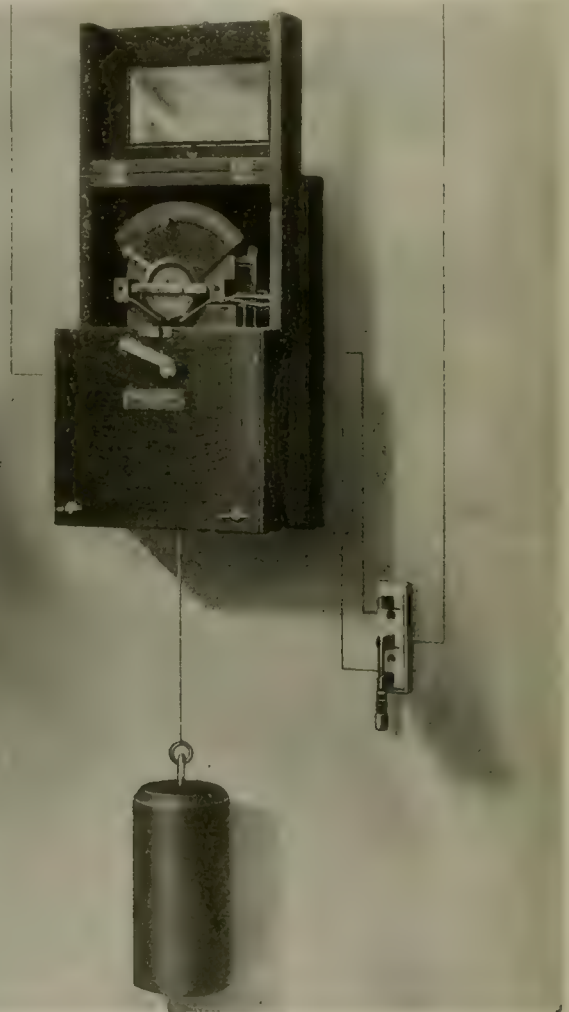


Telegraph Signal System—Figure 4. Semaphore Control Device Open.

accidents, but greatly facilitating traffic and adherence to schedule time.

Let it be supposed that it is desirable to give the crews of two cars out on the line orders to meet at switch No. 4.

The dispatcher throws the blade at station 4, the operation and the return signal occupying from 6 to 12 seconds. The dispatcher then throws the semaphore at switch No. 3 against the westbound train and also in turn the semaphore at switch No. 5 against the eastbound train, getting all three records on his tape in less than 30 seconds. The dispatcher thus knows that he has placed stop signals at switches 3, 4 and 5. Finding the signals against them the conductors open the booths, communicate with the dispatcher by telephone, and understand clearly that the trains are to meet at switch No. 4. Proceeding, they both also find the semaphore at switch No. 4 against them, reminding them of the special orders they have received at switches Nos. 3 and 5. A moment is required to check the operation of passing to the dispatcher, the signal is thrown to clear and the trains or cars proceed. No time is lost, all danger of meeting head-on is obviated, and the record



Telegraph Signal System—Figure 2. Master Machine in Dispatcher's Office.

of the transaction appears on the tape register at the dispatcher's office.

It will be seen at once that within a few seconds' time the dispatcher can halt a car or train at any station or siding for any purpose and can at once get into communication with the crew. What this means in case of a mistake in orders will at once be appreciated by dispatchers and railway officials generally.

The telegraph signal is of much value in wild-cattling special cars over the road or increasing the number of cars to handle especially heavy traffic. It places the movement of every car on the line in the hands of the dispatcher, who can throw every semaphore on a long line to danger while the car is traversing a single mile of track.

The telegraph signal system of semaphore control is independent of any other signal which may be in use on the line, does not depend on track circuits for its operation and fittingly supplements all other signaling systems for emergency purposes and for the enforcement of orders in single-track practice.

Perhaps one of the best examples of its practical use is

on the line of the Indiana Union Traction Company. It is also being installed on the Buffalo Lockport & Olcott line of the International Railway of Buffalo. The handling of the largest traffic ever experienced on the Rochester Charlotte & Manitou Beach Railroad was greatly facilitated by the telegraph system of semaphore control, with which the line is fully equipped. Contracts have been made for installation on other important suburban electric lines in various parts of the country.

This system is also of immense value on single-track steam roads, where it accomplishes all of the work done on suburban lines. At stations where there is no night operator it is especially valuable, as the dispatcher is not only enabled to throw the regular semaphore to stop position, but also to ring a bell at the station operator's house, thus calling him. In case the operator has left his key open it will be automatically cut out, leaving the circuit intact. The telegraph signal is used for emergencies, the correction of orders, the reminder of orders and the enforcement of orders on trunk steam lines, as well as suburban electric lines.

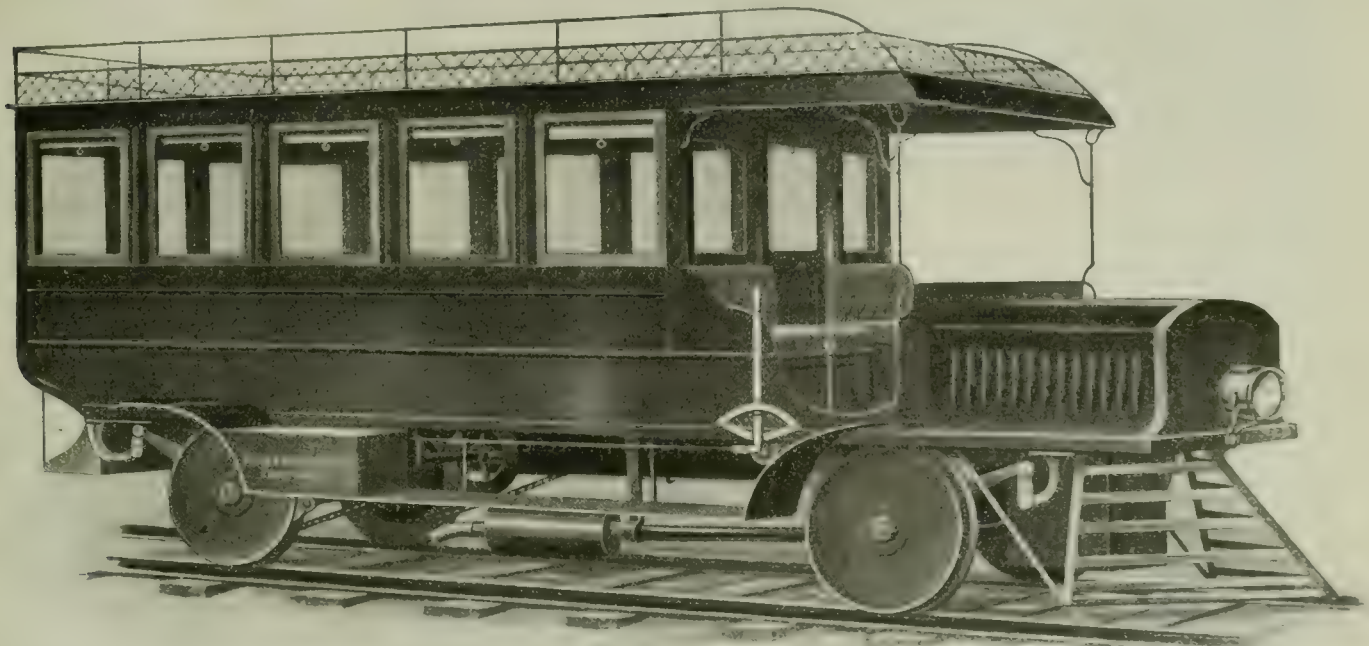
The apparatus for this system is manufactured and installed by the Telegraph Signal Company of Rochester, N. Y.

THE STOVER MOTOR CAR.

Our readers will no doubt learn with considerable interest that the Stover Motor Car Company of Freeport, Ill., is bringing out a gasoline motor car which will have capacity for carrying about 35 passengers, and which has been de-

signed for use on smaller branch lines, or on logging roads, where it is desired to handle a passenger business, which business is not sufficient to warrant the expense of using a steam locomotive and coach. The cylinder pistons and piston rings are ground accurately to size. The piston pins are of large diameter, hardened, ground and carefully fitted. The connecting rods are drop forged, adjustable at lower end, and bushed with bronze and babbitt bearings. The bearings are all made of phosphor bronze and babbitt bronze and are accurately scraped to a perfect running surface. The valves are drop forged in one piece, thoroughly annealed, are all of the same size, and are interchangeable. The valve lifters are made of hardened steel and bronze, all exactly alike and interchangeable. The timing gears are of drop-forged steel and are completely inclosed in the crank case and run in oil. The cam shafts and cams are made in one piece from the best steel, case hardened all over and accurately ground, and are completely inclosed in the crank case and run in oil. The intake and exhaust pipes can be easily removed by loosening four nuts. The use of gaskets in the joints between pipes and cylinders is entirely eliminated. The water pipes are made of brass tubing. The pump is of the well-known gear type, made entirely of bronze, except the bearing shaft, which is steel. The commutator has hardened steel contacts, and the terminals are all protected by a glass cover. The motor at a normal engine speed will develop 45 to 50 horsepower.

Immediately underneath the motor and back of and protected by the pilot are located the radiating coils, which are intended for use during the warm months. In cold weather the water pipes from the motor are connected to coils which extend underneath the seats in the body of the car and the



The Stover Motor Car.

signed for use on smaller branch lines, or on logging roads, where it is desired to handle a passenger business, which business is not sufficient to warrant the expense of using a steam locomotive and coach.

The Stover company, since bringing out its smaller models of railway cars, has had so many inquiries for a larger car that it decided to meet this demand, and the type of car designed is shown in the accompanying engraving.

The gasoline motor is located in front and covered by a hood, as is now standard practice in automobile construction. The hood can be folded back, making the motor easily and quickly accessible. The motor is of the 4-cylinder, 4-cycle type and was designed to embody all the recognized good features to be found on high-grade automobile engines, without any radical departures.

The cylinders have the same bore and stroke—5 inches. They are cast separately and mounted individually on the crank case. The crank case is made of a special aluminum alloy and divided horizontally into halves, the upper half containing all of the bearings, and the lower half serving only as an oil pan. Supporting arms are cast on the upper half of the crank case, so that the lower half can be taken off for adjustment of the bearings without disturbing any of the connections on the motor. The crankshaft is drop forged and

heat radiating from these coils is utilized for keeping the car at a comfortable temperature.

The Stover company is using the same type of transmission on this large car as it has been using with success in the smaller cars. This type of transmission is so designed that the car can be driven in either direction at the same speed. There is but one lever control on the transmission; the lever is set conveniently at the right hand of the driver, who, by throwing the lever forward, can drive the car forward, or, by throwing the lever backward, drive the car backward. The transmission shaft carries two heavy leather fiber bevel friction cones, one of which, when thrown in contact with the driven wheel on jackshaft, drives the car forward, and the other drives the car backward.

The wheels of this car are made of cast steel, to secure the advantage of extreme lightness, combined with the necessary strength and durability.

The body is mounted on long springs, which absorb all vibration. The car is handsomely finished, and the seats well upholstered in leather. A railing is provided around the top of car, so that light baggage can be carried.

The new line of the Oregon Electric Railway from Portland to Salem, Ore., is expected to be in operation by January 1.

ELECTRIC SWITCHING LOCOMOTIVE FOR BUSH TERMINAL COMPANY.

The Bush Terminal Company employs for switching purposes around its extensive docks and warehouses in South Brooklyn a number of steam locomotives and one electric locomotive. This latter was built by the General Electric Company about three years ago and has given such satisfaction, in the way of tonnage capacity, ease of control and low

transmitted to the equalizers through one semi-elliptic spring on each side, instead of through bolster springs and helical side springs, as is the customary construction in the so-called M. C. B. equalized truck. This produces a simple, substantial form of truck, suitable for locomotive service, and having a low cost of maintenance in such service.

The driving axles are 6 inches in diameter, of forged steel, with 36-inch fused steel-tired wheels. Each truck is equipped with two GE-55-A (90-horsepower) 2-turn motors, with a gear ratio of 52 to 21. These motors with this gearing will give at their 1-hour rating a tractive effort of 3,000 pounds per motor, or 12,000 pounds per locomotive, at a speed of approximately 18 miles an hour.

The cab is built of sheet steel, supported by a framework of small angles, and consists of a main operating cab, and sloping end cab, with narrow side platforms extending from the main cab to the ends of the locomotive. The floor of the locomotive is $\frac{3}{8}$ -inch sheet steel, but the floor of the main operating cab is covered with a $\frac{3}{4}$ -inch wood covering.

The locomotive is equipped for both straight and automatic air, and in the center of the main cab is a CP-23 air compressor, having a capacity of 50 cubic feet per minute and supplying air for the brakes. In the operating engineer's corner is located a C-6 master controller and the valves and handles for operating the combined straight and automatic air. In the end cabs are located a sand box, air drum, contactors and rheostats. As the locomotive is to be used solely for switching service, it is supplied with a pantograph trolley, instead of the ordinary wheel trolley, thereby obviating the necessity of the frequent reversal of the trolley which would be required in such service.

The locomotive is equipped with bell, whistle and headlights. The headlights are supplied with 32-candlepower incandescent lamps, and gauge lamps for illumination of the instruments are wired on the headlight circuit and controlled with the same switches.

The principal dimensions of the locomotive are as follows:

Length over bumpers...	29 ft.	Length of rigid wheel base.	
Height over cab....	11 ft. 9 in.		6 ft. 6 in.
Track gauge.....	4 ft. 8½ in.	Weight on drivers...	80,000 lb.

Wyckoff Pipe & Creosoting Company, Stamford, Conn., reports that the New York & New Jersey Telephone Company is laying creosoted conduit made by the Wyckoff company for

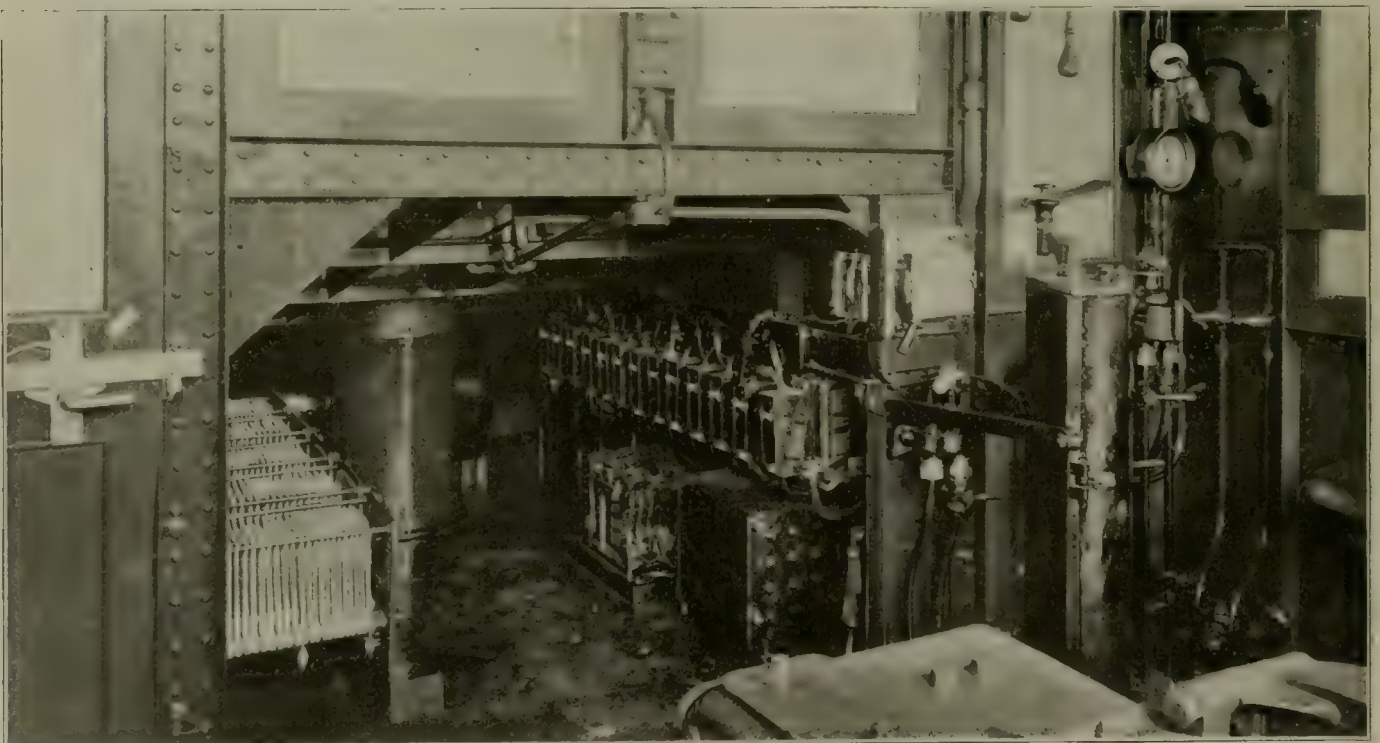


Electric Locomotive for the Bush Terminal Railway—Exterior.

cost of maintenance, that the company recently ordered a second electric locomotive.

The new machine has just been completed jointly by the General Electric Company and American Locomotive Company.

The truck is a bar-frame equalized design, but the con-



Electric Locomotive for the Bush Terminal Railway—Interior.

struction adopted differs from that ordinarily used on electric motor trucks and follows rather a type which has been used with a good deal of success for the tender and guiding trucks of steam locomotives. The bolsters are carried rigidly on the side frame, and the weight of the frame and bolster is

underground wires in Brooklyn and Coney Island, N. Y., and Long Branch and Allenhurst, N. J. The telephone company, during the last 23 years, has used millions of feet of this creosoted conduit, and that laid 23 years ago in Brooklyn is as perfect as on the day it was laid.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 22

CHICAGO, NOVEMBER 30, 1907

WHOLE No. 240

TABLE OF CONTENTS.

Editorial:	
—Delivery Systems and the Bear's Head.....	847
—Records of Street Railway Accidents.....	847
—Economy in Second-Hand Bridges.....	847
—The Cleveland Situation.....	847
—The Public Service Corporation.....	848
—Operating with 1,200 Volts Pressure.....	848
Communications (Illustrated).....	850
Owl Car Service to be Established in Des Moines.....	851
The Indianapolis & Louisville 1,200-Volt Railway (Illustrated).....	852
Interurban Railways. By Hugh J. McGowan.....	858
The Operation of the Pay-As-You-Enter Car (Illustrated).....	859
Seoul Street Railway.....	861
A Railway Test Car (Illustrated).....	862
Should the Jurisdiction of the Storekeeper Extend to the Time the Material is Actually Used? By H. A. Anderson.....	863
A Non-Chattering Brake Hanger (Illustrated).....	863
Committee Appointed to Formulate Accounting System for Electric Railways.....	864
Report of the International Railway Employees' Association, Buffalo.....	864
The Proposed Traffic Association in Central Electric Territory.....	865
American Society of Mechanical Engineers.....	865
Piping and Power Station Systems—LXIV. By W. L. Morris, M. E. (Illustrated).....	866
Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	869
News of the Week:	
—Standard Signs on the Lines of the Connecticut Company.....	871
—Recent Accidents.....	871
—Cleveland Electric Railway Insists on Arbitration.....	871
—New York Public Service Commission.....	871
Construction News:	
—Franchises.....	873
—Recent Incorporations.....	873
—Track and Roadway.....	873
—Power Houses and Substations.....	875
Personal Mention.....	875
Financial News.....	876
Manufactures and Supplies:	
—Rolling Stock.....	877
—Trade Notes.....	877
—Advertising Literature.....	878
Self-Lubricating Trolley Wheel (Illustrated).....	878
Increasing Use of Graphite Paint.....	878
The Continental Whistling Post (Illustrated).....	878

Roads which have recently established a freight and express service or which are contemplating doing so will do well to consider carefully before taking action in the matter of a house-to-house delivery system. Though there are roads which make a house-to-house delivery and at the same time apparently show a profit on their express business, it does not necessarily follow that a delivery system is the best way to build up an express business. The consensus of opinion among those who have had practical experience in the matter and those who have investigated the systems in vogue and the profits of roads having an established freight and express business, is that nothing eats up profits so rapidly nor causes a larger expense than a delivery system. One of the chief difficulties of establishing a system of this sort and the principal reason why the roads which now have a delivery system in operation do not cut off the large expense incurred is that they are in the position of the man who had hold of the bear's head—it was unwise to let go.

Publicity of the accidents reported by street railways has one thing in its favor: it directs the attention of the traveling public to dangers with which there has come to be too much familiarity, and therefore some measure of contempt. Many people undoubtedly take risks on street railways which they would avoid with horror if they were boarding or alighting from steam railway trains in the course of long journeys. The surface car which passes along the streets at a moderate rate of speed has become so accustomed a sight, first in large cities, then in small cities, and now in towns and villages and on country highways, that people forget the necessity which exists for care regarding every vehicle or piece of machinery. The statistics which are being compiled monthly by the public service commission of the first district, New York, relate to the reported accidents on all railways, including steam railways, within its jurisdiction, and have attracted much attention. It is unfortunate that these compilations cannot differentiate between those accidents which are bona-fide and those which are essentially forced, the product of dishonest

claimants. The honest people in most communities would be amazed at the number of unjustified claims made against street railways.

Builders of new lines may find it to their advantage in preparing estimates on bridge work to obtain figures as to the cost of second-hand railway steel bridges which have been discarded because of the increasing weight of the equipment of steam railways. Many of the structures which have been cast aside are in good condition and some of them have been in service for but a short time. It goes without saying that they can be secured for less than the cost of new steel bridges and where the feature of prompt delivery is to be considered they can be had in much shorter time than is required for the manufacture of new material. In many instances structures of this sort may be secured direct from the purchasing agent of some large steam line, although there are brokers who make a specialty of this class of material.

The prospects for any kind of a settlement of the Cleveland franchise controversy seem no brighter now than before the recent election, when Tom L. Johnson was re-elected mayor of the city on a 3-cent fare platform. At that time it was expected that matters would soon come to a crisis in which the protracted squabble between the Cleveland Electric Railway and the low-fare interests as represented by the Forest City Railway and Mayor Johnson and the city administration would be terminated in one way or another. A settlement on almost any terms which would take the street car service out of the hands of the courts and the politicians would be welcomed with joy by the citizens of Cleveland, who are interested in street railways as a means of transportation, not as a football for politicians. But the mayor and his party do not take that view of the matter and apparently seek only to keep the issue alive to further their own ends. The Cleveland Electric Railway has proposed various plans for an arbitration of its property valuation, but all have been rejected. The company is not in favor

of the holding plan, but if the city wishes it is ready to do business on that basis. But because it is not willing to allow its property to be confiscated the mayor and his party seek to make it appear that the company, not the politicians, is delaying the settlement.

THE PUBLIC SERVICE CORPORATION.

The public service corporation has some things to be thankful for. The service it renders is nearly indispensable; and, as a natural reaction from radical attacks, new voices point out facts, not inimical to public welfare, which show the connection between the corporation and the people served. We quoted in our issue of November 9, page 752, from the decision of the Wisconsin railroad commission giving authority to the La Crosse Gas & Electric Company to increase its rates because the revenue realized from existing rates was insufficient to provide for operating expenses, including allowance for depreciation, and for interest on the investment. The situation affecting the La Crosse company was produced by the construction at different times of plants which were designed to be independent, and therefore competitors of the existing company. All of these independent corporations were absorbed in turn by the existing company, the finances of which, on account of the absorption of duplicate plants and the wastes of competition, were considered by the commission in arriving at a decision.

A brief statement is embodied in the decision setting forth the essential points of differences between public service corporations and ordinary commercial enterprises, so far as they were involved in the question at issue. Promulgated by a public body of the character and importance of the Wisconsin commission, this statement is of interest to all public utility corporations. If the principles were more clearly understood by all, the attitude toward corporations of the public they serve would be more wholesome. The commission states: "The conditions which surround the former [public service corporations] are of such character that the services which they render can usually be furnished at a much lower cost by one plant than by two or more in the same locality. The differences between them * * * extend to the principles of competition."

A much larger investment in plant, equipment and other fixed property is required by the public service corporation than by the ordinary commercial enterprise, involving heavy annual charges for interest, repairs and maintenance. When competition reduces prices below a level yielding a profit to the investors whose capital is at risk, when gross revenues are reduced to an unprofitable point or operating expenses are enhanced to a level which affords no provision for those charges that are essential in the conduct of the business as a going concern, the ordinary commercial enterprise can usually stop expenses: a public service corporation must continue. The investment of the ordinary commercial enterprise can sometimes be withdrawn or even converted into other purposes, but the interest and the maintenance charges of the public service corporation continue at nearly the same rate whether the plant is operated or not.

Under these conditions it is not only best from a financial standpoint, but wise if an aroused public sentiment is to be avoided, for the public utility corporation to continue in operation if it earns only enough to meet actual operating expenses. "Duplication of such plants," adds the commission, "is a waste of capital whenever the services can be adequately furnished by one plant only. It necessarily means that interest and maintenance must be earned on a much greater, if not twice as great, an investment and that the actual cost of operation is likely to be relatively higher." This has been realized in many communities, and it has necessarily been a costly experience. It frequently means poorer service and the waste of capital. The wisdom of the truth which follows is not often

perceived by the public until too late: "Active and continuous competition between public utility corporations furnishing the same service to the same locality seems to be out of the question. Two distinct and separate corporations are not likely to remain separate very long after it becomes clear that the service rendered by both can be more cheaply and more effectively furnished by only one of them."

It is encouraging that notwithstanding the anti-corporate hysteria of the age there are public bodies to recognize some of the fundamental principles affecting the success, in which every community is concerned, of the public utility corporation.

OPERATING WITH 1,200 VOLTS PRESSURE.

In the endeavor to attain economy in current distribution for electric railways various systems of transmission and feeding recently have been placed under the test of actual operating conditions. The expense of maintaining rotary converter substations, fed from high-tension transmission lines, is warranted for feeding long interurban working conductors, because it shows economy over the direct feeding at 600 volts. And while the rotary converter substation has been greatly perfected in design during the past few years there has been ever present the desire to equip the road without the somewhat complicated machinery of a converter substation.

The result has been a widespread introduction of the single-phase railway equipment. The method of single-phase distribution is, indeed, simple and has been rapidly perfected so that its performance may be considered as satisfactory. The three-phase system of distribution, using two trolley wires with the track as the third side of the circuit, has had but one trial in America; and that installation has been replaced by one of the usual direct-current form. Still another method especially applicable to long electric railways is that of feeding direct current at 1,200 volts pressure direct to the trolley from a generating station located near the midpoint of the line. This principle is, of course, subject to expansion in the same way that the 600-volt rotary converter fed method of distribution may serve a long line; but when feeding with the 1,200-volt current sections four times as long as those for 600 volts may be used with the same weight of copper in feed wires.

The first 1,200-volt interurban railway to be placed in actual service in the United States began operation on November 6, 1907, between Seymour and Sellersburg, Ind., distant 41 miles apart. This road of the Indianapolis & Louisville Traction Company also operates all its cars from Sellersburg to Louisville, Ky., 14 miles, over tracks fed with 600-volt current. Fulfilling the expectations of the designing engineers the operation of this company's cars over sections of trolley fed with current at both 1,200 and 600 volts has been found satisfactory.

The economy in copper is apparent when it is stated that a centrally located power station satisfactorily feeds all the high-speed interurban cars over 41 miles of No. 0000 trolley with a supplementary feeder comprising 34 miles of single conductor ranging from 500,000 to 211,000 circular-mils cross section. The additional copper other than the trolley wire is not thought to be greater than the installation on any well-designed 600-volt feeding system; and as the result of the use of 1,200-volt current the additional expense for rotary converter substations and transmission lines is absent.

The method of generating 1,200-volt current introduces no difficulties at the power house. In the installation earlier mentioned each generating unit comprises a reciprocating engine, on the shaft of which are mounted the armatures of two standard 300-kilowatt 600-volt direct-current railway generators. To obtain the higher potential the series fields of these generators and the armatures are connected in series, while the shunt fields for compounding are connected each

across the 600-volt terminals of its own machine. Elsewhere in this issue a wiring diagram is presented showing how simple are these connections. The combination of two machines connected as described furnishes a united output in this instance of 600 kilowatts at 1,200 volts difference of potential between the positive of one machine and the negative of the other.

With regard to car equipments suitable for 1,200-volt operation, this subject was very thoroughly described by E. H. Anderson in our issue of September 28, page 368. Each car is provided with four motors and the control equipment has all the desirable features offered by the latest designs of multiple-unit, automatic acceleration apparatus now built. For 600-volt service the control connections are identical with those of the series-parallel type. A commutating switch is placed in the motorman's vestibule convenient for making the necessary changes in the connections so that the same equipment may operate over the trolleys fed with 1,200 or 600 volt current. These changes in connections comprise a rearrangement of the motor circuits so that the two motors on either truck are connected permanently in series, and this group represents one motor of an equipment of the usual series-parallel type. The motors used are of the commutating-pole type, which is especially well adapted to the severe service of high-speed interurban roads. Inasmuch as two motors are placed in series across 1,200 volts, the potential across the terminals of either motor is 600 volts and the performance and efficiency curves remain the same as for that voltage.

The successful inauguration of service on the 1,200-volt line of the Indianapolis & Louisville Traction Company offers an interesting example of how a 40-mile road may be satisfactorily fed from one point with direct current. The service records that may be obtained from this new 1,200-volt installation will afford arguments of weight in establishing the place of the high-potential direct-current railway in America.

TEMPORARY EXTENSIONS OF TRANSFER PRIVILEGES.

There is hardly a more delicate question in electric railway operation than the extension or curtailment of transfer privileges. In some respects the transfer touches the public pocketbook more intimately than the straight 5-cent fare. The average passenger is accustomed to paying his nickel for a ride in one car, rarely objecting to the charge even for moderate distances in American cities, and it seems to be pretty well settled that the American public has little use for the zone system in urban trolley travel. The value of time saved by taking a car for a ride of a few blocks on a non-congested route is keenly appreciated by the great majority of short-distance riders. This class of traffic ought to be encouraged, and there is a special field for it in connection with service to railroad terminals.

During construction work and in times of traffic interruption from accidents or other temporary causes, it often happens that a company can relieve the situation materially by issuing special transfers. It may be possible to provide a service in this way which would otherwise be temporarily suspended, as in the case of a double-track line connecting business and residential districts crossed at some point by another double-track line ultimately reaching the same destinations, but by devious route. If service on one intersecting track is suspended, special transfers with rigorously enforced time limits will make possible all necessary movements between important centers. This is in addition to the common practice of issuing "disabled car" checks to the next car. Transfers to a parallel street may also be helpful as expedients.

In the use of special transfers it will generally be found that the routes may be covered as not intended by a certain portion of the public, as by round trips traversed on a single fare. Some abuse of special privileges is always to be expected when such are granted the public at large, but it is

doubtful if a company loses anything by a broad policy in this direction.

It is of great importance to set forth either in the newspapers, by bulletins in the cars or otherwise, the exact reasons for the granting of temporary privileges inconsistent with ordinary operating routine, at least in communities where hostility toward public service corporations is a prevalent condition. Then, when these facilities are withdrawn, fair-minded patrons will recognize that they were put forth by the company largely as a public accommodation, and there will be less criticism of the restoration of old conditions. Public sentiment is very strong in some cities where the service on important lines is temporarily affected adversely, and an open policy on the part of the company, with a frank statement of the conditions, will do much to disarm antagonism.

ANNUAL REPORTS.

Boston & Worcester Electric Companies.

The report of the Boston & Worcester Electric Companies for the year ended September 30 comprises statements of the affairs of this voluntary association and of those of the Boston & Worcester Street Railway. The Boston & Worcester Electric Companies owns the capital stock and \$600,000 notes payable of the Boston & Worcester Railway. Gross earnings of the Boston & Worcester Railway amounted last year to \$531,560, as compared with \$514,465 in the previous year. Of the gross earnings last year \$517,370 was received from passenger traffic. The principal figures, with a comparison, follow:

Year ended September 30—	1907.	1906.	1905.
Gross earnings	\$531,560	\$514,465	\$448,366
Operating expenses	273,364	269,391	229,656
Net earnings	\$258,196	\$245,074	\$218,710
Charges and taxes	151,662	132,676	113,648
Divisible income	\$106,534	\$112,398	\$105,062
Dividends	103,500	103,500	103,494
Surplus	\$ 3,034	\$ 8,898	\$ 1,568

James F. Shaw, the president, says that the local business showed a healthy increase, notwithstanding that the last year was a poor one for New England street railways. The through business from Boston to Worcester did not increase in the year and Mr. Shaw does not look for any improvement of importance until the through line is completely double-tracked. This will eliminate the delay and slow speed incident to a single track with turn-outs and will permit a reduction in the running time between these two points. As there are now less than two miles of double track to be completed it is hoped to finish the work by early spring. Mr. Shaw adds:

I am much disappointed that we have been unable as yet to establish the freight and express service which we have been trying to install, but the Boston Elevated Railway Company up to this time has failed to obtain the necessary rights to allow it to take our cars from Chestnut hill to the center of Boston. We are sure to receive a very handsome net revenue from this business as soon as it can be put into operation, and I am using every effort to bring the same about. At the present time our capital charges are practically at their maximum, as a comparatively small additional capital outlay will complete our property and we will then receive the benefit of the revenue due to the improved through service and the full development of our property.

Although the number of fares collected during the year was 10,571,066, as compared with 10,279,303 in the previous year, the car mileage decreased from 1,862,136 miles in the year ended September 30, 1906, to 1,820,905 miles last year. Car-hour and car-mile earnings compare as follows:

Route—	Earnings per car-hour.		Earnings per car-mile.	
	1907.	1906.	1907.	1906.
Boston and Worcester	\$7.08	\$6.56	\$0.342	\$0.316
Boston and South Framingham....	4.23	3.97	.226	.210
Local lines	2.31	2.32	.225	.229

Communications

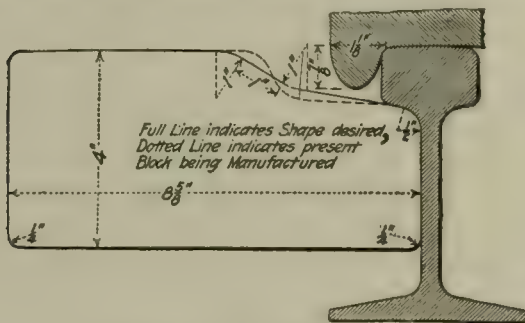
T-RAIL TRACK IN CITIES.

To the Editors:

I was quite interested in the article by C. Gordon Reel, entitled "The Use of the T-Rail in Cities," in your issue of October 19, 1907. From the city engineer's standpoint I can see no objection to the use of the T-rail, provided that where streets are paved some well-designed form of paving is used on the inside of the rails. In streets not paved the T-rail is as good a section as can possibly be used, for all parties concerned, and for the railroad companies it is the best. Especially is this true in macadamized streets, for the macadam can be maintained up to the rails, the flanges of the wheels making the small unobjectionable groove in the macadam that is necessary.

While city engineer of Richmond, Ind., where the T-rail is used exclusively, I designed in 1894 the nose brick shown by the solid line drawing on page 645 of your issue of October 19, 1907 (reproduced herewith). Since then this form of paving has been quite extensively used. This shape of block was manufactured by the Canton Brick Company for the city of Richmond to repair some tracks on Main street that had been of poor construction, and to pave along the rails on North E street, between Eighth and Tenth streets.

The track work planned for the North E street improve-



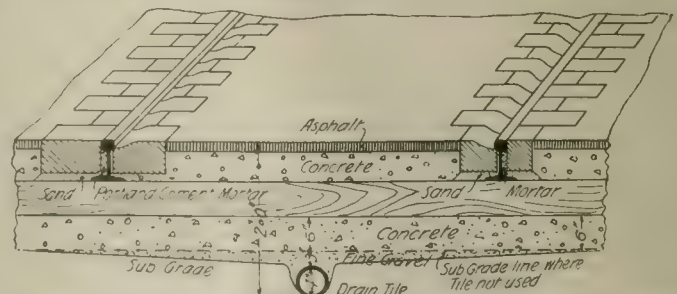
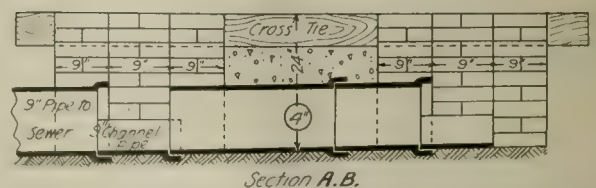
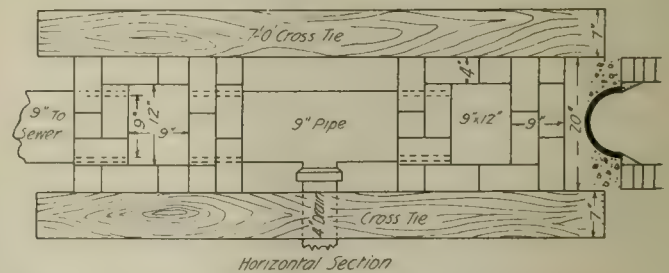
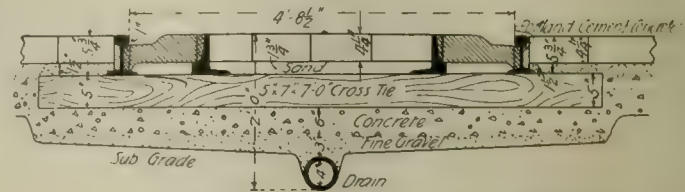
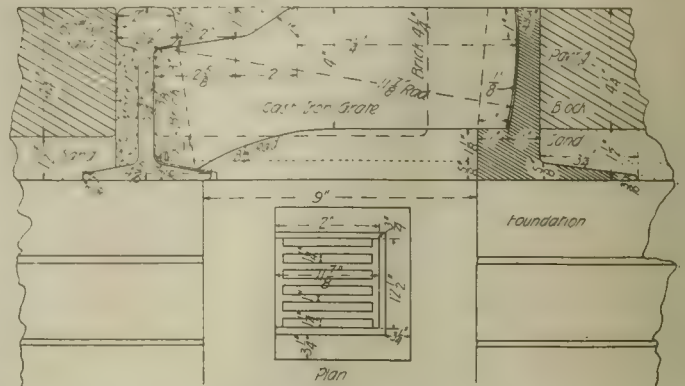
T-Rail Track—Special Nose Brick.

ment in Richmond was constructed as shown by the accompanying plans and sections, and is practically as good today as when it was laid in 1894. The brick indicated by the solid line drawing in the illustration first referred to represents the form as originally designed, and the dotted line the form as being manufactured today. The original form shown by the solid line drawing was designed after a great deal of thought and study upon the subject, and I am thoroughly convinced it is the best to use. It affords an easy egress for the wheels of vehicles in turning out of the way of cars, for, as the angle increases, the brick eases the wheel out of the rut, offering almost a gradual incline from the bottom of the ball of the rail to its highest point; thus, there is no abrupt hump to catch the inside of vehicle tires as in the dotted line drawing. For seven years after this track was laid all the outgoing freight of the Pennsylvania Railroad Company passed along this street and in that time I never heard any objection to this form of construction. In 11 years of experience as city engineer of Richmond I heard only words of commendation for this form of construction. The rail used was a 6-inch 60-pound tee, with 6 by 8 inch by 7-foot ties placed on 30-inch centers, as fully shown herewith. The track drains I consider a very essential appurtenance.

The change in form of this nose block has been gradually accomplished by brick manufacturers trying to cater to the ideas of city engineers, whose idea has been to make it like a grooved rail in appearance and effect. The latter, however, is impracticable. The outside of a rail needs no special block,

as the space between the outside of ball and web is quite cheaply, conveniently and better filled with concrete of damp sand. Concrete is the best for new work, but not always the most convenient in making repairs.

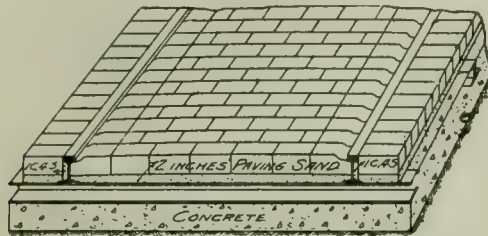
I am submitting the standard sections for our paving



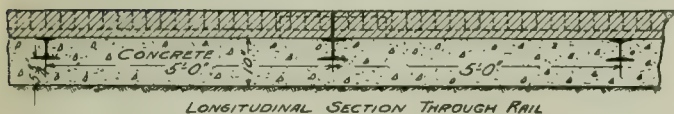
T-Rail Track—Details of Track and Drains in Richmond, Ind.

(reproduced herewith). I have recommended that our company, the Ft. Wayne & Wabash Valley Traction Company, adopt the 6-inch 72-pound T-rail section as its standard section for paved streets. This rail section has a bending moment about equal to the 85-pound A. S. C. E. rail section and has a depth sufficient for any kind of modern paving. Why should

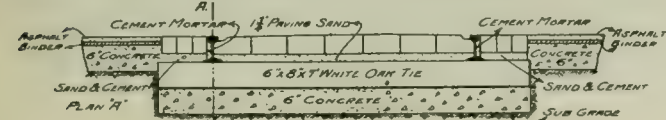
we advocate when not needed the use of a deeper rail section when it requires an unnecessary outlay of 25 per cent in steel and in pavement foundation above the tie? From an engineering standpoint and for the best interest of the corporation you represent, why not recommend a rail section to meet your requirements, and a form of pavement that is best adapted to the use of the general public? A pavement appurtenance that will annoy the public the least and answer the purpose of the railway company—one that will make the Trail



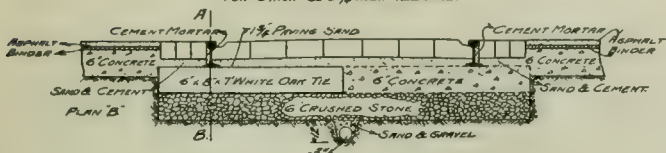
STANDARD STEEL TIE CONSTRUCTION FOR 6" RAIL
PLAN F



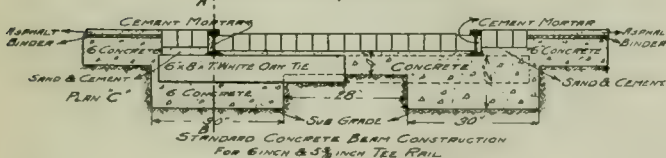
LONGITUDINAL SECTION THROUGH RAIL



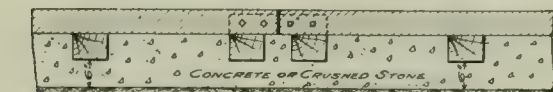
STANDARD SHEET CONCRETE CONSTRUCTION
FOR 6 INCH & 5 1/2 INCH TIE RAIL.



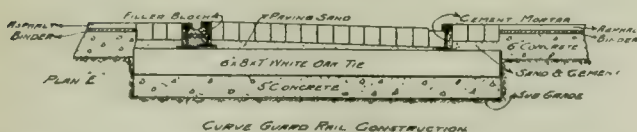
STANDARD CRUSHED STONE CONSTRUCTION
FOR 6 INCH & 5 1/2 INCH TIE RAIL.



STANDARD CONCRETE BEAM CONSTRUCTION
FOR 6 INCH & 5 1/2 INCH TIE RAIL.



LONGITUDINAL SECTION THROUGH A.B.
SHOWING SUSPENDED TYPE 22 JOINT.



CURVE GUARD RAIL CONSTRUCTION

T-Rail Track—Standards of Ft. Wayne & Wabash Valley.

as convenient generally as the grooved or girder rail—will pay any company to adopt.

Five and three-quarters to six inches is ample depth for rail for paving purposes in most cases. In some cases where deep block stone paving is used, however, it is necessary to have a greater depth of rail. What the street railway engineer must do in the near future is to use his old rail for cross-ties, or steel cross-ties, and sheet concrete for the foundation. This form will give him the minimum depth of foundation he can use, with the maximum bearing surface, which is so essential. I note that the Central Electric Railway Association has recommended the use of the 70-pound A. S. C. E. rail section for interurban lines and a 90-pound 7-inch rail for

city lines. I believe it a mistake to recommend or unnecessary for anyone to adopt a 90-pound 7-inch section for city lines when only a 70-pound A. S. C. E. section is required on the interurban lines, for the reason of strength alone. Interurban service is our heavy high-speed service. The impact is 10 times greater than city service where the same interurban cars are operated, for the simple reason that they are operated at slower speed, hardly ever to exceed 10 miles per hour; therefore the impact is much less on city than interurban lines. I believe it is a mistaken idea to add from 15 to 20 per cent to the cost of a foundation above the base of the rail or the top of the tie and to the cost of rails when it is not required; then scrimp and rob the foundation below the ties. This foundation must be depended on to hold up the rails so they will receive their load. What is desired is a rail of sufficient strength and height to sustain the load and receive the pavement; sufficient ties, wood or steel, to hold the rails rigidly in place and a foundation to hold the ties and rails in place so they may sustain their load without giving in the least, at a minimum cost. With a loose rail one has a loose pavement. He is a wise manager who adopts a rail not unnecessarily heavy, with a good foundation, instead of an unreasonably heavy rail with no foundation. Experience has taught many the folly of the latter plan.

When we have to use a 90-pounds-per-yard section I am rather inclined to the "Hunt" section. The proposed concrete beam track construction plan for 90-pound A. S. C. E. section, as shown in C. Gordon Reel's article, is impracticable, because the excavation cannot be made in that manner or the concrete beam be constructed without forms. The concrete beam, as a general proposition, is a failure, and the quicker we get away from it the better. It is supposed that when a 90-pound rail is adopted it is because the traffic is heavy; if this were true, and we assume the weight under each wheel to be distributed over a distance of, say, three ties with 24-inch centers, we have with the ordinary 6 by 8 inch by 8 foot tie 1,536 square inches, and with the proposed concrete beam, 1,008 square inches. This beam should have at least a 28-inch base. After the experience of our company I should not think of building any beam with less than a 30-inch base and then on tracks over which only light city cars are operated.

The first essential of any track is proper drainage, and next bearing surface on a good foundation. The rails directly take the weight and transmit the weight to the foundation through the ties. All that is essential in a rail is to have one of such strength that it will not bend under its load; one that will remain perfectly rigid, with ties placed from 36 to 48 inch centers. In sand, gravel or crushed stone I should use ties from 24 to 27 inch centers. In concrete we will soon have to go to steel at from four to five feet spacing, with a good concrete base, and I offer the accompanying suggestions, which are our standards for construction.

H. L. WEBER.

Chief Engineer Ft. Wayne & Wabash Valley Traction Company.

Ft. Wayne, Ind., November 19, 1907.

Owl Car Service to be Established in Des Moines.

George B. Hippee, general manager of the Des Moines City Railway, has announced that on December 1 an all-night service will be established on seven lines, with a 1-hour headway. An ordinance has been prepared by the city solicitor to permit the company to charge a 10-cent fare from 1 to 5 a. m. The council has abandoned its intention of trying to compel the company by ordinance to furnish an owl car service, but it is understood that if the service proves remunerative it will be made permanent. Mr. Hippee is quoted as saying that the night service will cost 16 cents per car-mile and that to pay operating expenses each of the seven cars must carry at last 45 passengers during the five hours.

THE INDIANAPOLIS & LOUISVILLE 1,200-VOLT RAILWAY.

The recently opened line of the Indianapolis & Louisville Traction Company is of particular interest because of its

towns: Seymour, Farmington, Chestnut Ridge, Langdon, Crothersville, Austin, Scottsburg, Vienna, Underwood, Henryville, Memphis, Speeds and Sellersburg. The right of way for a considerable portion of the route is adjacent to that of the



Indianapolis & Louisville 1,200-Volt Railway—Type of Bridge for Small Waterway.

high standards of construction and the introduction of 1,200-volt current for the operation of a high-speed interurban line. The new road connects Seymour, the southern terminus of

Pennsylvania Lines. As shown by accompanying illustrations, the roadbed has been especially well built. The waterways are crossed with permanent structures, including through



Indianapolis & Louisville 1,200-Volt Railway—Roadbed and Overhead Construction on Curves.



Indianapolis & Louisville 1,200-Volt Railway—Roadbed and Overhead Construction on Tangents.

the Indianapolis Columbus & Southern Traction Company, with Sellersburg, the northern terminus of the Louisville & Northern Railway & Lighting Company. The recently completed line is 41 miles long and follows an especially direct route between its terminals, passing through the following

truss spans, through plate girder spans, deck beams and flat top concrete culverts.

The track structure comprises 75-pound rails of standard section, and ties ballasted with crushed lime rock. The joints are electrically connected with No. 9000 bonds brazed

to the head of the rail by the process of the Electric Railway Improvement Company. Shelter sheds are placed at all regular stops and at stations in the larger towns accommodations will be provided for handling freight and selling tickets. The

line, each of which has its switch protected with a Buda semaphore standard. This semaphore is so actuated in unison with the movement of the switch point that when the main line is clear the blade has an inclined position and when the



Indianapolis & Louisville 1,200-Volt Railway—Scottsburg Shops and Office Building.



Indianapolis & Louisville 1,200-Volt Railway—Interior of Passenger Car, Showing Smoking and Baggage Compartments.



Indianapolis & Louisville 1,200-Volt Railway—Interior of Scottsburg Power House, Showing 1,200-Volt Generating Unit Comprising Two 600-Volt Machines.

Seymour terminal, to be used jointly with the Indianapolis Columbus & Southern, will provide two covered tracks, accommodations for freight and express, ticket and operating offices.

There are passing sidings at frequent intervals along the

switch is thrown for the siding it assumes a horizontal position. Standard switch lamps are mounted above the blades. This type of switchstand gives a positive signal for which the motorman must always look, rather than offering a signal

of varying form or color. The special track work, including the switchstands and railroad crossings, was supplied by the Buda Foundry & Manufacturing Company.

Overhead Construction.

Power for the operation of the cars over the 41 miles of the new line is fed direct from the power house at Scottsburg.

No. 0000 grooved trolley is supported on Richmond flexible brackets fastened to 30-foot poles placed 90 feet apart on tangents. On curves span construction is used with the poles placed 60 feet apart. Inasmuch as the potential carried is twice as high as that ordinarily used special insulation was needed. This requirement was fulfilled with the Ohio Brass Company's No. 5626 special type N galvanized straight-line



Indianapolis & Louisville 1,200-Volt Railway—Type of Combination Passenger Car.

about the center of the route. The feeding pressure at the power station is 1,200 volts between the single No. 0000 grooved trolley and the rails. The satisfactory operation of the road during the past month has shown that on the score

hanger having a $\frac{5}{8}$ -inch stud. A 2-inch Premier strain insulator is bolted on each side of the hanger to connect with the steel strand supporting cable.

The trolley wire is supplemented by direct-current feeders.



Indianapolis & Louisville 1,200-Volt Railway—Power Station and Storage Reservoir, Scottsburg.

of maintaining accurate schedules the distribution of current for a 40-mile line is perfectly feasible with 1,200 volts pressure. The absence of high-tension wiring and the now familiar interurban substations is quite noticeable.

As shown by the accompanying illustrations, the overhead construction is of an especially permanent type. The

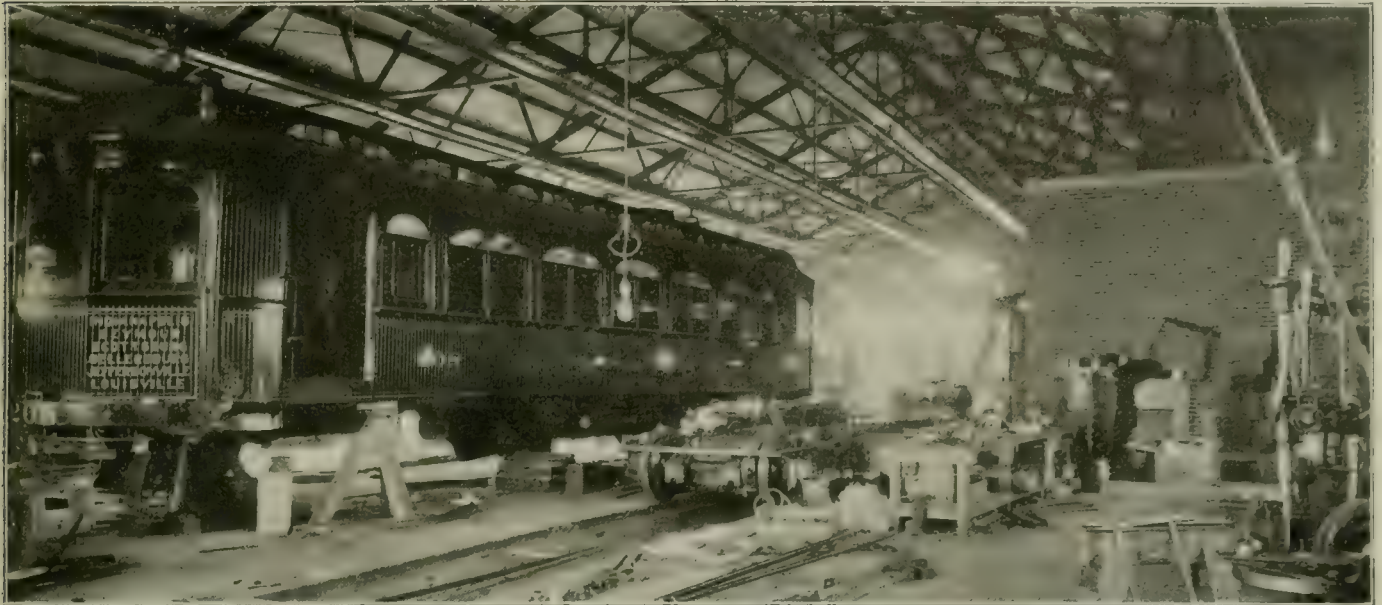
extending 17 miles each way from the power house. This additional copper comprises 10 miles of 500,000, 20 miles of 300,000 and 4 miles of 211,000 circular mil. The supplementary feeder, together with the pair of telephone wires, is carried on 4-pin crossarms at the top of the trolley poles. At all crossings and at intervals of one-half mile the telephone circuit

is brought down to the level of the motorman's cab and means provided for connection with the dispatcher by Lima jack boxes mounted on poles painted white. The Stromberg-Carlson telephone instruments used are carried in the front compartment of all motor cars.

The power station and repair shops are located at Scottsburg, which, as earlier stated, is about the midpoint of the

dumped ready for firing. An ash-handling plant will later be installed.

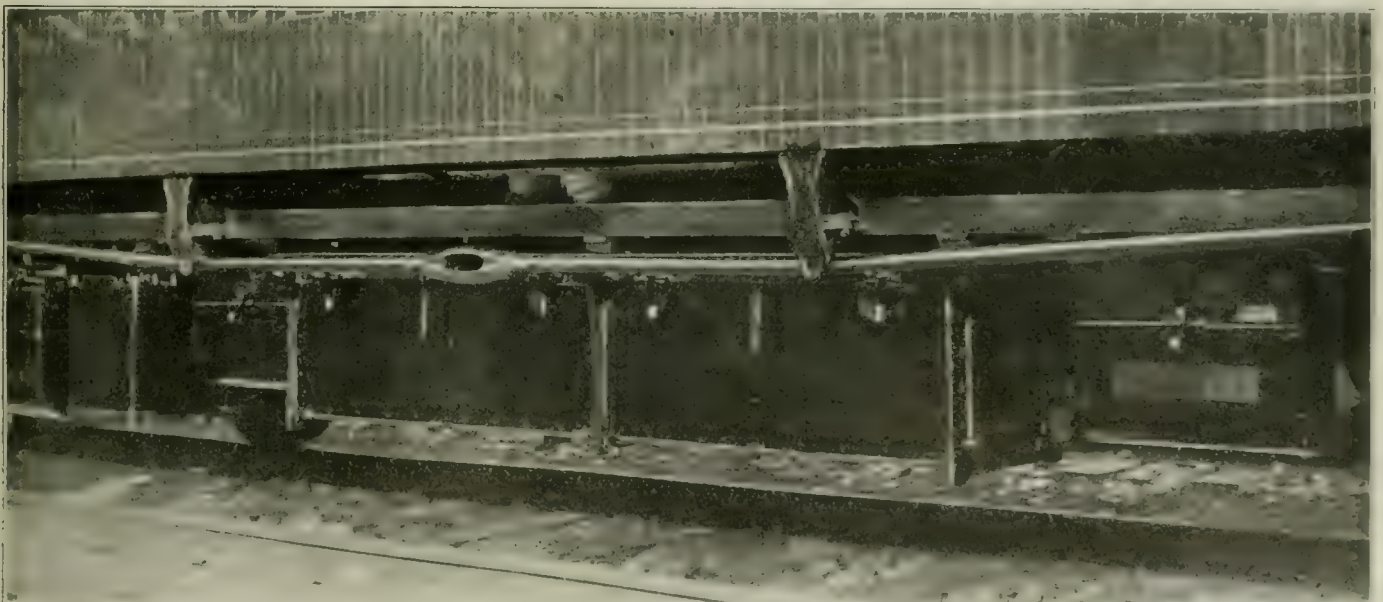
The boiler equipment comprises four Babcock & Wilcox units of 300 horsepower each, and there is space available in the boiler house for the addition of two units of similar capacity. These boilers are served by two steel stacks 5 feet in diameter and 147 feet high. The boiler feed pumps take



Indianapolis & Louisville 1,200-Volt Railway—Interior of Scottsburg Shops During Equipment of Cars.

road. This location necessarily was dictated if the entire length of the 41-mile line was to be fed direct without the use of rotary converter substations. As earlier mentioned the expectations of the designing engineers have been met with regard to the feasibility of feeding direct current from this

their suction from a Goubert feedwater heater. The pumps are of the Epping-Carpenter duplex type, with 9 by 5 by 10 inch cylinders. The supply of boiler feedwater is taken from an artificial reservoir having an area of 13 acres, one end of which is formed by the track subgrade, as shown in an accom-



Indianapolis & Louisville 1,200-Volt Railway—Method of Supporting Multiple-Control Equipment from Special Angle-Iron Frame.

centrally located station throughout the entire length of the 40-mile line.

The power station building of brick is 107 feet long, divided by a fire wall into an engine room, 42 feet wide, and a boiler house, 50 feet wide. Adjacent to the boiler house is a concrete coal pocket with a capacity of 300 tons, over which is a sidetrack connection so that coal from steam railroad freight cars, brought in over the Pennsylvania siding, may be

panying illustration. As an emergency supply of water there is a 30,000-gallon tank, supported on a steel framework 100 feet high and located close to the shop building across the track from the power house.

The engine equipment comprises two Allis-Chalmers heavy duty 24 by 48 inch engines operating non-condensing at 115 revolutions per minute. The engines have 18-inch shafts carrying 25-ton flywheels. Steam is fed to the engine throttles

compartment, which are of wood, are provided with locks and were supplied by the Hale & Kilburn Manufacturing Company. To protect the woodwork of the interior bulkheads it has been sheathed with copper to a point higher than where passengers will be liable to place their feet. And to give additional foot room openings have been cut in the bottom of the interior bulkheads so that passengers may stick their toes through these holes and not be cramped in the seats placed close to the partitions.

The main and smoking compartments are provided with continuous parcel racks, ventilator fixtures and candle brackets supplied by the Dayton Manufacturing Company. The curtains are of Pantasote, with Curtain Supply Company fixtures and the swinging doors in the two interior bulkheads have Blount door checks. The rear door is of the sliding type. A Peter Smith No. 2 hot water heater is placed in the front end of the car ahead of the pipe railing which protects the motorman. Coal is kept in a neat wooden box which serves as a motorman's seat. Some of the special fittings are: Fire tool case, Babcock chemical extinguisher, telephone on bracket, trolley pick-up and rope, classification and marker lamps, Hunter illuminated destination signs, two Nichols-Lintern air sanders, all in the front end; also there are found elsewhere on the car, deep-toned whistle, Knutson trolley retriever, General Electric arc headlight, speaking tube connecting rear platform with motorman's vestibule, International 2-fare registers for city fare registration and Ohmer No. 3 type register with identification key for eight classes of fares for intercity use.

General Dimensions and Specifications.

Length over buffers	50 ft. 4 in.
Length over vestibules	49 ft.
Length of car body	39 ft. 8½ in.
Length of vestibule	4 ft. 7¾ in.
Length of passenger compartment.....	22 ft. 8 in.
Length of smoking compartment.....	10 ft. 10½ in.
Length of baggage vestibule.....	6 ft. 2¾ in.
Width over sheathing.....	8 ft. 7½ in.
Width over all	8 ft. 10 in.
Width of aisle	20½ in.
Length of seats.....	37 in.
Height under sills to top of roof.....	9 ft. 6 in.
Height of track to top of roof.....	12 ft. 11 in.
Between bolster centers	26 ft. 6 in.
Weight of car body (about).....	29,400 lb.
Outside sills, 5 by 8 inches, with 2 by 6 inch steel channel between.	
Two intermediate sills of 6-inch steel I-beam.	
Glass.....	Polished plate and cathedral art glass

Electrical Equipment of Cars.

Particular attention is called to the motor and control equipment of the cars, inasmuch as they are operating on both 1,200 and 600 volt trolleys. Each car is equipped with four General Electric motors, No. 205 of the commutating-pole type, built for operation across 600 volts difference of potential. The control equipment (G. E. C-35-A) combines the features of automatic acceleration, multiple-unit operation and a "deadman" handle, which, on being released from any point by the motorman, cuts off all current from the motors and applies the emergency air.

The scheme for operating with 600-volt motors on 600 and 1,200 volt trolleys is to use the ordinary series-parallel control on 600 volts pressure and to connect two motors in series as one unit for 1,200 volts pressure; thus in the latter case operating the motors on each truck as one electrical unit designed for 1,200 volts, and combining that unit with a similar one on the other truck for series-parallel connections on the higher voltage. As a means of 600-volt current supply when on a 1,200-volt trolley a dynamotor is carried under each car, supported much the same as an air motor compressor. This dynamotor is thrown into circuit and across full voltage when the car passes on to the 1,200-volt trolley and it operates continuously. It is provided with two commutators wired in series, so that a tap from between them to the ground will

give current at 600 volts pressure suitable for operating the lights, control circuits, headlight, etc., as in the ordinary way on the 600-volt trolley.

In the motorman's section of these cars equipped for 1,200-600-volt operation are found the following devices: Master controller for operating contactors and with "deadman" handle as described, commutating switch for transferring the motor and rheostat connections from those for 600 to 1,200 volts and vice versa; master control main switch, which also acts as a trip for the circuit-breaker; set switch for circuit-breaker; an M. S. type safety switch for dynamotor; lighting and control circuits; and (in panel box) a limit switch for regulating the feeding of the automatic acceleration feature.

Other than the control limit switch the panel box board in the baggage compartment contains the control switches and fuses for seven lighting circuits, pump circuits and headlight circuit, and also a drum switch to open all control circuits simultaneously for fusing. The wiring throughout the car is carried in conduit. An interesting feature of the equipment is the method of supporting the control apparatus under the car body. Instead of hanging these various, and some of them heavy, parts from the sills they are grouped and hung from a framework of angle iron (3 by 3 by ¾ inch). This frame is in turn bolted to the sills of the car and clamped to the bottom flanges of the cross sills. An accompanying engraving illustrates this neat detail.

Service.

At the present time and until the track is fully ballasted, which undoubtedly will be within the coming month, service from each terminus is offered on 2-hour headway from 6 a. m. until 10 p. m. each day. The cars make the run of 55 miles between the Louisville terminal and Seymour in 2 hours and 27 minutes. At Seymour connection is made with the Indianapolis Columbus & Southern, which offers an hourly headway to Indianapolis, making the run of 62.25 miles in 2 hours and 50 minutes. Within the next two months limited service for the 117.19-mile run between Indianapolis and Louisville will be offered with two cars which are now being equipped for the purpose. It is expected that the running time will be four hours.

The new 1,200-volt line of the Indianapolis & Louisville Traction Company was built by the Tennis Company, Swift building, Cincinnati, general contractor. James Bryan, Park building, Pittsburg, represented the railroad as consulting engineer. The personnel of the Indianapolis & Louisville Traction Company is as follows: John C. C. Mayo, president; John E. Greeley, vice-president; Alexander C. Thompson, secretary-treasurer; A. A. Anderson, general manager; R. J. Thompson, assistant secretary-treasurer. Mr. Anderson is also general manager of the Indianapolis Columbus & Southern Traction Company.

In the new Maspeth car house of the Brooklyn Rapid Transit Company at various points throughout the house there are boxes with glass covers fixed to the walls, painted red and bearing the familiar sign, "For use in case of fire only." Each box contains a half dozen controller handles, which can readily be secured in an emergency by breaking the glass. As most of the motormen's controller handles are liable to be either locked up in the individual lockers or in service out on the line when a fire occurs the wisdom of the provision is apparent.

The new deck plate girder bridge erected by the Indiana Union Traction Company over the White river three miles east of Anderson, Ind., has been completed and cars are now running over the structure. The bridge has four spans of 60 feet each, with concrete piers and abutments. The grade at this point has been reduced considerably and the line has been shifted to avoid a sharp curve.

INTERURBAN RAILWAYS.*

BY HUGH J. MCGOWAN, PRESIDENT TERRE HAUTE INDIANAPOLIS & EASTERN TRACTION COMPANY, INDIANAPOLIS.

The successful operation of electric street railways in general dates back 20 years. First confined to the streets of cities, they gradually extended to the suburbs, thence to nearby towns or as far as direct current would take them. It was not until the introduction of the alternating current some 10 years ago, which made possible the transmission of electric energy over great distances, that interurban railways became a well-established factor in transportation. Our purpose tonight is to refer briefly and in a general way to the interurban railway, its present development and its future possibilities, without entering into the details of its history or burdening you with elaborate statistics. It should be mentioned, however, in passing, that some of the earliest and most successful experiments in traction development were made in this great city of Chicago.

An interurban railway may be defined as a high-speed electric railroad having nearly all its mileage outside the limits of municipalities and running, as the name implies, between cities, serving at the same time intermediate towns and villages. Transmission of power is generally by overhead trolley, although the third rail is used in some sections of the country to a limited extent. Heavily ballasted roadbeds with from 70 to 90 pound rails constitute typical construction. The up-to-date equipment consists of large and elegantly appointed double-truck cars, approximately 62 feet in length, weighing from 40 to 50 tons, provided with smoking and baggage compartments, and with a seating capacity for 66 passengers. These cars are usually propelled by four 85-horsepower motors, or four 100-horsepower motors.

To accommodate those desiring quick service between cities and towns, and those living in the rural districts, two distinct services are maintained, one known as limited cars competing with the first-class trains on steam railroads and running every hour or two, and stopping only at the principal towns along the line; the other called local or regular cars, dispatched at frequent intervals and making stops every half or three-fourths of a mile, enabling dwellers in the country and on the farm to reach their very door or board a car at their gate for the next village or city. The local cars might be called country omnibuses, for they convey the children to and from school and carry their parents and friends between towns and villages, at the same time maintaining a speed of 20 to 30 miles an hour.

Most of the interurban lines do an extensive freight and express business, principally in the lighter class of package freight. For this purpose large and commodious freight and express cars are provided. The interurban freight and express service has opened up new markets for the produce and poultry of the farmer and has done much to develop and stimulate gardening along the lines, the raising of vegetables, fruits and flowers, and the establishment of first-class dairies. The slow and cumbersome produce wagon trudging into town is superseded by the interurban freight express.

The growth and success of interurban railways is not confined to any particular section of the country. They flourish in New England and the middle Atlantic states as they do in the western and Pacific states. They were early known in the south and were welcomed in the north. But I may be pardoned in stating that it is believed by many that they have reached their highest efficiency in the states of Illinois, Indiana and Ohio, which may be characterized as "The Big Three."

The total interurban railway mileage in this trio of states approximates 5,000 miles, representing an investment of many millions of dollars. As an indication of the possibilities of through travel it may be mentioned that upon the completion of a gap of 50 miles one may journey in interurban cars from East St. Louis to Chicago, and upon the building of a short connecting link between Danville, Ill., and Crawfordsville, Ind., it will be possible to go from St. Louis to Buffalo by electric traction. At present the interests which I represent own a through line in full operation between Paris, Ill., and Zanesville, O., a distance of over 300 miles, and will in the near future install a through service between Indianapolis and Toledo, as well as between Cincinnati and Toledo and thence to Cleveland and Buffalo.

Indianapolis is located in the center of this great network of electric lines and occupies a unique position in the traction world. From the middle of a large block owned by the traction company, situated in the heart of the city, rises the now famous traction building, erected three years ago at a

cost exceeding \$1,000,000, with its spacious and handsome terminal station adjoining, conceded to be the finest in the world. Nine tracks enter this station, accommodating 12 interurban lines and divisions which run in all directions. Four hundred cars on an average arrive and depart daily, which on a steam railroad would be equal to 100 trains of four cars each. In 1906 more than 5,000,000 passengers were carried to and from this terminal station, and it is estimated that in 1907 the number will reach 6,000,000. These figures do not include passengers carried between points outside the city limits.

This terminal station stands as a justification of the faith of my associates and myself in interurban railways. When first projected there was naturally some doubt as to whether the volume of prospective business would warrant the erection of such a building, which would be the first of its kind in existence, but our confidence was never shaken and it has since transpired that we have found it necessary to purchase more ground to provide for additional facilities for the constantly increasing traffic. Since its completion buildings of a similar character have been erected in other cities, both in this country and in Europe.

The benefits resulting to the people of Indiana, with its 1,500 miles of interurban roads controlled by various companies, are duplicated in every other state of the Union enjoying a like means of transportation. Employment has been created for thousands. Social conditions have wonderfully improved. We read no longer of the man of 80 in the rural districts who never rode in a passenger car, for these interurban cars pass his door every few minutes, ready to convey him to the next village or into some great metropolis.

There is an awakening and thrill of life in every town and village through which an interurban line runs never felt before. Commercial opportunities which lay dormant are made possible and become profitable realities. New markets are opened. The reciprocal relations which develop between the city and town and between the village and farm are beneficial to all. The dweller in the small town, while escaping the expense of living in a big city, may still enjoy all its advantages. He receives by means of the interurban cars his morning paper every day before breakfast and his afternoon paper before his evening meal, and is in touch with the news of the world. The weekly newspaper is getting to be a thing of the past. His sons and daughters may attend the institutions of higher education in the city and return to the parental fireside every evening. The theater and concerts are likewise available. No longer is the narrow view entertained that interurban roads benefit the large cities at the expense of the towns.

Summing up interurban development throughout the United States we find that this new means of transportation has won favor with rich and poor alike. Hundreds of thousands of dollars have been saved to the people in reduced fares, while the enhancement in the value of lands contiguous to interurban lines has reached millions of dollars. It is difficult to obtain correct statistics regarding electric roads which may be strictly classified as interurban railways, but in general terms it may be stated that the present and projected interurban railway mileage is equal to nearly one-tenth of the total mileage of the steam roads of this country. Their capitalization reaches hundreds of millions of dollars and they give employment to an army of tens of thousands of men.

Investments in interurban lines which have been properly located, financed, constructed and operated have yielded substantial profits and their securities are sought by conservative investors. The freight and express business, though confined principally to the handling of the lighter classes of merchandise, has increased materially and is a large source of revenue. The carrying of mails is being steadily developed.

The question is often asked: Are interurban railways injurious to steam railroads? Sufficient time has elapsed since the establishment of interurban roads to warrant our answering this in the negative. Each has its sphere. One benefits the other. There is ample business for both. We are a growing race, following the biblical injunction, "increase and multiply," so wisely promulgated by our chief executive. To show how inadequate are the present means of transportation for our 90,000,000 of population, we need only cite the statement of James J. Hill, that it would require \$5,000,000,000 to properly equip the steam roads of this country to handle the increasing traffic. It should also be remembered that the steam roads derive the greater part of their revenue from the carriage of heavy freight, in which they have practically no competition.

In this brief and imperfect presentation of the subject allotted me I have endeavored to show something of the present development of interurban railways. What of their future? Their future is as limitless as the bounds of elec-

*Abstract of an address before the National Business League of America, Chicago, Ill., November 23, 1907.

tricity. They are harnessed to a power infinite in its possibilities. Interurban railways have come to stay. Each succeeding year will mark their further extension, improvement and efficiency. We who are now interested in them are but witnessing their beginning. Who will predict to what a standard of perfection they will reach when in operation as many years as the steam railroads are at present? To us is not given the gift of prophecy, and yet I may be permitted to say in conclusion that in the upbuilding of this nation and in all that makes for a happy and prosperous people, no greater element to that end will be found than the interurban railways on the United States.

THE OPERATION OF THE PAY-AS-YOU-ENTER CAR.

Many of the readers of the Electric Railway Review are familiar with the general features of the pay-as-you-enter type of city street car. In 1906 this type of car, as used by the Montreal Street Railway, was described by Duncan McDonald, manager of that company, before the Street Railway Association of the State of New York. A car of his design was exhibited at the Columbus convention of the American Street and Interurban Railway Association.

Much has been published in these columns and elsewhere in regard to the pay-as-you-enter cars ordered for the New York City Railway and for the Chicago City Railway, but no comprehensive, practical test under service conditions has ever been made in the United States until the past week, when 150 of the new cars were placed in operation on the Cottage Grove avenue line in Chicago.

Origin of the Idea.

The idea of the pay-as-you-enter car was originated by Duncan McDonald, manager, and W. G. Ross, managing director, of the Montreal Street Railway, and was the result of a belief that the present methods of fare collection are unsystematic and unbusinesslike, depending so largely upon the accuracy of the constantly changing mental diagram that the conductor is able to retain in his mind during 10 hours a day as to the distribution of the passengers in his car. The conductor fruitlessly endeavors to distinguish those who have paid from those who have not paid their fares, with the result that he must frequently rely upon the good nature and the honesty of passengers whose good nature and honesty are often conspicuously wanting.

In considering the question the inventors of the new type of car reached the conclusion that the "positive" system of collecting fares by selling tickets at stations, as practiced on the elevated and the subway lines of Chicago and New York, was the surest means of obtaining the receipts in their entirety, and with that idea in mind they designed and patented a car in which that system was applied as nearly as possible to surface cars. The rear platform was made the paying office. At the rear of the car body are two doors, one at the left (as the passenger approaches) for entrance and the other at the right for exit. The platform was divided by a railing extending from the step around the right-hand exit to the edge of the left-hand door, the conductor standing behind the railing in the space between the doors. In the first cars of this type the rear platform was made seven feet long, accommodating about two passengers abreast at the exit and three at the entrance. The front platform was also arranged for an exit. In later cars that have been built the platform is nine feet long.

Operation in Montreal.

The first car of this type was put into service on the St. Catharine street line, one of the busiest thoroughfares of Montreal, in June, 1905. It met with such instant success that other lines were equipped. By March, 1907, 37 pay-as-you-enter cars had been installed on the St. Catharine street line.

Figures are now available showing the great increase of receipts on that line consequent upon the change as compared with the same number of cars, seating no more passengers, in

1905. During March, 1907, the receipts increased 27.69 per cent over March, 1905, the car-hours decreased 16.25 per cent, the mileage decreased 8.07 per cent, the receipts per car-hour increased 52.87 per cent and the receipts per car-mile increased 38.92 per cent. In April receipts increased 31.23 per cent, car-hours decreased 13.18 per cent, mileage decreased 6.72 per cent, receipts per car-hour increased 50.28 per cent and receipts per car-mile increased 40.67 per cent. A part of this increase is doubtless due to the natural growth of traffic, but as the number and capacity of the cars remained the same the results are significant.

Another result of the innovation was the saving in time in the operation of the cars owing to the facility of exit and entrance provided by the separation of passengers. There were also found to be many moral advantages in the removal of opportunities for friction between the conductor and passengers on account of doubt as to who had paid fares and the employees were all exceedingly anxious to get on a pay-as-you-enter car. The fact that the conductor was enabled to remain at all times on the rear platform where he could observe the passengers entering or leaving was also the means of a considerable decrease in the number of accidents. During all of 1906 there were but two slight accidents on pay-as-you-enter cars.

The idea was readily accepted by the Montreal public, which soon became as accustomed to having its fares ready upon boarding a street car as it was to buying tickets before boarding a railroad train. The operation of the system was facilitated in Montreal by the use of fare tickets, which the company's patrons had long been used to depositing in portable fare boxes and which came into more general use when the fare box was placed on the platform.

A large number of these cars are now in use on other lines in Montreal and additional ones are being put on as fast as they can be built. Ten pressed steel cars of this type have recently been received.

However, even after a two years' test had demonstrated the practicability of the system in Montreal, the idea was not readily accepted by companies in the United States as applicable to conditions in our large cities, although Montreal is a city of 400,000 population and is considered one of the most difficult cities in which to operate street cars, owing to its climate, hills and congested state. It was not believed that the people in our large cities would readily adapt themselves to restrictions as to when they should pay their fares or where they should get on or off.

In casting about for a plan to prevent the overcrowding of cars by restricting the number to be carried on one car and leaving the remainder to wait for succeeding cars, President T. P. Shonts of the Interborough-Metropolitan Company, New York, appreciated the possibilities presented by having the conductor on the rear platform at all times where he could exercise some control over the number of passengers to be carried. After an investigation of the Montreal cars by representatives of the company it was decided to make the experiment and early this summer 155 pay-as-you-enter cars were ordered for use on the Madison avenue line of the New York City Railway. It is now announced that these will be placed in service about December 15 and that more will be ordered for the other lines if they prove satisfactory.

Applicability to Congested Cities.

In dealing with the traffic conditions prevailing in our large centers of population at the rush hours of the morning and evening the pay-as-you-enter car offers unusual advantages, of which the most important are increased safety, speed and comfort.

The position of the conductor on the rear platform insures against the car being started until the rear platform steps are clear. This prevents the large number of accidents caused by starting the car too soon while the conductor is

inside collecting fares and is thus unable to see the rear platform. During 1906 approximately 30 per cent of the accidents on the Chicago City Railway were caused by persons getting on or off moving cars and many of the most serious personal injuries resulted from these accidents. A large proportion of these accidents is caused by excessive overcrowding. Under the usual method of operation the companies have been unable to prevent overcrowding of cars during rush hours for the reason that there is no way of keeping surplus passengers from entering. Under the pay-as-you-enter plan the conductor is able to step to the edge of the platform when the car is full and to prevent more passengers from getting on, courteously requesting them to wait for the next car. There is no advantage to the company in hauling such an excessive number of passengers that the conductor must miss a large percentage of fares, while at the same time the chances for accidents are considerably increased. Moreover, by his position on the rear platform the conductor is often able to assist infirm persons or persons burdened with packages to get on or off the car.

Saving in Time at Stops.

One of the most important advantages is the saving in time at stops and consequent increased efficiency of the cars. The separation of entrance and exits removes much of the confusion and delay incident to each stop, as those desiring to enter a car may begin to do so as soon as the car stops, without having to wait for passengers to get off. As a delay to one car at a time of heavy travel invariably entails a corresponding delay to the following cars the value of this assistance in the maintenance of schedules will be readily appreciated.

Numerous tests made in Montreal have shown that while with the ordinary type of car an average stop of two seconds is required for each passenger carried, with the pay-as-you-enter car only 1.5 seconds per passenger is required.

On the side of comfort the conductor is relieved of the mental strain of trying to remember who has paid fare and of the necessity for frequent altercations with passengers over their fares. He is not obliged to push his way through a crowded car, disturbing all the standing passengers thereby, in order to collect a fare as each passenger boards the car. The use of the front door for exit alone creates a tendency for passengers to move forward in the car at once without waiting to be pushed forward by those who enter later, and as the front platform is always kept closed while the car is in motion the extreme drafts from the front door are eliminated. The plan of keeping the exits clear at all times prevents much of the unbearable jostling and crowding heretofore prevalent. Those in the forward half of the car usually leave by the front door, while those in the rear half use the rear exit. The longitudinal seats at the ends of the car are made somewhat shorter than usual and the extra wide space thus provided near the doors eliminates most of the collisions between boarding and leaving passengers.

Adopted in Chicago.

Recognizing all of these advantages the Chicago City Railway decided to make a trial of the new system and on September 19 President T. E. Mitten announced that 300 pay-as-you-enter cars had been ordered, to be placed in operation in November. The International Railway Company of Buffalo has also ordered some pay-as-you-enter cars, to be placed in operation next month, and the Public Service Corporation of New Jersey is considering a trial on its Jersey City lines, where a city ordinance imposes a fine of \$50 for failure to provide a seat for each passenger who pays fare.

The adoption of the system in Chicago was heralded for weeks in advance of the arrival of the cars in the press and in other ways and the newspapers were furnished with complete information as to its principal features in order that as little time as possible might be lost in familiarizing the public

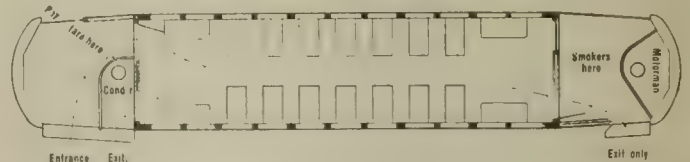
with the workings of the plan after it was put in operation.

The new cars ordered by the Chicago City Railway were described and illustrated in the Electric Railway Review of September 21, 1907, page 332, and those for the New York City Railway in the issue of October 26, page 709. The cars for both cities were built by The J. G. Brill Company of Philadelphia. The Chicago cars have 14 cross seats and 4 longitudinal seats, have a seating capacity for 40 passengers and are 45 feet 9 inches long over all. The New York cars have longitudinal seats the entire length of the car, seat 36 passengers and are 48 feet long over all. Both cars are of the standard types of their respective railways, with the addition of the pay-as-you-enter feature. In the Chicago cars the four longitudinal seats are shorter than in the standard type, seating three instead of four, and are provided with an arm rest on the end nearest the door.

Difference Between Chicago and Montreal Cars.

The Chicago cars differ in several important respects from their Montreal prototypes, in the arrangement of the doors and platforms. The Chicago cars are built for double-end operation and have 7-foot platforms. The Montreal cars are only for single-end operation and have a 9-foot rear platform, the extra two feet being partially separated from the remainder by a railing placed parallel to the dasher, allowing room for passengers who wish to stand without obstructing the entrance. The step extends only as far back as this railing, so that the space for entrance and exit is no greater than on the Chicago cars.

The inside of the Chicago platform (as the car advances) is composed of folding doors, which are folded back on themselves when the car is operated in the other direction and that side is used for entrance. The outside edge of the platform



Floor Diagram of Pay-As-You-Enter Car for the Chicago City Railway, Showing Arrangement of Entrance and Exits.

(as the car advances) has a sliding door, controlled by the motorman, which forms the exit on the front end of the car. The right-hand front door opening to the vestibule swings outward, while the left-hand door is of the sliding type.

In the Montreal car there is only one door from the car to the vestibule, of the sliding type. The exit door, on the side of the platform adjacent to the car body, folds toward the motorman, and, with a brass rail extending two-thirds across the platform, completes the barrier between the passengers and the motorman. The arrangement of the doors in the Chicago cars is shown in the accompanying diagram. The motorman is inclosed by the same railing that is used to separate the entrance and the exit when the car is going in the other direction. The fare boxes on the rear platform, which are used in Montreal, have not yet been adopted in Chicago. The fares are recorded by a register of the usual type, operated by a treadle near the floor of the platform.

On Sunday, November 24, the Chicago City Railway placed 130 pay-as-you-enter cars in operation on Cottage Grove avenue and on the following day added 20 more. The remaining 150 of the order will be placed on the Indiana avenue line. Careful observations of the operation of the new system were made by the company's officials during the first few days and President Mitten expressed himself as highly pleased with the results. Favorable comments were also made by the newspapers and by the city superintendent of transportation, M. B. Herely.

Since it was first announced that these cars were to be tried in Chicago and New York all sorts of comment has

arisen and the opinion has been often expressed that their operation was doomed to failure from the start. Many considered the innovation simply as a new scheme to increase the company's revenues, while the more conservative doubted whether the impatient metropolitan public could be educated into having its fares ready on entering the car or to obey regulations for leaving and entering by a specified door. Others doubted the possibility of handling large crowds in this manner.

In a city like Chicago, where the main business district is congested into a comparatively small area known as the "loop district," within which large numbers of passengers board the cars at every stop, the last objection appeared the most formidable. It seemed reasonable to expect that difficulty would be encountered in requesting impatient passengers to pay their fares before beginning the scramble for seats or to stand on a crowded platform while the conductor was making change for someone ahead. The company appreciated the difficulties and proceeded to forestall them by a judicious campaign of publicity in the newspapers before the new cars were delivered. The trainmen were also thoroughly informed as to their new duties by a booklet of instructions issued to them about a week before the cars were put in operation. An abstract of the instructions was published in the *Electric Railway Review* of November 16, 1907, page 795. It was decided not to enforce the new system rigidly, but to allow sufficient flexibility to provide for emergencies until the public became accustomed to it. It was announced that whenever the crowds to be handled at once were considerably greater than the capacity of the platform, or in the case of ladies with bundles or children or in the case of infirm persons passengers might be allowed to enter the interior of the car without paying fare, and that the conductor would as soon thereafter as his duties on the rear platform would permit enter the car and collect fares in the usual way, returning at once to his position on the rear platform.

Operation of Pay-As-You-Enter Cars in Chicago.

Personal observations since the cars were placed in operation show that while there is some reason for many of these objections all difficulty should be eliminated after a few days' use of the cars and the plan should prove an unqualified success. The Chicago public in general evinced a ready willingness to co-operate with the company in its efforts to improve the service and the complaints, which it was only natural to expect, have been few. Several of the ladies have shown some resentment upon being requested to enter by the entrance door after they had started for the exit, and of course during the crowded periods in the business district delays have arisen because of the slowness of someone in producing his fare. However, the company was prepared for such cases and the uniform courtesy of the conductors has overcome many opportunities for friction. The city ordinance requires that a conductor furnish change for nothing larger than a \$2.00 bill, but instructions have been given the men to give change wherever possible and, in case a number of passengers would be delayed by such a proceeding, to request the passenger to step back on the platform until the others had passed into the car.

A sign above the top of the door inside the platform states that passengers are not permitted to stand on the rear platform, and the rule is rigidly enforced, but ample room is provided for smokers and others on the front platform, where, as the front door is used only for exit, the confusion and jostling caused by the entrance and exit of passengers are eliminated. The rear platform provides space for 20 passengers, who may enter the car at one stop without inconvenience, and even when more than that number enter at one stop there is no confusion if approximately half have their fares ready. Experience so far has shown that about this percentage will do so. The location of the grab handle on the forward side of the front door prevents ladies from stepping

off backward and on the rear of the car the pole dividing the platform is so far from the edge of the step that it is more natural for them to take hold of the forward grab handle.

Many passengers have been seen to board a car and try to enter at once, not noticing that it was a new car, but the company has avoided this as far as possible by a liberal use of signs. The exits are clearly marked over each door. At the right of the front dasher is a large sign, "Pay As You Enter." On the rear corner post facing the passenger is another sign, "Please Have Your Fare Ready," and inside of the platform is another legend, "Pay As You Enter," located where the passenger may readily notice it as he approaches the conductor. A large poster in the space between the doors at each end of the inside of the car requests the co-operation of the public, as follows: "Please assist us in reducing accidents and overcrowding. First, enter car at rear, leave by front platform. Second, have exact fare in hand before boarding car. The city gets 55 per cent." The last sentence refers to the city ordinance under which the company operates, which provides that the city shall receive 55 per cent of the company's net receipts.

A small feature which, however, is of considerable importance, is that the curtain in the window between the front doors may be permanently closed, so that the light from the car will not obscure the motorman's view of the track.

An objection is noted in the lack of provision for laboring men carrying the bulky paraphernalia of their trade, who have heretofore been used to standing on the rear platform, but who must now walk through the car to the front platform. Doubtless sufficient flexibility will be allowed to provide for such men on the rear platform.

In the work of familiarizing the public with the system much credit is due to the conductors, who are almost unanimously enthusiastic about the new cars and have greatly assisted in making the plan a success by their courtesy and zeal in explaining it to patrons and by their alertness to make everything run smoothly.

It has not yet been attempted to restrict the number of passengers carried on one car, although it is proposed, when a car contains more than 80 passengers, to request succeeding passengers to wait for the next car.

The pay-as-you-enter system was patented on September 26, 1905, by the Pay-As-You-Enter Car Company, of which Duncan McDonald of Montreal is president and Thomas W. Casey is manager, with office at 26 Cortlandt street, New York City.

Seoul Street Railway.

United States Consul-General Thomas Sammons says that the American-Korean Electric Company operates at Seoul the only street railway in Korea, of which he furnishes the following description:

On this railway the average number of passengers carried daily in 1904 was 11,442; in 1905, 12,963; and in 1906, 13,714. The car mileage was 145,110 miles in 1904 (five months), 326,793 in 1905, and 398,616 in 1906. The equipment included 37 passenger and 18 freight cars. The company operates 12 miles of tracks with overhead electrical equipment.

The gross receipts in 1906 were \$98,221 and the net earnings \$25,324, the increase in net earnings in 1906 over 1905 being 48 per cent. The company announces that the operating expense has been reduced from 80 per cent of the receipts in 1905 to 74 per cent in 1906, but with the decrease in the cost of coal and with an increased service without addition to the expense of management it is hoped that a further material reduction will occur in 1907.

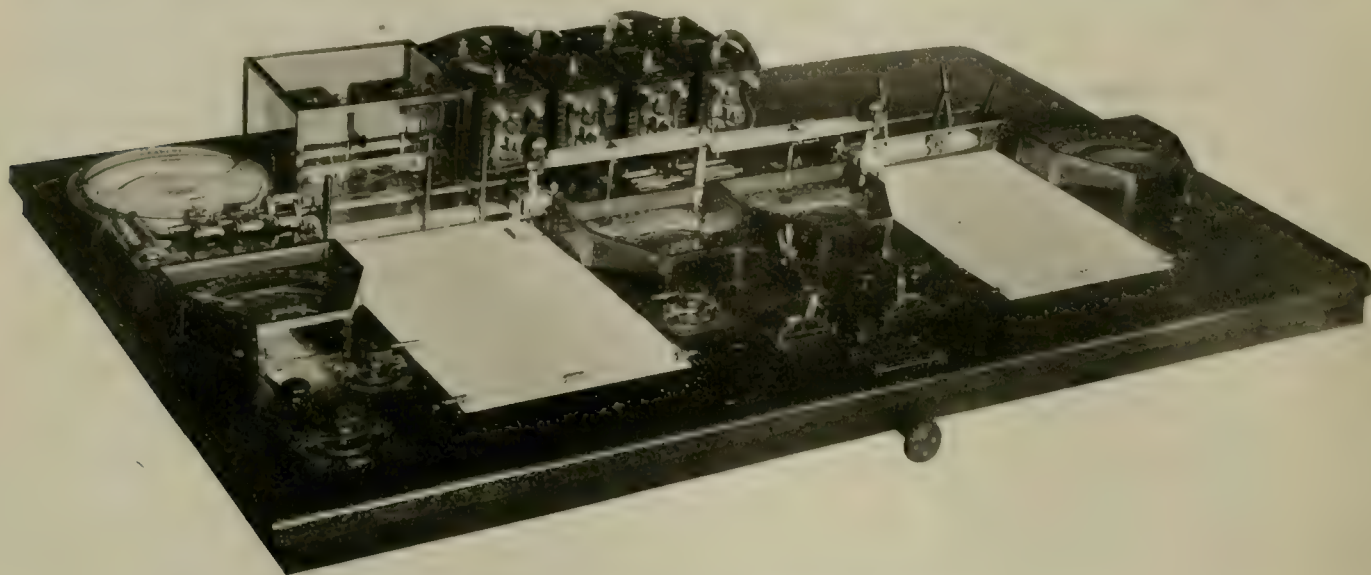
With the exception of an injury to a boy, who fell under the car while stealing a ride, no accidents occurred during 1906, and the efficiency of the Korean motormen and conductors is becoming more and more apparent. A reward, in the nature of a bonus, is paid by the company at the end of each month in which no accidents occur.

A RAILWAY TEST CAR.

A careful analyzing of the different costs of railway operation will lead to the most economical results. In a paper entitled "Analysis of the Cost and Methods of Electric

by himself. Inasmuch as the use of such a car may be made quite general a description and illustrations of the equipment will undoubtedly be found of interest.

In studying transmission losses it is essential to find the mean, average and maximum loads on feeders, individually;



Railway Test Car—Near View of Recording Apparatus.

Railway Maintenance," by Albert B. Herrick, electrical engineer, read before the Central Electric Railway Association

where these losses occur in distribution under actual working conditions; what portion of the losses is in the copper and



Railway Test Car—Arrangement of Interior.

at Indianapolis, November 21, 1907, and abstracted in the Electric Railway Review of November 23, 1907, page 819, the author described the results effected with a test car designed

what portion in the ground return system; and what is the cost per annum of these losses. In the station the loads are found by an autographic record of feeders taken during different

periods of loading. On the line they are taken by the autographic test car. The data obtained by running over the line with this car give the actual variation of the voltage on the line while the system is in operation. An autographic record will also show, after plotting the ground return and copper losses, the total loss on the distribution system and thus feeder loads may be equalized and the existing copper utilized most efficiently. To analyze the ground return circuit the car is so equipped with track collector brushes and recording instruments that a record is produced showing the electrical condition of every bond passed over.

To produce this record the drop along the rail is taken by means of two brushes making contact with the rail. It has been found that the steel in these brushes must be of nearly the same composition as the rail, otherwise there will be a thermo-electric effect when taking pressures on a dry rail. The brushes are four feet apart. In bond testing the presence of current on the rail is not certain, so a low-tension current of about 200 amperes per rail is fed between the two trucks of the car, produced by a local low-tension generator. The drop current from the brushes serves to actuate a millivoltmeter whose movements are recorded permanently on a record paper moving at a rate of one inch of paper to 60 feet of car movement along the track. The locations along the track are produced on the record manually by a pen having two motions magnetically controlled. For a street intersection the pen is lifted from one curb to the other. Curves are offset by the location pen from one tangent to the other; poles are indicated by a dash made when the center of the car is opposite the pole, and a numbering machine stamps the numbers at each station, which numbers correspond with the written list of stations. These are afterward typewritten on the record. Both rails of the track are taken at once.

SHOULD THE JURISDICTION OF THE STOREKEEPER EXTEND TO THE TIME THE MATERIAL IS ACTUALLY USED?*

BY H. A. ANDERSON, SPECIAL AGENT PURCHASING DEPARTMENT PENNSYLVANIA RAILROAD.

You will no doubt find that most of the men using material do not appreciate the enormous expense involved in carrying more supplies than actually required, and while some of them are perfectly willing to return the excess stock, charged out, to the general storehouse from which it was drawn, many others are unwilling to part with it unless compelled to do so. While it is true that the men doing the actual work are naturally best qualified to determine what amount of material they should have, you will find a tendency to overestimate, with the result that certain work will be overcharged, and if not properly controlled by some one department, the excess material in many cases is left lying around, depreciating in value, or is perhaps used for some other purpose without the proper charge being made.

Material drawn from stock and charged out, but not put in actual use, will not receive the same care and attention it would if it were carried as an asset under the direct charge of a supply agent or storekeeper. It will be found that on many railroads, where material is drawn from stock and charged out, the responsibility of the stores department ceases and it then comes under the care of a foreman or a road supervisor, who does not, in most cases, realize the necessity of properly accounting or caring for it, and the railroad becomes the loser. This division of responsibility is not conducive of good results and it has a tendency to increase the stock rather than keep it within reasonable limits, for the reason that the stores department in making up requisitions cannot take into consideration material charged out but not consumed.

If all material, whether in stock or charged out and not consumed, were placed under the direct charge of the supply agent and storekeeper, whose entire time and attention is given to this subject, the best results should be obtained. It is, of course, understood, that such officers should be well informed as to the use of material for various purposes, which can only be accomplished by personal and direct contact with

the work under way and by interviewing those in charge of such work.

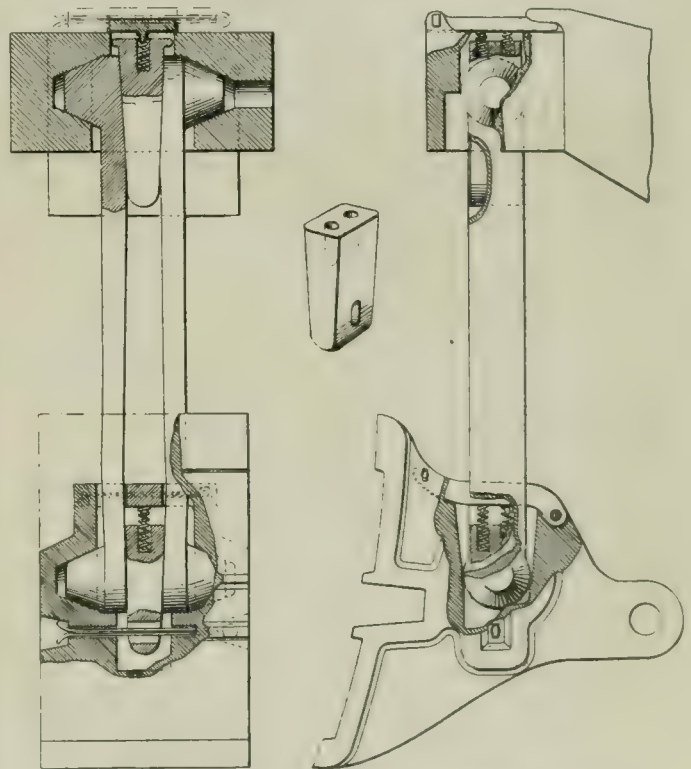
In this connection we must not overlook the question of responsibility over scrap. All scrap, with few exceptions, has, like new material, a market value and represents so much money invested. On some roads the stores department is held responsible until it is disposed of, while on others it is carried under the jurisdiction of a foreman. If the scrap pile is not gone over intelligently to recover good parts and the balance sorted according to its class and character, the railroad company cannot expect to get the full benefit of the credits they are entitled to.

It is just as important to have a well-regulated system of handling and caring for scrap as for new material, and it will be found, where proper care and judgment are exercised in dealing with this class of material, that you can frequently pick out good material and avoid the purchase of new.

The constant increase in cost of material used by our railroads necessarily means the outlay of additional capital and this fact alone makes it all the more obligatory on our part to keep the amount of stock reduced to the minimum consistent with safety. To do this the stores department must control all material, new as well as scrap, charged out or not, and must be given full authority to handle it for the best interests of the service and by centering the responsibility it will enable the department to give a more accurate account of material on the system.

A NON-CHATTERING BRAKE HANGER.

An accompanying illustration shows cutaway elevations of a non-chattering brake hanger that recently has been designed and patented by E. W. Holst, superintendent of equip-



Cutaway View of Non-Chattering Brake Hanger.

ment, Old Colony Street Railway Company, Boston, Mass. The object of this device is to provide hangers which may be connected to the brakeshoe head from the supporting bracket in such a manner as to prevent the chattering noise which often is produced when brakes are applied. Another object that has been realized in the design of this attachment is to provide means for automatically taking up wear at the points of connection between the hangers and the shoeheads and brakes.

It will be noted from the illustration that the new features of this hanger include the use of conical-shaped bosses on the ends of the hanger, which bosses, by means of a wedge, are held snugly in conical recesses in the bracket and brakeshoe

*Abstract of a paper read before the Railway Storekeepers' Association.

head. A wedge is used for this purpose. By means of a spring which is recessed in the wedge and kept under compression by a cap secured to the bracket or brakeshoe head a constant pressure is exerted tending to hold the conical bosses to a close fit in their seats.

It will be noted from the foregoing description and illustration that the hangers are capable of swinging with the bracket and as fast as the trunnions or the recesses wear the wedge will be automatically pushed downward by the springs and will spread the hangers apart, thereby forcing the trunnions and bearings into the recesses and compensating for any wear that may occur. In view of the fact that the trunnions are held at all times snugly within the bearings it is apparent that chattering will not occur when the brake is applied. The wedges not only provide an effective means for fitting the trunnions in their bearings to take up wear, but also hold them positively against displacement.

COMMITTEE APPOINTED TO FORMULATE ACCOUNTING SYSTEM FOR ELECTRIC RAILWAYS.

At a meeting held at the office of the interstate commerce commission in Washington, D. C., on November 22 for the purpose of taking steps to formulate a standard system of accounting for electric railways a committee was appointed, representing the different interests in attendance, to consider the subject and report at a meeting to be held on December 10. This committee held its first meeting in Washington yesterday. The members of the committee, with the interests represented, are as follows:

1. One member for the interstate commerce commission—C. F. Balch.

2. Two members representing the state railway commissions—William J. Meyers, chief division of statistics and accounts, New York public service commission, second district; W. O. Seymour, member Connecticut railroad commission; appointed by C. C. McChord, president National Association of Railway Commissioners.

3. One member each, representing, respectively, the following associations: American Street and Interurban Railway Association—W. Caryl Ely, president Ohio Valley Finance Company, Buffalo, N. Y., appointed by C. G. Goodrich, president of the association. American Street and Interurban Railway Accountants' Association—W. F. Ham, comptroller Washington (D. C.) Railway & Electric Company, with Frank R. Henry, president of the association, as alternate. Street Railway Association of the State of New York—C. Loomis Allen, vice-president and general manager Syracuse (N. Y.) Rapid Transit Railway.

There was presented at the meeting a statement showing in parallel columns the interstate commerce commission classification of operating expense accounts for steam railways, a tentative interstate commerce commission classification for electric railways, and a "tentative electric railway" classification representing the ideas of New York state interests.

The tentative interstate commerce commission electric railway classification contains 97 primary accounts. It contains five general heads for operating expenses, covering: Way and structures, equipment, transportation, traffic and general. In submitting it Professor Adams prefaced the list of primary accounts with the same statement of principles governing depreciation accounts which is embodied in the pamphlet copy of the classification of operating expense accounts prescribed for steam railways beginning July 1, 1907.

The tentative electric railway classification as submitted shows general heads for: I. Way and structures. II. Equipment. III. Transportation (power plants). IV. Transportation (operation cars). V. Transportation (miscellaneous). VI. Traffic. VII. General.

The meeting adjourned after passing a resolution to the effect that a working committee should be immediately appointed to report at a meeting to be held on December 10. The committee will have before it the tentative classifications of the American Street and Interurban Railway Accountants' Association, the Street Railway Association of the State of

New York and of the interstate commerce commission.

Among those present at the meeting were:

Prof. Henry C. Adams, in charge of statistics and accounts, interstate commerce commission.

C. F. Balch, examiner interstate commerce commission.

William J. Meyers, chief, division of statistics and accounts, New York public service commission, second district.

B. V. Swenson, American Street and Interurban Railway Association.

Edgar S. Fassett, general manager United Traction Company, Albany, N. Y.

H. M. Beardsley, treasurer Elmira Water Light & Railroad Company, Elmira, N. Y.

J. C. Collins, secretary and auditor Rochester (N. Y.) Railway.

A. L. Linn, Jr., general auditor Mohawk Valley Company.

T. W. Wilson, Jr., general manager International Traction Company, Buffalo, N. Y.

Frank R. Henry, president American Street and Interurban Railway Accountants' Association.

REPORT OF INTERNATIONAL RAILWAY EMPLOYEES' ASSOCIATION, BUFFALO.

The seventh annual report of the International Railway Employees' Association of Buffalo, N. Y., for the year ended October 31, 1907, has been made by the trustees, who are: Henry J. Pierce, chairman; T. W. Wilson, first vice-president; and C. A. Coons, G. A. Harvey, Thomas Kerwin and W. C. Smith. An abstract of the statement of the trustees follows:

We now have a membership of 1,527, an increase of 68 over the previous year. This membership comprises 58 per cent of all employees of the International Railway system, trackmen excepted.

The increase in receipts for the year was \$1,404.89, and the increase in death benefits paid was \$550. The increase in sick benefits and medical attendance paid was \$889. Notwithstanding these increased expenditures our surplus has increased \$3,048.85, reaching \$14,269.18. We invested \$3,930 in International Traction Company 4 per cent bonds; the total amount invested in securities of all kinds being \$12,367.50. The International Railway Company contributed \$3,082.56 toward the expenses of the association in addition to the free use of the club rooms at Virginia street.

Since the organization of the association the members have paid for dues and initiation fees \$56,989.32, and with payments to the beneficiaries of 37 members who have died and to members for sick benefits and medical attendance, the members have paid into the association but \$724.81 more than has been returned to them and their beneficiaries.

The surplus of \$14,269.18 results almost entirely from donations from the International Railway Company and others, interest on securities and profits from the annual ball. The experience of the past warrants the belief that this will be sufficient to provide for the future obligations of the association. Surely this state of facts demonstrates the value of the association, and should secure for it the influence and support of all employees of the company.

There were enrolled during the year 1,158 members and 1,090 resigned, leaving the net increase of 68.

The report of the treasurer, J. F. Slocum, shows receipts and disbursements as follows:

Receipts.		
Year ended October 31—	1907.	1906.
Initiations, Class "R".....	\$ 967.00	\$ 865.00
Dues, Class "R".....	8,730.00	8,249.50
Toilet supply	117.25	97.20
Interest receivable	608.16	296.20
Sale of lost articles.....	85.06	106.50
Net proceeds of ball.....	2,191.22	1,679.40
	<hr/>	<hr/>
	\$12,698.69	\$11,293.80
Disbursements.		
Sick benefit, Class "R".....	\$6,430.00	\$4,541.00
Death benefit, Class "R".....	1,200.00	650.00
Medical attendance, east side.....	849.96	849.96
Medical attendance, west side.....	849.96	849.96
Medical attendance, south side.....	99.96	99.96
Medical attendance, Niagara Falls, N. Y.	120.00	120.00
Medical attendance, Lockport.....	99.96	99.96
	<hr/>	<hr/>
	\$9,649.84	\$7,210.84
Net surplus	\$3,048.85	\$4,082.96

THE PROPOSED TRAFFIC ASSOCIATION IN CENTRAL ELECTRIC TERRITORY.

An account of the meeting of traffic officials at Indianapolis was published in the *Electric Railway Review* of November 23, 1907, page 816. At our request some of those who are interested in the work which it is hoped to accomplish have given us statements concerning the advantages which they believe would be realized by the formation of an association such as is contemplated. These replies, which are from those who attended or from members of the committee appointed to take up the questions raised, follow:

J. O. Wilson.

J. O. Wilson, general passenger agent Cleveland Southwestern & Columbus Railway, Cleveland, O.: "I am of the opinion that there is a good field in the Central Electric Railway Association territory for an organization composed of traffic officials, and feel that it could accomplish much good in the way of settling matters relating to tariffs and schedules of freight and passenger rates. If such an association is formed I think the subject of the promotion of traffic would be directly in line with the work, as well as the best way to handle business on interurban and urban systems during the busy hours of the day."

J. F. Starkey.

J. F. Starkey, division passenger and freight agent Indiana Union Traction Company, Anderson, Ind.: "I think there would be a field in the Central Electric territory for an organization of traffic officials. It is difficult to say just now what other questions in addition to matters relating to tariffs and schedules of freight and passenger rates such an association could take up, as the matter is in its extreme youth or even in an embryo state, but all matters pertaining to the furtherance of traffic could be discussed. The promotion of traffic would come within the scope of an association of this character. There is no doubt in my mind that the interchange of ideas which would take place at regular meetings would be of value to urban and interurban systems."

R. J. Thompson.

R. J. Thompson, assistant secretary and treasurer Indianapolis & Louisville Traction Company, Seymour, Ind.: "Judging from the gentlemen who were present at the meeting referred to, and judging from the conversation, I am pretty sure that a traffic organization will be formed. In regard to my own position in the matter, I am convinced that such an organization will be of great benefit and am willing to do all that I can to assist in forming one. There is a decided field for such an organization in the Central Electric territory. Such an organization could discuss the interchange of freight or rather methods of interchange, the best way to solicit traffic, the needs of traffic men and their departments, and keep in touch with traffic conditions over the country; and in many ways matters would come up that could be settled by full and free discussion. Without going into details, I can see many uses for such an organization. I would say that the promotion of traffic would be one of the principal things to come into the scope of the organization. By all means the interchange of ideas would be of great benefit to all concerned. While I have been in the interurban business only a very short time, I have had a great deal of experience in the traffic departments of steam roads, having been connected with several lines in the south for some 10 or 12 years. My experience with them has taught me the value—I can say, necessity—of traffic organizations, and I regard this movement as being of great benefit to the interurban lines and hope that it will be pushed to a successful conclusion."

W. S. Whitney.

W. S. Whitney, general passenger and freight agent Interurban Lines (Indiana Union Traction Company, Terre Haute Indianapolis & Eastern Traction Company, Ohio Electric Railway, Cincinnati Northern Traction Company): "I think the time is about ripe for the formation of an association of this nature by the interurban lines of the Central States territory. The questions to be considered would be of the same nature as those which come before the Central Freight and Central Passenger associations. The rapid growth of the interurbans in the last few years, throughout the section above mentioned, reaching, as they do, all the principal cities and towns, has taken them out of the strictly local field, as they are now enabled to ticket a passenger through for considerable distances over several lines. An association of this kind, with

periodical meetings for the exchange of ideas, would, in my opinion, certainly be a benefit to all its members."

For Permanent Traffic Organization.

Another of those interested writes: "It has been my object, and I feel it has been the object of all interested in interurban matters, to bring about some permanent traffic organization. As regards the general electric territory, I know of no section in the east that will afford a better and more lucrative field than that covering the central electric territory, or, you might say, including four states. In regard to this organization, should it be formed, tariffs and schedules, passenger rates and all questions relative to general traffic organizations would be taken up. The promotion of traffic would be one of the principal aims of the organization. Another aim of the organization would be to relieve each individual company of what has been quite a serious matter, that is, the filing of tariffs and schedules with the different commissions, and at the same time relieving those companies of certain legal obligations which would undoubtedly be overlooked, not because of their being unwilling to comply with the law, but from their not knowing whether they were filing in compliance with the laws laid down by the last general assembly. In regard to the interchanging of ideas being of value to interurban roads, I would say for my standpoint I feel that this field has been left open too long to the steam roads, simply because the electric roads have acted independently. We never can be successful from a railroad standpoint until we get together, unite our ideas and work unitedly. At the next meeting of the committee this matter will be fully taken up and possibly an organization formed with the purpose of defining rules and regulations governing an association to handle matters of this character in the territory that will be covered or that is covered by the Central Passenger Association of steam roads. I feel that this is one of the most interesting subjects that lie within reach of the interurban companies at the present time."

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The annual meeting of the American Society of Mechanical Engineers will be held at the Engineering Societies building, New York, on December 3 to 6. The programme includes the following papers and addresses:

Tuesday, December 3 (Evening).

The president's address, Prof. F. R. Hutton, New York.

Wednesday, December 4 (Morning).

The Rational Utilization of Low-Grade Fuels in Gas Producers, F. E. Junge.

Duty Test on Gas Power Plant, J. R. Bibbins.

Control of Internal Combustion for Gas Engines, Prof. C. E. Lucke.

Evolution of the Internal Combustion Engine, Prof. S. A. Reeve.

Wednesday, December 4 (Evening).

Color Photography, F. E. Ives and A. R. Streglitz.

Thursday, December 5 (Morning).

The Foundry Department and the Department of Engineering Design, W. A. Boile.

Molding Sand, A. E. Outerbridge.

Power Service in the Foundry, A. D. Williams.

Foundry for Bench Work, W. J. Keep and Emmet Dwyer.

Volumetric Study of Cast Iron, H. M. Lane.

Thursday, December 5 (Afternoon).

Specifications for Iron, Coke and Method of Testing Output, R. Moldenke.

Foundry Cupola and Iron Mixtures, W. J. Keep.

Foundry Blower Practice, W. B. Snow.

Patterns for Repetition Work, E. H. Berry.

Some Limitations of Molding Machines, E. H. Mumford.

Friday, December 6 (Morning).

The Specific Heat of Superheated Steam, Prof. C. C. Thomas.

Engine Design Adapted for the Use of Superheated Steam, Max E. R. Toltz.

Power Transmission by Friction Driving, Prof. W. F. M. Goss.

Cylinder Port Velocities, J. H. Wallace.

Industrial Education, W. B. Russell.

The entertainment features include an informal reception on Tuesday evening, an inspection of the Hudson Company's tunnels on Wednesday afternoon and a reception at the Engineering Societies building on Thursday evening.

The Illinois Traction System has posted a bulletin announcing that it will make a Christmas present to its employes of a turkey for each married man and a box of cigars to each single man.

PIPING AND POWER STATION SYSTEMS—LXIV.

BY W. L. MORRIS, M. E.

Class S3—Blow-Off Branches from Economizers.

As with boiler blow-off connections, there should be two valves used for the economizer blow-off. The valve next to the economizer should be so located that its bonnet might be removed to allow washings to accumulate and water to pass to the sewer. If the boiler room floor has ample drainage, then the valve may be so located that any washings will fall on the floor, allowing the water to run to the sewer. The first blow-off valve should not be located at a high level, as the water cannot be discharged through the bonnet opening.

Located at the economizer blow-off valve there should be a pressure gauge to show how much the pressure is being reduced in the economizer. The valve can be so adjusted that the pressure will not be sufficiently low to let steam be generated. In order to discharge water from an economizer it is necessary for the pump to speed up and supply water as fast as it is blown out, or steam will be formed as a result of the drop in pressure and the economizer be partially emptied of water. The amount of steam formed is about the same quantity as that of the water discharged. This caution should be observed, otherwise water hammer may occur.

A pressure gauge located near the blow-off will show when the pump has maintained the pressure. In closing the valve the gauge will show whether or not the pump slows down to prevent excessive pressure in the economizer. Figure 203 shows an economizer with the feed entering, in one case at the end of the upper manifold, then passing through two sections to the lower manifold. It also shows in dotted lines the usual and more correct form, having the feed enter at one end of the lower manifold, with the blow-off at the other end. As the lower portion of the economizer is much cooler than the tubes and upper headers, it is much better that the cool water enter at the bottom, thereby avoiding the extreme changes in temperature which cause trouble.

Class S4—Blow-off Branches from Heaters, Purifiers, Etc.

A closed heater requires a blow-off at the lowest point in the water space, where the precipitation in the form of mud is not likely to injure the valve. However, it is best to use two blow-off valves, as with boilers. If only one valve were used it would be necessary to have a wash-out T next to the heater. Live steam purifiers should have similar protection and means for washing out. The washings from any station device should be in plain view, so that the operator can see exactly what is being accomplished.

It is essential that the station operator be able to know what he is doing and be able to protect himself against accident. Double blow-off valves and sewer wash-outs are necessary to care for these requirements. Small economies effected by saving a few valves will be insignificant compared to the payment of damages in cases of injury.

Class S5—Blow-Offs from Steam Traps and Bleeders.

Steam trap drips which contain grease should be discharged through a blow-off, if practicable, to avoid vapor in the sewer. Traps discharging water from the intermediate receiver discharge at low pressures and should be provided with check valves to prevent the possibility of water backing through them if a trap were open while a boiler was being blown.

Check valves in blow-off lines are liable to cause trouble, first appearing, with possibly destructive results, when water reaches a low-pressure cylinder. Bleeders for removing condensation from boilers and engine branches should be run to the heaters, if such connections can be made without piping complications.

Steam traps either are furnished with gauge glasses, or have tapped openings for them. As it is impossible to main-

tain a glass where the temperature is constantly changing, a better plan is to arrange for an audible discharge from the trap. The operator, becoming accustomed to this sound, is warned immediately upon its ceasing. Figure 375 (S5-1) shows a trap having two different sound-making devices in

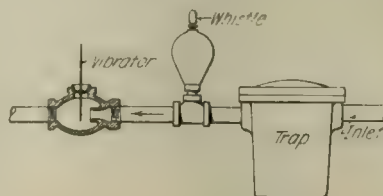


Figure 375 (S5-1).

its discharge. One has an air chamber which fills with vapor and air after the trap has discharged. When the trap again discharges the vapor and air are blown out, sounding the whistle. The other device

consists of a vibrator placed in the path of the discharge, the impact of the water causing a vibration similar to that of a tuning fork.

Bleeders are generally small, and if much used should have two valves placed together, the valve next to the pressure being used as a controlling valve, the second one only as a stop valve.

Class S6—Blow-Off Tanks.

A blow-off tank is intended to protect the sewer against high temperature water and steam. Its use is compelled by ordinance in many cities. That these tanks are often made and used in a manner unfit for the service is shown by steam escaping from many sewer gratings in the streets. The problem is far from simple and the arrangements necessary to overcome the existence of vapor and hot water in sewers are very extensive.

With a blow-off tank as sometimes designed the steam is allowed to escape through a vent pipe carried to a high elevation. This tank is all that is provided in many cases to care for the boiler blow-off, and the vent often is too small, not only allowing steam to be carried into the sewers, but, since it also fails to relieve the pressure, allowing water to be discharged through the vent. High temperature water from the boiler will expand to about 200 cubic feet of steam for each cubic foot of water discharged. In blowing off a boiler there would possibly be 75 pounds of water discharged per second, and to avoid pressure in a blow-off tank for such a quantity of water the vent should be not less than 12 inches in diameter. This quantity of water would require about 100 pounds of coal per minute to raise its temperature to that of the boiler and the energy required would be equivalent to the output of a 1,500-horsepower boiler. The immense amount of heat discharge at each blowing off of a boiler is greatly underestimated. This heat must be liberated at the station or it will escape through the manholes of the sewer. From one to two tons of water are liable

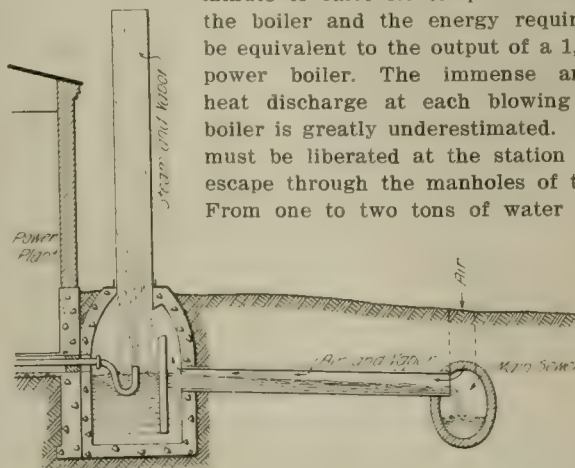


Figure 376 (S6-1).

to be passed in during one blow and the liberation of the heat confined is a large problem.

If the blow-off tank is small the water will pass through it to the sewer without losing any appreciable amount of heat. In considering the difficulty to be caused by steam in sewers it must be remembered that the discharge may either be steam or highly heated air carrying the ultimate amount of moisture, this latter originating as a circulation of air down some dis-

tant catch basin, which again rises where much heat is being thrown off.

The exhaust can be carried off with a large vapor pipe run to a high elevation so that the air will flow into the sewer openings and out through the vent pipe, as shown in Figure 376 (S 6-1). As shown, the discharge from the blow-off main is pointed upward to break up the boiler water and allow the greatest possible amount of steam to escape, this being the only point for discharging the heat from the water other than into the sewer. The baffle in the blow-off system prevents the hot water from going directly to the sewer. The vent pipe should be very large, say 18 to 24 inches in diameter, and may be made of materials similar to those used in a smoke-stack. The joints should be lapped so that the water will run from the outside to the inside. A circulation down the sewer manhole, through the main sewer and blow-off to the cistern, then up the vent pipe, would prevent leakage at the sewer manholes. In such blow-off equipments the sewer leading from the cistern to the main sewer should be large, thus enabling air and vapor to pass the water which would be discharged into the sewer.

The heat units in the blow-off water are ordinarily wasted, but it would be practicable to blow off into a settling chamber, thus allowing the impurities and the scale to settle and then returning the water to the boilers. As the blowing off of a boiler takes place, ordinarily, but once or twice a day, the gain by thus saving the water blown from the boilers would necessarily be slight.

The blow-off cistern shown in Figure 377 (S 6-2) is located at a considerable distance from the building and has an open grating to permit the escape of steam. This cistern is constructed as a storage for the blow-off of water with its discharge valves set so that the rate of discharge into the sewer will be small. Such a cistern should have a storage capacity of not less than 70 cubic feet. The pipe from the building to the cistern should be inclosed in a tile sewer pipe, which will permit its removal. The opening, A, in the building wall should have a clear space in front of it to permit removing a full length of pipe, thus allowing the entire blow-off main to be removed. The slip-joint at the cistern end would afford a ready means for closing the opening in the cistern, at the same time permitting free movement of the pipe line in the

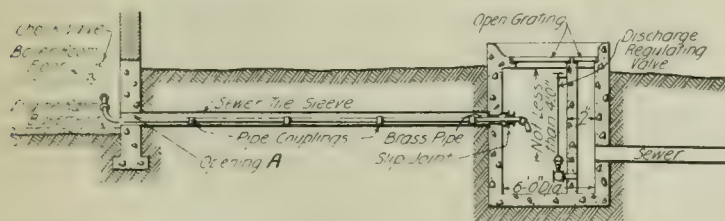


Figure 377 (S 6-2).

boiler room. The regulating valve in the cistern should not be over $2\frac{1}{2}$ inches in diameter and should be of brass. An old valve can be used for this purpose, as it will neither be under pressure nor closed tightly. The check valve in the boiler room should not be less than one inch in opening, as the discharge end of the blow-off will be under water and any vacuum formed in the blow-off main should be broken without drawing cistern water back into the line. The blow-off main back of the boilers should be located above the high-water level of the cistern to avoid water hammer.

Ordinarily a cistern should be located 50 feet from the building to prevent trouble from escaping steam. For installations where an open top cistern is permitted the most simple method of disposing of the blow-off water is that shown in Figure 377. If a cistern must be built close to a building, as shown in Figure 376, it will be possible to place the two pipes from the cistern as shown in Figure 377; or, if a large vapor pipe be used, the partition shown in Figure 376 may be run

down to the bottom of the cistern and the discharge valve used as in figure 377.

Class T 1—Grease Sewer Main.

Grease sewers are not generally dignified as systems; in fact, they are usually given but little consideration. Instead of well planned systems being installed, one finds that greasy discharges are run into the blow-off. Figure 46 shows in a general way the cold sewers and the hot sewers, each as a separate line. There are many greasy wastes in a plant that should not be discharged into the regular gravity sewers. The grease sewers should be constructed similarly to the blow-off systems, but if free from pressure they may be built of iron soil pipe with calked lead joints and run underground. It is partly due to the fact that these greasy drips ruin cement work that separate lines are necessary.

The various locations of hot sewer inlets make it quite impossible to use standard wrought pipe and to place the grease lines above ground. In Figure 46 the pipe is shown

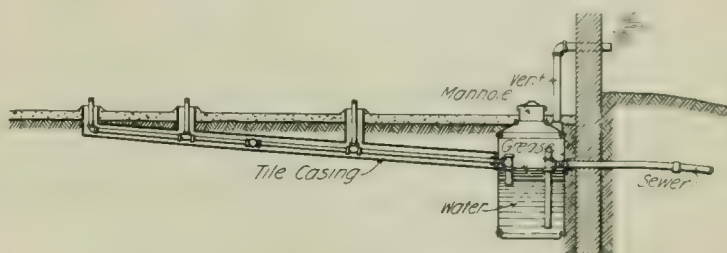


Figure 378 (T 1-1)

resting on loose packing sand and provided with a sleeve through the cement floor, which latter detail allows for the movement of the pipe. If screwed wrought-iron pipe were used for the hot sewer, it would last indefinitely if the sewer were not subjected to pressure in blowing off, as oil would also be discharged through the blow-off cistern. Figure 378 (T 1-1) shows good construction for a separate blow-off or grease separating tank with a small vapor pipe. As built the grease would remain in this tank until removed, and as a comparatively large amount of oily drips would reach this tank a considerable amount of grease would be collected. The drip line is carried through a tile pipe, the purpose of which is to hold the soil away from the line. Each branch of the drip line should have a tight connection at its upper end to prevent steam from coming out of the tile pipe. The drip line should run down into the tank sufficiently far to prevent much agitation of the grease at the top. The discharge is shown with a T at the upper opening, thus preventing the contents of the tank from siphoning down to the sewer level. The drop pipe allows water to be discharged without losing the grease.

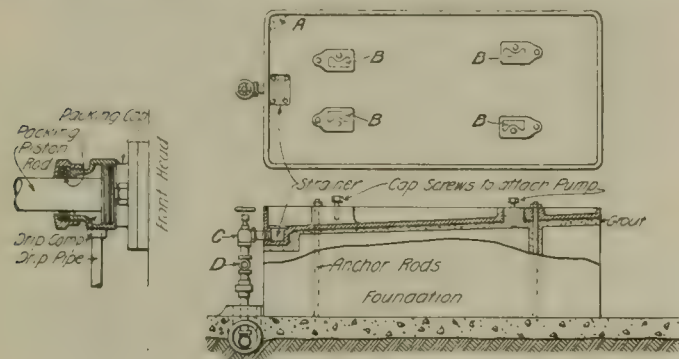
Some form of tin pump might be used to remove the grease, which could be used for various purposes. In considering the saving of oil and grease, no arrangement should be made to discharge this kind of grease into an oiling system, as it is wholly unfit for journals; in fact, an oiling system to work most satisfactorily must be able to rid itself of this class of grease if once it has taken it up. If these are run into this system of drips, which at times may be under pressure, then it will be necessary to give the line considerable pitch to avoid the possibility of drawing back water standing in the line.

Class T 2—Grease Sewer from Engines.

Practically all of the cylinder oil that gets into the oiling system is discharged from the piston and valve rod stuffing boxes. Some engine builders provide a grease compartment between the front head of the cylinder and the cross-head guide, with a stuffing box to isolate this compartment. If pockets to catch oil drips are also provided in valve bonnets then little cylinder oil will be discharged into the oiling system. Ordinarily these drips are run to the sewer, but with the grease

sewer system, as shown in Figure 378, much oil can be saved and used. Ordinarily a pocket can be put on the front head to catch drips from the piston rod, as shown in Figure 379 (T 2-1).

If there are bleeders at the ends of the cylinders, also from the steam chest, it will be found safer to discharge them into the exhaust at the highest point possible, rather than into the grease sewer. Then the drain from the exhaust line or receiver could be run to the grease sewer. If a trap is used to carry away drips from the intermediate receiver, it should discharge into the grease sewer, and if the line is well pitched there will be but little water for it to suck back in case pressure on the receiver falls below that of the atmosphere. To further protect engines against water being drawn in, it is ad-



Figures 379 (T 2-1) and 380 (T 3-1).

visible to place a check valve at a T in the trap discharge, the check falling closed, but free to open when under a partial vacuum. The exhaust that runs to the condenser should also have a check in its drip line, but the reverse of that for the intermediate receiver trap. The exhaust should close with a vacuum and be open when under pressure.

These different oily steam drip lines are shown, in Figure 331, as running to a drip tank. The drain from this tank is run to a grease sewer. A drip tank should be of generous capacity, say, for a 2,000-horsepower engine, 12 inches in diameter by 4 feet high. The vent from the top to the atmospheric pipe should be amply large to discharge the steam blown into it, say about $2\frac{1}{2}$ inches in diameter. With such a drip tank but one underground connection to the grease sewer will be required.

Class T 3—Grease Sewer from Pumps.

All pumps should be provided with a lipped cast-iron pan the full size of the pump. This pan should have raised spots for the pump feet and a strainer for the pipe discharge. The pan shown in Figure 380 (T 3-1) is simple in design and effective. The tops of the bosses are set level and the pan pitched toward the drain. A strainer should be placed over the drip opening.

A possible error in pan construction is to place the anchor rods close to the edge of the pan, thus making a good job of masonry of either brick or concrete impossible, since there will be too little material outside of the rod. The rod bosses should be projected from the pump feet bosses, making the fewest possible corners to wipe around. Another error is to use these anchor rods for securing the pump to the pan. The anchor rods are more or less elastic and do not hold the pump firmly. To obtain a rigid job the pump should be anchored to the pan and the pan then anchored to the foundation. The holes, B, are quite essential for securing a good job of grouting when the pan is placed on the foundation. The lip around the edge of the pan should not be less than $1\frac{1}{2}$ inches high. The top of the pump bosses and the outer rim also should be on one level to prevent oil from getting into the foundation.

The drain valve, C, should be used if the pan drips are run into the grease sewer. The tee, D, is to connect the blow-

offs from the steam cylinder as shown in Figure 330. The pan drips will carry away much grease and oil which can ordinarily be discharged to the grease sewer by leaving the valve, C, slightly open. The drain from the exhaust pipe may also be connected to opening, D.

Class T 4—Grease Sewer from Grease Extractors.

If there is a grease extractor in the exhaust line, then the drips should be discharged directly to the grease sewer; but if considerable back pressure is carried, then a trap such as shown in Figures 161 and 162 should be used to keep the steam from blowing through to the grease sewer. Any drains taken from the bottom of exhaust lines should be run to this sewer. If a grease extractor is used in a vacuum line, then the drips should be run to a vacuum trap and this trap should discharge into the grease sewer. If the heater overflow is used to discharge oil from the surface, then this discharge should also be run to the grease sewer. It is poor station management, after the grease has been caught, to discharge it into the regular sewer, thus not only losing this valuable material but injuring the sewers as well.

Class T 5—Grease Sewers to Precipitating Tanks.

The precipitating tanks are used to remove from the engine oil system such oil and grease as may be found in the grease trap shown in Figure 378. If considerable light oil reaches this trap it also should be discharged into the precipitating tank. After heavy oil has stood in the precipitating tank, it becomes of a more uniform grade and can be drawn off. This detail requires some kind of a pump that can be started and run until the grease has been removed from the grease trap.

Class U 1—Tile Sewers—Main.

Power plant sewers fulfill so many different services that it may be found better not to join them all. The wash water and rain water sewers can be joined, but the grease discharges and soil pipe wastes should be kept independent. In a condensing plant the wash and rain water can be run into the discharge waterway. The sewers under a high head should not be connected with those of low head or they will flood the basement floors. The requirements of each service must determine which branches shall be united into one main.

If water and grease of extremely high temperature are kept out of the sewers the main may be built of tile pipe with cement joints. Oil carried in drain serves to preserve the iron pipe, but it will destroy the cement joints of tile pipe. The choice of material for sewers depends upon how much grease is to be handled and how much water will flow with the grease.

(To be continued.)

On Wednesday, November 20, the Boston & Worcester Street Railway Company ran a funeral car from Brookline to Worcester, Mass., a distance of 40 miles. The company used one of its regular closed cars, taking out one of the side seats on the end and one of the large windows on the side to allow the casket to be placed in the car. The funeral party used the balance of the seats in the car, which were not removed. The running time from Brookline to Worcester, between which points the funeral party was carried, is ordinarily about 2 hours and 20 minutes. This party was given the right of way and was taken through in 2 hours and 7 minutes. The car did not make any faster running time than the regular service, but on account of not having to make any stops except at junction points, was able to make much better than the regular running time. This is a new departure for New England, but it is stated that it probably will not be a novelty, as the party was extremely well satisfied with the service on this trip. The expense was not so great as it would have been by steam railroad and on account of the absence of delays the service was most satisfactory.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Trains and Electric Cars Under Different Rules.

Wolf v. City Railway Company, 91 Pacific Reporter, 460.—The supreme court of Oregon says that the principles of law governing the management of trains propelled by steam power and regulating cars operated by electricity are not identical.

Conductor's Police Power No Defense.

Georgia Railway & Electric Company v. Baker, 58 South-eastern Reporter, 88.—The court of appeals of Georgia holds that while the conductor of a common carrier is clothed with police power, that fact affords no immunity to the carrier for damage resulting from his wrongful or illegal discharge of his duty, either as servant of the company or under color of the police power delegated to him by law.

Duty to Protect Passengers from Passengers, Especially Where One is Intoxicated.

Montgomery Traction Company v. Whatley, 44 Southern Reporter, 538.—The supreme court of Alabama says that a carrier of passengers owes to a passenger the duty of protecting him from violence and insults of other passengers, so far as this can be done by the exercise of a high degree of care; and such carrier will be held responsible for its own or its servants' neglect in this particular, when by the exercise of proper care the acts of violence might have been foreseen and prevented. If, for example, a passenger was unable to stand on account of his intoxicated condition, and his condition was known to the conductor, the conduct of that officer in permitting him to attempt to walk up and down the aisle of the car while it was in motion, instead of requiring him to be seated, or, in the event of his refusal, ejecting him from the car, was clearly an act of negligence in the discharge of the duty which he owed the other passengers. It was clearly a question for the determination of the jury whether the conductor, in the exercise of that degree of care exacted of him by law, ought to have foreseen that he might do injury to some passenger upon the car. It is undoubtedly the law that the servant of a carrier has the right to reject a drunken and disorderly passenger, when necessary to protect other passengers against his insults or violence; but if, under the testimony, the jury is authorized to find that the injury could have been avoided by requiring the drunken passenger to be and remain seated, the carrier cannot avoid liability by the failure of its servant to perform that duty.

Reason for Riding on Platform Immaterial—Duty to Wait for Another Car After Giving Up Place Inside.

Paterson v. Philadelphia Rapid Transit Company, 67 Atlantic Reporter, 616.—The supreme court of Pennsylvania holds that when one chooses to ride upon the platform of a car rather than wait for a car in which he can be accommodated, if not with a seat, with standing room at least inside, and is injured in consequence, the law does not concern itself to inquire as to the considerations which influenced his choice. Whether serious or trivial, the result is the same. The platform is a known place of danger, and one voluntarily there assumes the risk. For the exigency which determines him to take the risk rather than delay for another car, the company is not responsible.

In this case the plaintiff, with a courtesy altogether commendable, surrendered his place within the car to a lady, who, but for his action, would have been excluded. Having once yielded his place in the car, he was put to his choice whether to ride on the platform or take a later car, just as the person he accommodated would have been obliged to do had he not surrendered his advantage to her. The legal consequence of

his choice was that he forfeited the advantage of the presumption, which the law raises in favor of one injured while riding in the car, that the accident resulted from the negligence of the company. His riding on the platform would not excuse negligence on the part of the company in exposing him to known and avoidable danger; but it put upon him the burden of showing that his injuries resulted from negligence of this degree.

Traction Company Liable for But One Tax.

Montgomery Traction Company v. State, 44 Southern Reporter, 541.—The supreme court of Alabama says that the traction company was convicted of the offense of doing "business as a corporation in this state without a license and contrary to the provisions of Subdivision 55 of Section 4122 of the code of 1896, * * * as amended by the act * * * of 1901." The agreed statement of facts showed that the corporation was a street railroad company, operating a street railroad in the city of Montgomery; that it had paid for and taken out a license as a street railroad company, as required by Subdivision 34 of Section 4122 of the code of Alabama, as amended by act of March 4, 1903, but had not paid for or taken out the privilege tax, as provided by Subdivision 55 of Section 4122 of the code of 1896, as amended. The principal question involved in the case was whether or not a street railway corporation is liable for both the license tax imposed by Subdivision 34 of Section 4122 of the code of 1896, as amended, and the privilege tax imposed on street railroads by Subdivision 55 of Section 4122 of the code, as amended. According to its terms this last-named act imposes the tax only on "corporations * * * not otherwise specifically required to pay a license tax." The evident purpose of this act was to exempt from its provisions such corporations as, being of special nature, the legislature had fixed a specific tax upon as such. Such are commercial railroads, street railroads, etc., as to which the legislature has made special provision requiring license taxes which are deemed sufficient to cover all the necessities of the case. Without such an interpretation there would be no field of operation for the exception. It is therefore held that the traction company, having paid the license tax required of street railway corporations, was not liable for any other corporate license or privilege tax; the judgment of conviction is reversed, and a judgment rendered discharging the company.

Right to Cross Railroads—Things Determining Character of Company—Consolidation Immaterial.

Shreveport Traction Company v. Kansas City Shreveport & Gulf Railway Company, 44 Southern Reporter, 457.—The supreme court of Louisiana holds that the power of a railway to cross highways and other railroads is necessarily implied from the law authorizing its construction. In this particular railways for the local transportation of passengers, such as street and electric lines, cannot be justly differentiated from commercial railroads.

The plaintiff in this suit did not seek to obtain the ownership of any property of the defendant. It asked only to have decreed to it a right of way or crossing over the defendant's tracks at a particular point at occasional periods; an easement which, in view of the fact that the defendant was itself operating a road for public use, was subject to be altered or modified to conform to future exigencies and contingencies.

A street railway and an electric railroad designed to run beyond the municipal limits may be incorporated under the same charter.

In determining what the character of the corporation is, reference must be had to its charter, and not to the relation which may have been established between itself and the city by permit or license, or by contract. If by its charter it is a railroad corporation, its rights as such are not waived, or

forfeited, or abandoned, by entering into relations with the city for operating lines of street cars inside the city limits. Between the city and the company the relations entered into may control the situation as to the operation of its cars; but, when the company extends its line beyond the city under its right to do so reserved in the charter, the city has no control over it. As to its extension the character of the company is to be held to be a railroad company, entitled to its privileges as such, and bound by its obligations to the general public.

Where the defendant does not pretend that the route of the plaintiff corporation outside of the city limits is parallel with and competes with its own, or that its business is affected by the fact that the plaintiff is a corporation resulting from the consolidation of two corporations operating lines of street cars in the city, the defendant has no interest in contesting the consolidation of the two companies on the ground that the lines of the two companies in the city were to some extent parallel and competing with each other.

Conductor Shooting at Passenger and Killing Pedestrian—Employing Intoxicated Armed Conductor.

Savannah Electric Company v. Wheeler, 58 *Southeastern Reporter*, 38.—The supreme court of Georgia holds that a street railway company is liable for a tort committed by its conductor in the prosecution and within the scope of its business, whether by negligence or wilfully.

Where a petition alleged that a conductor on the car of a street railway company, while engaged in the prosecution and within the scope of his business of collecting fares, failed and refused to give a passenger correct change, and, upon request therefor, drew a pistol and fired at the passenger, but that the ball missed the passenger and struck a woman passing on the public street through which the car was running, causing her death, and that the plaintiffs were the husband and children of the decedent, the allegations set out a cause of action against the company, and the petition was not demurrable.

Allegations that the company knowingly placed in charge of one of its passenger cars a conductor of bad character, who was drunk and armed with a pistol, and that a homicide occurred in the manner indicated in the preceding paragraph, were not demurrable.

In its conduct of the business of operating electric street cars as a common carrier of passengers, the company was bound to use extraordinary diligence to protect the lives and persons of its passengers. Who was discharging this duty for the master? The petition referred to alleged that the conductor was so engaged. He was taking up fares, not for himself, but for the company. In doing this he had to make change. He failed and refused to give proper change to a passenger, and, when it was asked for, assaulted the passenger with a pistol. The protection of the passenger, the collecting of fares, the giving of change, and dealing with passengers about these matters were all in the prosecution and within the scope of his employment. But it was said that when he conducted this dealing, not properly by giving change, but improperly by shooting at the passenger, that was his individual tort, and the company was not liable. If any authorities declare such a rule as that the master is bound by torts of the servant which benefit him, but not by any others, this court cannot accept it as the rule in this state. In this matter, as in some others, there has been an evolution in the law, arising from the growth and change in corporate life and activity, and the better study of them.

It requires no argument to show that it was negligent to knowingly place a drunken conductor armed with a pistol and of bad habits in charge of a passenger car, traversing the streets of a city, or at least that it should be left to the jury to determine whether this was not negligent. As matter of law, on demurrer, the court cannot say that this was not an act of negligence. It was contended that the homicide was not the natural and probable result of such act on the part of the com-

pany. But the court knows nothing more apt to endanger life and safety than to place in control of a passenger street car the combination of a dangerous character, a conductor loaded with whisky, and a pistol loaded with powder and ball. If the company negligently assigned the conductor to take charge of the car, and, while acting in the general scope of the business intrusted to him, he wrongfully shot at a passenger, and as a proximate consequence thereof a person passing on the highway was killed, the company would be liable.

Limit to Duty and Liability to Passengers on Cars Stalled in Snow.

Prosper v. Rhode Island Suburban Railway Company, 67 *Atlantic Reporter*, 522.—The supreme court of Rhode Island says that it was alleged that the plaintiff was, in December, a passenger on one of the defendant's electric cars, which became stalled in a deep snow and snow storm, and became very cold and of a temperature and condition dangerous to the health of any person remaining in the same, and that the defendant negligently allowed the plaintiff to remain in the condition aforesaid for a long time, namely, about 11½ hours. Evidence was introduced by the plaintiff to the effect that the car was stopped by the snow at different places from time to time as efforts to move the car were made and were partially successful; that there were dwelling houses near said places where the car was stopped; that the plaintiff requested the conductor to apply to the residents of one or more of said houses for shelter for herself and her infant son, and that the conductor refused so to do until after 3 o'clock a. m. on the day after she took passage, when he did apply to a man who was walking in the road, and obtained admission for the plaintiff and her child and another passenger to a house near by. No testimony was offered, however, to show just how near any one of the other houses was to the car, or whether it was possible for the conductor safely to convey the plaintiff and her baby to any one of these houses at the time of her request. It was as fair to suppose that the conductor did not attempt to assist the plaintiff to any of the other houses because of the danger of such attempt as it was to say that he refused for any other reason. There was no testimony to show that the conductor himself left his car, or could leave it safely, for any distance, or at all, at such times.

The contract of the defendant in this case was to carry the passenger safely to her point of destination, and so to conduct the operation of its cars as not to injure her by any willful act or negligence on the part of its employees. The defendant could not be held to be guilty of negligence in failing further to operate its car after it had been stopped by the snow, having exhausted all its power in the effort to move the car from time to time against the accumulation of the snow. It was not, then, guilty of negligence in not carrying the plaintiff to her destination; and, having carried her as far as it could by the exercise of its power with the appliances at its disposal, it had done all that could be required to carry out its legal duty in her behalf. It would, indeed, have been an act of humanity and kindness on the part of the conductor, as of any other person seeing the plaintiff helpless and exposed to injury from cold and snow, to have helped her to a place of safety, if possible; and the duty of so doing, resting in moral rather than in legal obligation, would have been a personal one, resting upon the conductor or the motorman as an individual, and not as an agent or servant of the defendant corporation, in the same way and to the same extent that it would have rested upon any individual, had the plaintiff seen fit to leave the car and endeavor to struggle through the snow to a place of safety. The duty of assistance or rescue in distress in such case rests, not in contract, or in legal obligation, but in moral obligation growing out of human relations, and therefore is not a proper ground of action for damages.

The court is of the opinion that there was no error in directing a verdict for the defendant upon the evidence.

News of the Week

Standard Signs on the Lines of the Connecticut Company.

The Connecticut Company is equipping 120 cars on its lines in Rhode Island and Connecticut with the Hunter sign, made by the Hunter Illuminated Car Sign Company, 542 West Twenty-third street, New York, which is both a day and night sign. The principle in all types is the same, the various destinations appearing in white letters on a black background on a curtain which rolls up and which can be adjusted to display the desired destination. If, after reasonable trial, the public is satisfied with the signs of this type and the company finds the mechanical and practical application to be satisfactory, it is expected to adopt them for all the cars on the lines of the Connecticut Company.

The Connecticut Company is also taking steps for the adoption of a ticket system. The company has many lines where the run is thirty miles or over and where from four to sixteen fares are collected under the system of 5-cent zones. At the present a duplex ticket is being tested. This is issued by the conductor and the full fare collected when the passenger states his intention to travel over three zones or more. The original portion of the ticket is retained by the conductor for the report to the auditor and the duplex portion is given to the passenger for use as an identification check to the end of the run. The fare is rung up in each zone in the same manner as under the system of collecting five cents in each zone.

Recent Accidents.

Traffic on the Metropolitan West Side Elevated Railway was blocked for several hours on the night of November 26 when a grain steamer became stranded in the Chicago river under the jackknife bridge near Van Buren street.

A peculiar rear-end collision between two subway trains occurred in New York on November 25, which seems difficult of explanation, except on the theory that a motorman suddenly fainted or dropped dead. The accident occurred on the elevated portion of the West Farms branch of the subway route, just above the One Hundred and Seventy-fourth street station. A northbound train had just left the station and had come to a stop on the curve at Boston road and Hoe avenue, awaiting the signal to proceed. The following train, under the control of Motorman Joseph Meyers, pulled out of the station shortly after the first and was immediately running at full speed. Although the signals were set against the train, its speed was not checked until it struck the train that was standing on the curve. Both the rear car of the forward train and the first car of the second train were of steel, but the impact was so great that the cars were telescoped and the ends were crushed for a distance of several feet. Meyers was jammed into the wreckage so that his body could not be removed for three-quarters of an hour. There was nothing to obstruct the view of the car ahead and the distance between the cars was so short that it seems impossible to understand how a motorman in his right mind could have allowed his car to attain full speed. The controller was so badly wrecked that it was impossible to ascertain the position of the handle at the time of the accident or whether the spring controller or "dead man's handle" was in good order. The brakes had not been set. An autopsy failed to show whether Meyers met his death as a result of the accident or before it occurred. The trains were not heavily loaded and only six passengers were injured, none seriously.

Twelve persons were injured in a head-on collision on the Lake Shore Electric Railway near Sandusky, O., on November 22. Misunderstanding of orders is thought to have been the cause.

Cleveland Electric Railway Insists on Arbitration.

After meetings of the directors of the Cleveland Electric Railway on Friday and Saturday of last week the company on Monday of this week sent a communication to the city council in reply to the resolution passed by the council on November 15, in which the council suggested that representatives of the city and the company get together at a public hearing and agree on such portions of the holding company plan as they could without arbitration. No definite reply was made to the proposal, but the company stated that if the city could not bind itself to abide by an arbitration plan there was no reason why the Municipal Traction Company and the Cleveland Electric should not agree to determine a valuation of the property by arbitration, the agreement to be reported to the council for its approval or rejection. The company said it would be willing to settle any differences of opinion by a disinterested arbitration and restated its position in regard to

the proposed settlement. The company is willing to have the value of its property determined by a disinterested appraisal and to accept any franchise that will secure sufficient money to be invested in the property to give good service and that will insure a reasonable return on the investment. The company does not believe the holding plan is in harmony with good business principles, but if the city wishes a settlement along those lines it is willing to arrange the terms, providing for reasonable safeguards to be placed around the holding company, what rental shall be paid and what provision shall be made for the protection of the property.

The council did not consider the communication specifically, but proceeded to pass all pending low-fare legislation except the Central-Quincy grant, which is still held up by lack of consents. An ordinance was passed requiring the Cleveland Electric Railway to widen the space between its tracks on Superior avenue. Another ordinance was passed appropriating \$40,000 of the \$78,000 paid to the city by the Cleveland Electric for the use of Central avenue and Quincy street, for the rearrangement of tracks in the public square. Five other ordinances were passed fixing the compensation to be paid by the Forest City Railway for joint use of the Cleveland Electric tracks in so-called free territory at \$68,706.

New York Public Service Commission.

In the investigation of the Brooklyn Rapid Transit Company by the New York public service commission on November 20 a certain agreement between the Brooklyn Rapid Transit Company and the Long Island Railroad was produced in evidence which provides for an absolute division of territory between the two system in Kings, Queens, Nassau and Suffolk counties. The agreement has been in force since April 1, 1899, and both President Winter and Vice-President Williams disclaimed their ability to explain it specifically. It comprises a pamphlet of about 20 pages and goes much into detail. In brief, the agreement divides the territory into three classes: Long Island territory, including part of Queens county and the counties of Nassau and Suffolk, neutral territory, including College Point, Flushing, Jamaica, and the islands in Jamaica Bay, and Transit territory, including Kings county and part of Queens. It is provided that neither party shall enter into neutral territory without the consent of the other. The effect of the agreement was to give each of the companies a practical monopoly of the transportation business within their respective territories. The Long Island reserved the right to operate over the Brooklyn Rapid Transit lines crossing any or all bridges to Manhattan.

On the same day the commission issued an order to the Long Island Railroad to show cause why it should not maintain as frequent a service to East New York as it did in 1902.

The investigation of the Brooklyn Rapid Transit Company was continued on November 21. Vice-President T. S. Williams was again called upon to testify in regard to the financial history of the development of the company and its absorption of other roads. Mr. Ivins, who conducted the investigation for the commission, attempted to show that many of the companies composing the system were greatly overcapitalized. This was denied by Mr. Williams. Mr. Ivins claimed that before the Nassau Electric Railroad was acquired by the Brooklyn Rapid Transit Company Tom L. Johnson had injected \$6,000,000 of water into its stock, which was included in the cost of the road on the latter company's books. Mr. Williams claimed that it made no difference how much the stock had been watered if the earning capacity justified the price paid for it.

Mr. Williams said that the structures of the elevated systems, except as they have been strengthened in recent years, are largely as they were originally. The cost of strengthening at the present time, he said, is charged to construction account and not to maintenance, and the strengthening of the structure is not in any sense a repair of the old structure. The purpose of it is to fit the elevated structure for the new demands that are put upon it by the use of heavier electric trains. In the discarding of the steam locomotives the money received from their sale was credited to construction account. In reply to a question from the commission as to whether there was a deduction from the capital account because of the loss in value of the discarded rolling stock, Mr. Williams answered that he was incompetent to speak, as his knowledge of the accounting was merely general and not specific. In the rebuilding of the old cars considerable expense was entailed to adapt them to electric operation. Not many of the old cars were destroyed.

On November 21 Commissioner McCarroll held a hearing on two orders directing the Richmond Light & Railroad Company and the Staten Island Midland Railway to show cause why their service should not be improved. S. F. Hazelrigg, manager of both companies, testified in regard to financial and operating conditions. He said the company intended to

provide comfortable accommodations but could not provide seats for all the passengers in rush hours. He said the franchise for an extension from Bull's Head to Linoleumville had never been exercised for lack of funds.

On November 22 the commission ordered the Union Railway Company, which operates the surface lines in the Bronx, to increase its service 25 per cent by December 10. Specific directions are given in the order for the running of a certain number of cars within prescribed hours.

On November 26 the commission issued an order to the Brooklyn Rapid Transit Company to show cause why it should not operate the maximum service of shuttle trains over the Brooklyn bridge for a longer period in the morning and evening than at present.

Pittsburg Subway Bill Delayed.—The ordinance granting a franchise to the Pittsburg Subway Company has been sent to a conference committee of the Pittsburg select and common councils.

Five-Cent Night Fare.—The Pittsburg Railways Company last week established a 5-cent fare on its night cars to Allegheny, instead of the 10-cent fare which has heretofore been charged on those lines for night service and which is still charged on the other lines.

Technical Publicity Association.—The November meeting of the Technical Publicity Association was held in New York on the evening of November 21. Paul Pfizenmayer delivered an address on "The Evolution of Fine Printing and Its Influence on Advertising Literature."

New England Street Railway Club.—The November meeting of the New England Street Railway Club was held in Boston, Mass., on Thursday evening, November 21. Following the business meeting George W. Bishop of the Massachusetts railroad commission addressed the club on "Experience and Observation in Transportation Matters."

Louisville Strike Ended.—The strike of the employees of the Louisville Railway, which was declared on November 15, was called off by a vote of the men on November 26 with no conditions. The officials of the company have announced that individuals who have not been implicated in acts of violence during the strike will be taken back upon application.

To Discontinue Six-for-a-Quarter Tickets.—It is reported that after a year's trial of the plan of selling six tickets for 25 cents the Pottsville Union Traction Company, Pottsville, Pa., has decided to discontinue the practice and will hereafter charge a straight 5-cent fare. Although the number of passengers was increased, it was found that there was no corresponding increase in the revenues.

Compilation of Massachusetts Railway Law to be Issued.—The Massachusetts railroad commission is now having published a new compilation of all the laws of the state relating to railroads and electric railways, with an elaborate index and marginal references. The volume will comprise about 200 pages and is the third compilation, edited by Charles E. Mann, clerk of the commission. The annual report of the commission is expected to be issued about the time the legislature convenes in January.

American Institute of Electrical Engineers.—Dr. Charles P. Steinmetz, past president of the American Institute of Electrical Engineers, and now professor of electrical engineering at Union College, addressed a special meeting of the Urbana section of the institute at University chapel, University of Illinois, Urbana, Ill., on November 27 on the subject of "Alternating Current Railway Motors." Dr. Steinmetz also addressed the first meeting of the Chicago section for the session of 1907-08 on November 26 in the Art Institute, Chicago, on the subject of "Lightning Protection."

New Oregon Line.—G. W. Talbot, general manager of the Oregon Electric Railway, which is completing its line from Portland to Salem, Ore., has announced some of the plans for the service, which it is expected to begin about January 1. Eight trains a day will be run in each direction, of which two or three will be through trains, making the distance of about 50 miles in an hour and threefourths. Later this schedule will be reduced to an hour and a half when the track has become firmer. Sites for depots are now being selected. The passenger terminal in Portland will be at Front and Montgomery streets.

New York Public Service Law Upheld.—In a decision involving the constitutionality of the New York public service law the appellate division of the New York supreme court, third department, last week upheld the right of the legislature to delegate to an administrative commission the right to fix a tariff of rates for a public service commission. The case was an appeal taken by the Saratoga Gas Electric Light & Power Company from an order of the state commission of

gas and electricity, which is succeeded by the public service commission, fixing a maximum charge for gas and electricity in Saratoga Springs. The vote of the court was 3 to 2.

Wall & Cortlandt Street Deal Investigated.—The grand jury at New York, which, as reported in last week's issue of the Electric Railway Review, is investigating the sale of the Wall & Cortlandt Street Ferries Railroad to the Metropolitan Securities Company in order to ascertain if a violation of the law was involved, on November 22 examined as witnesses Anthony N. Brady, Thomas F. Ryan and H. H. Vreeland, who were concerned in the deal. Paul D. Cravath was subpoenaed as a witness, but was not examined. Some of the principal facts of the transaction were brought out in Mr. Brady's testimony before the public service commission in October.

Philadelphia Car Men Demand Increased Wages.—The motormen and conductors employed by the Philadelphia Rapid Transit Company, who have recently organized, on November 25 sent a communication to President Parsons demanding a workday of 10 hours within 12 consecutive hours; 25 cents an hour for motormen and conductors, instead of 21 cents; that all motormen and conductors be allowed to purchase their uniforms in open market; that all motormen and conductors discharged for joining the organization be restored to positions; that when employees are discharged they shall be given a fair and impartial hearing before the proper officials of the company and a committee of employees, and that in the event of failure to agree on any grievances or reinstatements the question shall be referred to arbitration.

Accidents in New York City.—The New York public service commission of the first district on November 22 gave out the number of street railway accidents reported to the commission for the month of October. The total number of accidents recorded was 4,866, as compared with 5,202 for September. The number of serious injuries is given as 191 and the number of killed as 47. The accidents have been tabulated as follows:

Car collision	221
Collision with vehicles	791
Persons struck by car	354
Injured boarding	510
Injured alighting	593
Employees injured	603
Other accidents	1,794

Total4,866

No Seat No Fare Law Tested.—The city authorities of Jersey City have taken steps to enforce the "no seat no fare" law, which, as previously reported in the Electric Railway Review, was recently upheld by the state supreme court. The law requires the street railway company, the Public Service Corporation of New Jersey, to provide a seat for every passenger during the evening rush hours on all cars operating from the Erie and Pennsylvania terminals. On November 22 10 detectives were detailed to board crowded cars for the purpose of securing evidence which the city corporation counsel proposes to use in prosecuting the company. When unable to obtain seats they refused to pay and were requested to leave the car. The company has appealed the case to the court of errors and appeals and claims that the appeal acts as a stay. Passengers have been given the alternative of paying, whether provided a seat or not, or leaving the car, and it is stated that the majority preferred to remain and pay fare. The city street and water board has passed an ordinance extending the "no seat no fare" regulation to all cars in the city at all times.

Plan to Relieve Subway Congestion.—The New York public service commission is considering a proposal made to it a few days ago by which, it is said, the present congestion at the Ninety-sixth street station of the subway could be done away with. It has been suggested that, inasmuch as the whole congestion at the point mentioned is due to the fact that the trains of one division have to cross the switches in front of the trains of the other division, the whole trouble could be done away with if the switches were unused during the rush hours. To this end the proposal is made that during the morning rush hours all the trains coming south from the Broadway division shall be local trains, and all the trains from the Lenox division shall be expresses. For the evening rush hours a similar proposal is made—that all the northbound local trains shall be Broadway trains, and that all the expresses shall be Lenox avenue trains. If this were done the switches at Ninety-sixth street, the operation of which congests the whole line at times, would not be used at all when the traffic is heavy. Any such plan would be only temporary, as \$850,000 has been appropriated for the construction of a new layout of switches, for which plans are being prepared.

Construction News

FRANCHISES.

Bedford, Ind.—A franchise has been granted to the Grand Central Traction Company of Indianapolis to operate its proposed interurban line through Bedford and to construct and operate an electric light and heating plant. The line will run from Indianapolis to Bloomington, Ind., with a branch to Terre Haute.

Chehalis, Wash.—B. J. Weeks has been granted a 60-day extension for the construction of the proposed interurban line from Centralia to Chehalis, Wash., on condition that the company agrees to pay its share of the brick paving which is being laid in Market street. It is stated that a similar extension was granted by the council of Centralia.

Defiance, O.—The city council has granted a franchise to the Toledo & Defiance and the Defiance Hicksville & Ft. Wayne railway companies for the operation of their cars through Defiance. With the exception of Wayne street, where the road will be single track (except one block) the entire route through the city may be double-tracked. It is estimated that entrance to Defiance over this route will cost about \$100,000. These lines are subsidiaries of the Toledo Wabash & St. Louis Electric Railway, of which Clarence D. Whitney of Toledo is president.

Fond du Lac, Wis.—The Eastern Wisconsin Railway & Light Company has applied for a franchise to enable it to operate interurban cars in this city. It desires to use T-rails in place of the present girder rails.

Port Marion, Pa.—The borough council has granted the Brownsville Masontown & Smithfield Street Railway Company a franchise for the operation of its interurban line over several of the streets of that village. The company now has franchises in Port Marion, Smithfield and Masontown, Fayette county; Rice's Landing, Carmichaels and East Waynesburg, Green county; Bealsville, Bentleyville and Zollarsville, Washington county. When the road is completed direct communication will be afforded from Morgantown to Pittsburg, 59 miles, as against 103 miles, the distance by existing steam roads. W. J. Sheldon, McKeesport, Pa., is president.

San Francisco, Cal.—The public utilities committee of the board of supervisors has recommended the passage of a supplemental 25-year franchise to the Parkside Transit Company for the operation of its line in Twentieth avenue, provided the company surrenders all rights granted in a former franchise for the operation of its line in Nineteenth avenue. The company applied for the supplemental franchise in Twentieth avenue on account of the light grade on that street as compared with Nineteenth avenue. The city reserves the right to purchase the line within the last 10 years of the life of the franchise. It is stated that actual construction work will not be started until next spring.

Smithfield, Pa.—A franchise has been granted to the Brownsville Masontown & Smithfield Street Railway Company for the operation of its proposed interurban line in Smithfield.

Windsor, Ont.—The Windsor Essex & Lake Shore Rapid Railway of Kingsville, Ont., will make an application to the city of Windsor for an extension of its lines from the present terminus at Ouellette avenue to the new station of the Michigan Central, which is to be built at the entrance to the tunnel. From this point it is planned to build the electric road south to connect with its present line near the driving park, thus forming a belt line. W. S. Piggott, secretary.

RECENT INCORPORATIONS.

Johnstown Electric Railway, Johnstown, Pa.—Incorporated in Pennsylvania to construct and operate an electric railway. Capital stock, \$50,000. Incorporators: John B. Morgret, E. V. Remington, Charles M. Moses and others, Johnstown, Pa.

West Chester & Wilmington Electric Railway.—This company has applied for a charter to build and operate an electric railway from West Chester to Wilmington, Del., 17 miles. Right of way has been secured in portions of Chester and Delaware counties and it is stated that the necessary capital has been paid in to the treasury. Capital stock, \$54,000. The directors are: Thomas E. O'Connell, president, West Chester, Pa.; Casper P. Faucett, treasurer, Westtown, Pa.; James A. Kirkpatrick, Birmingham, Pa.; Charles Gleason, Brandywine Summit, Pa.; Wills Passmore, Brandywine, Del.; F. Harry Day, M. D., Talleyville, Del.; M. A. O'Connell, West Chester, Pa.

TRACK AND ROADWAY.

Albia (Ia.) Electric Light & Power Company.—This company is said to be contemplating the construction of 4½ miles of new track.

Allentown, Pa.—Construction work has been started on the new \$400,000 modern steel bridge, which will form the connecting link in the system of electric railways owned or leased by the Lehigh Valley Transit Company. Brown Brothers & Co. and E. B. Smith & Co., bankers of Philadelphia, have undertaken to finance the project and on its completion mortgage bonds, guaranteed by the Lehigh Valley Transit Company, which will own all of the stock, will be issued. The plans call for the completion of the work within 18 months. The banking firms named have purchased the old Allentown & South Allentown Bridge Company and the Allentown & South Allentown Railway, which companies undertook the construction of the bridge several years ago, but were obliged to discontinue the work.

Appalachian Interurban Railway.—It is reported that financial arrangements have been made for the construction of this company's electric line from Knoxville, Tenn., to Greenville, S. C., via Rutherfordton and Waynesville, N. C. S. A. Jones of Waynesville is interested.

Atlanta & Carolina Construction Company, Atlanta, Ga.—Financial arrangements are said to have been made for the construction of this company's line from Atlanta to Augusta, Ga., via Lithonia, Conyers, Monroe, Athens and Washington, and the contract has been awarded to the Cook & Laurie Company of Montgomery, Ala. Work is to begin in the spring at Atlanta. Surveys have been completed, but all of the right of way has not yet been secured. James W. English is president and Matthew Mason is vice-president and general manager.

Bristol & Kingsport Railway, Bristol, Tenn.—F. H. Cothran has been appointed chief engineer of this company, which proposes to build an electric railway from Bristol to Kingsport, Tenn., 25 miles, and has started a survey.

Buffalo & Lake Erie Traction Company.—Officials of the road and of the city of Dunkirk, N. Y., on November 21 made an inspection trip over the company's lines under construction in and around Dunkirk and reported rapid progress in the work. The lines are practically completed, with the exception of a deep cut which is being made for an undercrossing with the Pennsylvania and the New York Chicago & St. Louis railroads. It is stated that this will not be finished until late in the winter.

Buffalo Niagara & Toronto Railway, Niagara Falls, Ont.—This company has secured the right of way for its line from Falls View to a point on the main line of the Niagara St. Catharines & Toronto Railway.

Canyon City & Royal Gorge Electric Railroad, Canyon City, Colo.—This company has decided to build its proposed interurban line instead of letting it out to contractors and work was started on November 21. The franchises of the company cover 27 miles of trackage, which will cost approximately \$250,000.

Chester, Pa.—Right of way is being secured by Rev. Moore Buchanan of Morgantown, W. Va., for the proposed Chester-Pittsburg interurban line from Chester to Pittsburg, Pa. It is said that this road may be built to East Liverpool to meet the extension of the Youngstown & Ohio River Railroad, now under construction to East Liverpool, thus forming a direct route from that point to Pittsburg. If built a territory rich in natural advantages and mineral deposits, and hitherto not served by railroads, will be opened up for development.

Columbus Magnetic Springs & Northern Railway, Delaware, O.—A large force of men is at work stringing wire, bonding rails, tamping ties and laying steel on the Columbus Magnetic Springs & Northern electric line between Magnetic Springs and Richwood, O. It is probable that service on this line will be opened between Richwood and Magnetic Springs about Christmas.

Connecticut Company, New Haven, Conn.—Announcement is made that regular passenger service on the Rockville-Hartford division of this company's lines, which is being converted for electrical operation, will be started on December 1. The line also will be a connecting link between Hartford and Worcester, by way of Stafford. The freight will be hauled over the Stafford trolley road in freight cars of the standard steam road type to Rockville and Vernon, where it will be transferred to the main line of the New Haven road. Electricity will be used as a motive power for hauling the freight on the steam as well as the electric lines.

Donora & Eldora Street Railway, Monongahela, Pa.—Official advice has been received from this company stating that the contracts for a 350-foot viaduct, track work and grading probably will be let about January 15. The line will be 3.3 miles long and will connect the towns named in the title. Grading will be started in March, 1908. B. M. Hanna, M. D., 718 Penn avenue, Pittsburg, Pa., is president. Headquarters of the company, Monongahela, Pa.

Duquesne, Ariz.—It is stated that the Columbus-Duquesne Copper Company may build a 25-mile narrow-gauge electric railway in Santa Cruz county.

Erie London & Tilsonburg Electric Railway, Tilsonburg, Ont.—This company, which was authorized last spring to build an electric railway from Port Burrell, Ont., northwest to London, 40 miles, with a branch east to Tilsonburg, 15 miles, has applied for an extension of time in which to begin the construction of the line. E. C. Jackson, Tilsonburg, is interested.

Fayetteville, Ark.—Citizens of Huntsville and Fayetteville are endeavoring to promote a project for an electric line connecting these towns with the main line of the Frisco system (steam). A project is under way to build a power plant in the White river to furnish electricity for the road. W. H. Standish, Moses Bowen, W. E. Williams and Mayor Mulholland of Fayetteville are among those interested in the project.

Hot Springs, Ark.—A 12-mile electric belt line, to be built along the Malvern road to the south, encircling Potash Sulphur Springs and returning to Hot Springs by way of the old Benton road, is a project under consideration by Hot Springs business men.

Indianapolis Newcastle & Toledo Electric Railway, Newcastle, Ind.—It is reported that plans are being made for a dissolution of the receivership, under which this property was placed on November 8, and for an early completion of the road from Indianapolis to Newcastle under a trustee. The road was nearly completed when the receivership proceedings were instituted. The \$300,000 power house at Newcastle was ready for the placing of the machinery, the grading had been completed, half the track had been laid, and the overhead work was mostly completed. It is stated that the road could now be placed in operation in 60 days.

Lake View Traction Company, Memphis, Tenn.—This company has completed its location survey from Memphis to Lake View, Tenn. The company proposes to build as far as Clarksdale, Miss., 77 miles. The Clarksdale Covington & Collierville Interurban Railway, a subsidiary, has secured a most favorable 30-year franchise for an entrance into the city of Memphis. R. F. Tate is president.

Lima & Toledo Traction Company, Lima, O.—Announcement is made that this company will soon open its new line as far north as Deshlar. A bihourly service will be maintained between Deshlar and Lima, serving Belmore. The line has been in operation as far north as Leipsic for some time, and the grading is completed as far north as the Maumee river. Contractors have begun the laying of rails on the road between Lima and Bellefontaine, and a portion of the line will be opened within 60 days.

Marion & Logansport Traction Company, Marion, Ind.—John O. Willson, secretary, Marion, Ind., writes that surveys are being made and that bids on the grading will be received. The line will be 39½ miles long and will connect Marion and Logansport, Ind., by way of Sweetser, Mier, Amboy, North Grove, McGrawsville, Lover, Bunker Hill, Onward and Anoka. James R. Poole, president, Marion, Ind.

Minneapolis St. Paul Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—F. G. S. Hunt, chief engineer, has a corps of engineers working on this road east from Owatonna, Minn., and within a few days expects to begin surveying southward. Grading will be resumed on the north end as soon as the weather permits. There will be no grades above 1¼ per cent and no short curves. Seventy-pound steel rails, laid on oak ties ballasted with rock and gravel, will be used. It is stated that the block signal system will be installed.

Northwestern Elevated Railroad, Chicago, Ill.—It is now stated that the through service from Evanston to Chicago over the new electric line which the Chicago Milwaukee & St. Paul Railway is building to connect with the elevated line at Wilson avenue will probably not be started until spring, instead of next month, as expected. Rapid progress has been made on the track work, but the electrical machinery for the substation at Evanston cannot be delivered this year.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—Officials of the company announce that its extension to the Iowa School for the Deaf will be completed and in operation by

January 1. There is comparatively little grading to be done and a large force of men is now completing this work in readiness for tracklaying.

Oakland (Cal.) Traction Company.—This company is preparing to begin work on the construction of a line to Dwight, Cal.

Oregon Electric Railway, Portland, Ore.—Tracklaying has been completed on this line between Portland and Salem and there remain only the surfacing and ballasting, which will require about a month to complete. It is expected that the line will be in operation by January 1. It later will be extended down the Willamette valley to Eugene and within the next few months a branch will be built to Hillsboro and Forest Grove.

Oregon (Mo.) Interurban Railway.—Lewis I. Moore, Oregon, Mo., secretary of this company, writes that the line will be six miles long, extending from Oregon, Mo., to the Chicago Burlington & Quincy tracks, with possibly an extension to Forest City. It will be operated either by steam or gasoline motors. The road is for the purpose of affording direct rail connection between Oregon, which is situated on the bluffs of the Missouri river, and is without rail facilities, and the Burlington tracks on the river bottom. The route has been selected and permanent surveys are under way. The company was incorporated on November 12, with a capital of \$60,000, of which \$44,000 of stock was subscribed by residents of Oregon and vicinity. It is expected that actual construction work will be started in the spring of 1908. The headquarters of the company are at Oregon, Mo. Benjamin F. Morgan, president, Oregon.

Pasadena, Cal.—An electric railway from La Canada to Pasadena and Los Angeles is being promoted by O. W. Potter, La Canada, Cal.

Pueblo, Colo.—N. C. Van Natta, chief engineer of the proposed interurban railway which is to connect Pueblo, Rocky Ford and other points in Colorado, announces that the preliminary work is being pushed in order that construction may be started by December 15, the limit set by the city council. The surveyors have reached a point 20 miles west of Rocky Ford and will soon enter Pueblo.

Reno, Nev.—It is reported that the Ubelieve Copper Mines Company proposes to build an electric railway from Bonnie Clair, on the Bullfrog-Goldfield Railroad, to the mines, about 48 miles. Power for operating this line will be secured from the Bishop power plant. H. G. Merry, vice-president, Reno, Nev.

Rochester Corning & Elmira Traction Company, Rochester, N. Y.—The Rochester & Southern Construction Company, which is building this 138-mile interurban from Rochester to Elmira and Hornell, N. Y., has completed the grading between the south end of Conesus Lake and Scottsburg; also between Scottsburg and a point two miles west of that village and one mile east of the Delaware Lackawanna & Western Railroad's main line, which it will cross by an overhead bridge three miles west of Scottsburg. This will be built next year. Grading will be continued during the winter, weather permitting.

St. Joseph Valley Railway, Elkhart, Ind.—It is reported that this company, which now operates by steam from Lagrange to Angola, Ind., 27 miles, proposes to equip the line for electrical operation.

St. Vital, Minn.—This city has decided to build an electric line, to be owned and operated by the municipality, from St. Vital to Winnipeg, Man., 12 miles.

Sonoma & Lake County Railway, Lakeport, Cal.—Since its incorporation last spring this company has been securing right of way and franchises and announcement is now made that actual construction work will be started in the spring. The line will be about 30 miles long and will connect Cloverdale, Kelseyville and Lakeport, Cal. A. E. Dickinson, president, Ukiah; J. E. Fulton, vice-president and general manager, Lakeport; W. S. Fry, secretary, Lakeport; J. R. Garner, treasurer, Upper Lake, Cal.

Southwest Missouri Railroad, Webb City, Mo.—With the beginning of the new year this company will have completed and in operation 10 miles of new track, construction work on which has been in progress during 1907. A. H. Rogers, president and general manager.

Smyrna Kent County & Delaware Bay Traction Company, Smyrna, Del.—Right of way through New Castle county has been secured to within 1½ miles of Delaware City and as soon as the remainder has been acquired the construction of this proposed electric railway will be started. The line will be about 35 miles long and will connect Smyrna, Woodland

Beach, Dover and Milford, Del., with a branch line from Milford to Rehoboth, about 20 miles. J. W. Endean is interested.

Tacoma Railway & Power Company, Tacoma, Wash.—This company is meeting with considerable difficulty in purchasing the right of way for its extension from Tacoma to Sumner and Orting, Wash., and the plans are being somewhat delayed on that account, as condemnation proceedings will be necessary. Manager W. S. Dimmock states that the financial situation will not affect the plans which Stone & Webster had contemplated for the Puget Sound properties and that work is to be pushed as rapidly as possible.

Tekamah, Neb.—A committee of citizens of Tekamah and Decatur, Neb., has been appointed to promote the construction of a railroad between those towns, to be operated with the Union Pacific type of gasoline motor cars. E. A. Hanson of Decatur is interested.

Texas Traction Company, Dallas, Tex.—It is stated that with the exception of a small amount of work to be done in each of the towns of Howe, McKinney, Plano and Richardson, Tex., the grading on this 65-mile interurban road from Dallas to Sherman has been completed. It is said that tracklaying will be started on December 1. On account of car shortage there has been considerable delay in the delivery of ties and steel, but it is expected that this will cause no further trouble. Theodore Stebbins, general manager, Dallas, Tex.

Tuscarawas Valley Transit & Power Company.—This company proposes to construct an electric railway from Canal Dover to Canton, O., by way of Zoar and Bolivar, a distance of 25 miles. The line later may be extended from its southern terminal at Canal Dover southwest to Columbus, by way of Coshocton. The names of the promoters have not been made public.

Whitman Electric Railroad.—This company has resumed work on its line from Colfax to Pullman, Wash., and is grading several miles of roadbed on Spring Flat.

Yazoo City, Miss.—The supreme court of Mississippi has approved an issue of bonds for a municipal street railway and it is reported that construction will begin at once. Kirkpatrick & Johnson of Jackson, Miss., engineers.

POWER HOUSES AND SUBSTATIONS.

Albia (Ia.) Electric Light & Power Company.—This company is contemplating the installation of a 200-kilowatt General Electric generator for railway service and a 200-horsepower Ball engine.

American Railway & Light Company, Americus, Ga.—This company, recently incorporated to build a 4-mile street railway system and a lighting plant at Americus, has prepared the plans for a large power house, and, it is stated, has placed orders for the equipment. W. A. Dodson of Americus is interested.

Atlantic Coast Electric Railroad, Asbury Park, N. J.—This company is installing three 500-kilowatt Westinghouse-Parsons turbines in its power house.

Austin (Tex.) Electric Railway.—This company is installing in its power house a 600-horsepower engine and a 400-kilowatt generator.

Claremont (N. H.) Railway & Lighting Company.—This company is now building a 2,250-horsepower hydroelectric plant on the Black river at Cavendish, Vt., from which power will be transmitted to Claremont, a distance of 15 miles. In the Claremont station there are being installed two Diesel oil engines, direct connected to a 300-kilowatt 2,300-volt Ft. Wayne generator, which will increase the capacity of the plant 500 horsepower. L. N. Wheelock is manager.

Consolidated Railways Lighting & Power Company, Wilmington, N. C.—This company contemplates the purchase of one 500-kilowatt Westinghouse-Parsons turbo-generator, one 250-horsepower Babcock & Wilcox boiler and one 500-horsepower Alberger condenser. A. B. Skelding, manager.

Northwestern Pacific Railroad, San Francisco, Cal.—This company has recently purchased for installation in its substation at San Anselmo, Cal., two 500-kilowatt Allis-Chalmers motor-generator sets, a 30-kilowatt induction motor-generator exciter set, and three 300-kilowatt Allis-Chalmers oil-filled, water-cooled transformers.

Smyrna Kent County & Delaware Bay Traction Company, Smyrna, Del.—This company, which proposes to build an interurban line from Smyrna to Woodland Beach and Milford, Del., by way of Dover, is announced as ready to begin the construction of a power house at St. George's, Del. J. W. Endean is interested.

Personal Mention

Mr. W. D. Hall has been appointed superintendent in charge of the power plant and electrical equipment of the St. Clair tunnel, with headquarters at Port Huron, Mich.

Mr. James K. Gray has resigned as general superintendent of the Western Ohio Railway, Lima, O., to accept a position with the Cleveland Southwestern & Columbus Railway at Mansfield, O.

Mr. O. R. Bilbrow has been chosen to fill the recently created office of auditor of the Lexington & Interurban Railways Company, Lexington, Ky. Mr. Bilbrow formerly was connected with the Mississippi Central Railroad.

Mr. M. Plunkett of Riverton, Ill., has been appointed master mechanic of the Illinois Traction System, succeeding Mr. E. T. Thomas, resigned to accept a position with the Cleveland Southwestern & Columbus Railway at Elyria, O.

Mr. A. B. Carleton and Col. Charles A. Sterling, vice-presidents of the Public Service Corporation of New Jersey, and Mr. Frederick Evans, secretary of the company, have resigned. Col. E. W. Hine, assistant to President T. N. McCarter, will succeed Mr. Evans as secretary.

Mr. John Blair MacAfee, Philadelphia, Pa., has been elected vice-president of the Lexington & Interurban Railways Company, succeeding Mr. Louis des Cognets, who has resigned to devote his time to private business matters. Mr. des Cognets will remain as a director of the company.

Mr. A. C. Murray, assistant to the general superintendent, M. L. Harry, of the southern division of the Illinois Traction System, with headquarters at Staunton, Ill., has been appointed assistant to General Manager L. E. Fischer at Springfield, Ill., and the former position has been abolished.

Mr. James F. Jackson, chairman of the Massachusetts railroad commission, has resigned to take up the private practice of law and will form a partnership with former Attorney-General Herbert Parker of Massachusetts and Mr. Hugh Bancroft, son of President Bancroft of the Boston Elevated Railway.

Mr. J. W. McFarland has been appointed general superintendent of the Macon Railway & Light Company, Macon, Ga., instead of general manager, as previously reported in the Electric Railway Review. Mr. McFarland was formerly superintendent of the Chattanooga Railways Company, Chattanooga, Tenn.

Mr. John B. Crawford, for the past year superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company at Ft. Wayne, Ind., has resigned to become general manager of the Lexington & Interurban Railways Company, with headquarters at Lexington, Ky. He succeeds Mr. Robert T. Gunn, who has resigned to become associated with an Indiana electric railway company.

Mr. S. A. Foltz, heretofore general manager of the Mansfield Railway Light & Power Company, has been appointed manager of the Bucyrus-Mansfield division of the Cleveland Southwestern & Columbus Railway, with headquarters at Mansfield, O. Mr. Foltz also will have charge of the Mansfield-Ashland division of this company as soon as the extension has been completed. He will succeed Mr. D. H. Lavenberg, who will be transferred to another part of the system.

Frank W. Mahin, United States consul at Nottingham, writes that "The Midland Railway is electrifying several of its branch lines. A similar change is being made on other British railways. The result, of course, will be the electrification of main lines, if the experiment on the branches proves what is desired."

The Michigan United Railways Company has removed its general offices from Lansing to Jackson, Mich.

L. W. Harrington, passenger and freight agent of the Columbus Delaware & Marlon Railway at Columbus, O., has devised a plan for converting one of its cars into a funeral car when desired by fastening a black leather covering on the outside of the car with carriage buttons. This can be removed while the car is being used for other service. It is expected that removable black drapery for the inside of the car will also be designed.

Financial News

Boston Elevated Railway.—The Boston Elevated Railway has recently asked permission of the Massachusetts railroad commissioners to withdraw the petition it filed early in April for authority to issue \$8,000,000 additional stock. This stock, however, will be issued later to provide funds for the construction of the Cambridge subway. Certain details regarding the new subway are in dispute between the city and the company and the matter has been taken to the courts, so that in the natural course of events it must be several months before a decision can be reached.

Chicago Railways Company.—Holders of \$12,537,500 bonds of the Chicago Union Traction Company underlying companies and of \$2,575,500 receivers' certificates have assented so far to the modified reorganization plan, which it is now believed will therefore be successful.

Concord Maynard & Hudson Street Railway, Maynard, Mass.—The issue of \$10,000 of 20-year 5 per cent bonds to fund a floating debt incurred for construction and equipment has been approved by the Massachusetts railroad commission.

Indianapolis Huntington Columbia City & Northwestern Railway, Indianapolis, Ind.—The sale of the property at auction has been ordered by John L. McMaster, judge of the superior court at Indianapolis. The date set is February 8, 1908.

Manhattan Railway, New York City.—Gross earnings for the year ended September 30, 1907, were \$8,816,101, as compared with \$8,061,554 for the previous year. Net earnings were \$5,592,595, as compared with \$4,859,972.

Massachusetts Electric Companies, Boston.—Approval has been given by the Massachusetts railroad commission to the issue of the following bonds by subsidiary companies to provide for floating debt incurred for construction and the purchase of new equipment: Old Colony Street Railway, \$200,000; Boston & Northern Street Railway, \$410,000.

Newtown (Pa.) Electric Street Railway.—It is reported that this property will be consolidated with the property of the Newtown Langhorne & Bristol Street Railway Company under the name of the Bucks County Electric Companies. The Newtown company now operates the Newtown Langhorne & Bristol Railway.

New York City Railway.—Papers have been served upon E. Henry Lacombe, judge of the United States circuit court at New York, requiring him to review his appointment of Adrian H. Joline and Douglas Robinson as receivers for the New York City Railway before the United States supreme court in Washington. The order requires Judge Lacombe to show cause why the receivership should not be terminated, and is returnable December 2 in Washington. It was secured by Roger Foster, representing several judgment creditors. Upon the return made by Judge Lacombe, together with the briefs and arguments of the interested counsel, the supreme court will determine whether the case is one that calls for the interference of that court. At the time the receivers were appointed Mr. Foster attempted to have the receiverships vacated upon the ground that the action was collusive and brought to throw the receivership into the federal courts instead of the state courts, where, he contended, it properly belonged.

Third Avenue Railroad, New York.—The following committee has been appointed representing holders of the 4 per cent consolidated bonds: James N. Wallace, chairman; Adrian Iselin, Jr., Edmund D. Randolph, Mortimer L. Schiff, James Timpon, Hans Winterfeldt and Franklin L. Babcock, secretary. The committee announces that, as the Metropolitan Street Railway, lessee of the Third Avenue Railroad, and the New York City Railway, sublessee, are in the hands of receivers, the committee, at the request of holders of a large amount of the consolidated bonds, has consented to act under an agreement dated November 6, 1907, for the purpose of conserving the interests of said bondholders. Holders are urged to deposit their bonds with the Central Trust Company of New York before December 20.

West End Street Railway, Boston.—In the annual report to shareholders for the year ended September 30, 1907, Joseph B. Russell, the president, says: "During the year \$500,000 of 4 per cent bonds, due on August 1, 1932, were sold, and the proceeds used to pay a like amount of the bonds of the Boston Consolidated Railway, due on January 1, 1907. The premium received from the sale of these bonds was \$2,290. The bonded

debt of the company has been reduced \$8,000. The common stock was increased during the past year by 8,400 shares, 7,270 of which were taken by the stockholders, and 1,130 sold at auction. The premium above par received from the sale of this stock was \$286,432. The proceeds were used to pay to the Boston Elevated Railway the audited accounts for additions and improvements made to the property of this company during the two years ending March 30, 1906. Two other accounts, covering the year to March 30, 1907, have been received from the Boston Elevated company, but have not yet been audited and approved. The dividends on the capital stock of this company for the past year, amounting to \$1,204,947, and interest on the funded debt and taxes have been paid by the Boston Elevated Railway."

Worcester (Mass.) Consolidated Street Railway.—Approval has been requested from the Massachusetts railroad commission of an issue of \$200,000 of 5 per cent bonds.

ELECTRIC RAILWAY EARNINGS.

Chicago & Milwaukee Electric Railroad Company.

October—	1907.	1906.
Gross earnings	\$99,329.01	\$88,905.75
Operating expenses	42,233.93	40,621.44
Net earnings	57,095.08	48,284.31
January 1 to October 31—	1907.	1906.
Gross earnings	\$884,729.80	\$722,448.24
Operating expenses	367,670.68	293,380.25
Net earnings	517,059.12	429,067.99

El Paso (Tex.) Electric Company.

September—	1907.	1906.
Gross earnings	\$45,556	\$35,905
Net earnings	13,650	10,761
Surplus over charges	8,428	6,405

Galveston-Houston Electric Company, Galveston, Tex.

September—	1907.	1906.
Gross earnings	\$97,650	\$84,356
Net earnings	40,998	32,794
Surplus over charges	25,214	18,462

Houghton County Street Railway Company, Hancock, Mich.

September—	1907.	1906.
Gross earnings	\$23,878	\$22,689
Net earnings	11,005	10,908
Surplus over charges	7,057	7,012

Jacksonville (Fla.) Electric Company.

September—	1907.	1906.
Gross earnings	\$32,651	\$26,968
Net earnings	10,821	9,488
Surplus over charges	5,969	6,155

Northern Ohio Traction & Light Company, Akron, O.

October—	1907.	1906.
Gross earnings	\$155,291.25	\$134,889.97
Operating expense	92,701.18	80,053.74
Net earnings	62,590.07	54,836.23
Fixed charges	43,368.85	39,548.40
Surplus for stock	19,221.22	15,287.83

Twin City Rapid Transit Company.

October—	1907.	1906.
Total earnings	\$515,177.73	\$473,821.20
Total operating expense	255,587.25	226,435.52
Net earnings	259,590.48	247,385.68
Deductions	132,641.67	114,758.32
Surplus	126,948.81	132,627.36
January 1 to October 31—	1907.	1906.
Total earnings	\$5,055,450.52	\$4,691,258.75
Total operating expense	2,436,023.76	2,177,485.39
Net earnings	2,619,426.76	2,513,773.36
Deductions	1,169,383.36	1,118,911.13
Surplus	1,450,043.40	1,394,862.23

The charge for taxes in October, 1907, was \$45,000, comparing with \$27,000 in October, 1906. The increase is caused by the addition of an amount necessary to cover the increase in taxes for 1907, due to increase in the tax levy.

Whatcom County Railway & Light Company, Bellingham, Wash.

September—	1907.	1906.
Gross earnings	\$29,032	\$23,369
Net earnings	10,984	7,527
Surplus over charges	4,454	3,768

Dividends Declared.

Chattanooga (Tenn.) Railways Company, preferred, quarterly, 1½ per cent.
Norfolk (Va.) Railway & Light Company, 1½ per cent.
Pensacola (Fla.) Electric Company, preferred, 3 per cent.
Rochester (N. Y.) Railway, common quarterly, 1 per cent.

Manufactures and Supplies

ROLLING STOCK.

Fargo & Moorehead Street Railway, Fargo, N. D., is in the market for one double-truck flat car.

Hull Electric Company, Deschenes, Que., is having five cars built by the Ottawa Car Company.

Trinidad Electric Railroad, Trinidad, Colo., is building a double-truck electric locomotive in its own shops.

Bartlesville Interurban Railway, Bartlesville, Okla., is reported as placing contracts for a number of new cars.

Columbus Railway & Light Company, Columbus, O., it is reported, will soon place an order for cars for 1908 and 1909 delivery.

Toronto & York Radial Railway, Toronto, Ont., is equipping six 60-foot passenger cars, which were built in its own shops, with motors.

Springfield Railway, Springfield, O., is having six single-truck cars built by the G. C. Kuhlman Car Company. Delivery will be made in December.

Benton & Fairfield Railway, Fairfield, Me., has just finished the construction of a motor car in its own shops. This car will haul freight and, when necessary, will be utilized as a snow plow.

Southwest Missouri Electric Railroad, Webb City, Mo., has built eight double-truck passenger cars in its own shops. Following are some of the details of these cars:

Seating capacity.....	46 passengers	Length of body.....	32 ft.
Weight	48,000 lb.	Over vestibule	42 ft.
Wheel base	6 ft.	Over all	43 ft.
Width, inside	7 ft. 10 in.	Body	Wood and steel
Over all	8 ft. 9 in.	Underframe	Steel

Special Equipment.

Air brakes	Heating system.....	Electric
.....General Electric Co.	Headlights	
Control system .....	.....General Electric Co.	
Couplers	Interior finish.....	
Curtain fixtures .....	.....Weathered oak	
.....Curtain Supply Co.	Markers	Taylor
Curtain material	Motors	4 GE 70
Gears and pinions	Seats	Hale & Kilburn
.....General Electric Co.	Trucks	Taylor
Hand brakes	Varnish	Murphy

SHOPS AND BUILDINGS.

Portland (Ore.) Railway Light & Power Company.—This company will build a passenger and freight station at Jefferson and First streets, Milwaukie, Ore.

Winona Interurban Railway, Winona Lake, Ind.—A brick addition, 60 by 80 feet, is being built to the shops at Winona Lake.

TRADE NOTES.

William Wharton, Jr., president of William Wharton, Jr., & Co., Philadelphia, Pa., died in Philadelphia on November 26 at the age of 78 years.

Schoen Steel Wheel Company, Pittsburg, Pa., has elected W. Martin Johnson second vice-president in charge of sales, with headquarters in the New York office at 11 Broadway.

Pay-As-You-Enter Car Company has established an office at 26 Cortlandt street, New York City. Duncan McDonald is president of the company and Thomas W. Casey is manager.

Archbold-Brady Company, Syracuse, N. Y., has received a contract from the Oneida (N. Y.) Railway for two electrically equipped transfer tables. These tables will be 60 feet long, with a carrying capacity of 50 tons.

Central Inspection Bureau, 17 State street, New York City, has received an order from the Royal Securities Corporation of Canada to inspect eight 9-bench open cars for the Camaguey Tramway Company of Cuba. These cars will be built by the St. Louis Car Company.

Russell Car & Snow-Plow Company, Ridgway, Pa., manufacturer of snow-fighting equipment for use on steam and electric railways, reports an excellent business with electric railways, having recently sold equipment to the Montreal Street Railway, Chicago Lake Shore & South Bend Railway, Jersey Central Traction Company, Templeton Street Railway,

Hanover & York Street Railway, with daily inquiries and very favorable negotiations with many other electric railways. The adjustable detachable steel noses designed upon the lines of the fronts of the steam road snow plows, which have stood the test for years and demonstrated their effectiveness, furnish an equipment at moderate cost for the electric railways, and the orders and inquiries show the appreciation of the same.

R. F. Hayes, western representative of the Curtain Supply Company, Chicago, has been appointed to succeed A. L. Whipple as eastern manager, with headquarters in New York. Mr. Whipple's resignation was noted in the Electric Railway Review of November 23.

Allis-Chalmers Company, Milwaukee, Wis., has engaged for its office in St. Louis, Mo., a new suite of offices located at 1302-1304 Third National Bank building, where the company's district manager, F. L. Bunton, and the salesmen of his staff will be prepared to receive visitors after January 1, 1908.

William S. Love, who for the past eight years managed the business of the Wheeler Condenser & Engineering Company in the central west, and who has been in New York for the last year as general sales manager of the company, will resume charge of the Chicago office of the company at 1137 Monadnock block, on January 1, 1908.

Dominion Dump Car Company, Limited, Montreal, Que., owner of Canadian patents for the Hart convertible side and center ballast cars and the Otis drop-bottom dump, coal and ore cars, has, by supplementary letters patent, issued by the secretary of state of Canada, under date of October 24, 1907, changed its name to the Hart-Otis Car Company, Limited.

The J. G. Brill Company, Philadelphia Pa., has been given a gold medal, the highest award at the Jamestown exposition, for the excellence of the Brill convertible and semi-convertible cars; Brill No. 27 truck for high-speed service; No. 21-E truck for city service, and the award also includes other types of Brill trucks, cars, the Brill "noiseless" brake hanger, track scraper and other patented specialties.

Wheeler Condenser & Engineering Company will remove its general offices from New York to the works at Carteret, N. J., on January 1, 1908, and all the present New York employees will be transferred there. The company is erecting a very extensive addition to the present office building in Carteret to accommodate the increased force and to provide room for the executive offices. The drafting room will be enlarged and occupy practically the entire upper floor of the office building, while additional room will also be provided for the engineering department proper. A kitchen from which luncheon will be served at noon will add to the comfort and convenience and also give that opportunity for the heads of departments to meet daily which has been found of such value and help in similar large establishments.

Allis-Chalmers Company, Milwaukee, Wis., makes public at this time a statement of shipments made by it for the six months preceding November 1, which carries more than ordinary interest and significance. During that period this company sent out machinery on orders as follows: May, 23,772,242 pounds; June, 22,139,757 pounds; July, 24,225,760 pounds; August, 26,006,434 pounds; September, 26,268,764 pounds; October, 27,821,682 pounds. From these figures it will be seen that the receipt and installation of machinery by industrial, lighting and power companies indicate continued progress. It required nearly 5,000 cars to transport the 150,234,639 pounds of machinery mentioned above from the works of Allis-Chalmers Company to the various places where it was to be installed and operated, and even more than this number of cars was used in bringing in the raw materials, fuel, lumber for patterns, etc., which are necessary in the manufacturing process.

Ball & Wood Company, Elizabethport, N. J., has added to its well-known engine business a line of high-grade air compressors of a new and advanced type, designed to meet the modern requirements of air compressing machinery equal in material and workmanship to the highest class of steam engine construction. These compressors are the product of the long experience of the company in the design and manufacture of engines, combined with important new improvements in the air compressing elements of the machine. They are liberally designed, with large bearings and wearing surfaces, rigid frames, effective lubrication, ample valve areas and intercooling capacities, securing compressors which operate with minimum noise and friction and at the highest economy. Owing to the increased efficiency and capacity of these machines it is possible to offer them at a price based on actual capacity. The company invites inquiries and in-

vestigation. The New York office of the Ball & Wood Company is at 17 Battery place.

ADVERTISING LITERATURE.

Allis-Chalmers Company, Milwaukee, Wis.—Bulletin 1037, entitled "Testing Alternating-Current Generators," describes a method perfected after many years of experimenting whereby the machines are subjected to full load conditions without actually being put under full load.

Westinghouse Machine Company, Pittsburg, Pa.—A handsome 32-page catalogue with an attractive cover in colors is devoted to "Westinghouse Storage Batteries for Portable Use." A large number of fine halftones are used to illustrate the various types. Complete installations are made for any service.

Western Tube Company, Kewanee, Ill.—Following the encouragement received at the conventions of the American Street and Interurban Railway Associations last month at Atlantic City, this company is sending to all those whose names were secured at the convention some excellent literature regarding the "Kewanee" union. The company offers to send a sample union for trial on receipt of 10 cents in stamps.

SELF-LUBRICATING TROLLEY WHEEL.

The problem of providing a wheel current collector with sufficient life to withstand the service of high-speed interurban cars has recently received marked attention. To meet the severe requirements imposed under present operating conditions the Recording Fare Register Company, New Haven, Conn., is now making a self-lubricating wheel in three sizes, 4, 4½ and 5½ inches in diameter, composed entirely of new metal, of which 88 per cent is copper and to which, it is stated, no lead is added. Owing to the improved design of these wheels no lubrication is required during their life. The wheels are shipped from the factory filled with oil so fed to the bushing that the supply will last until the rim of the wheel wears out.

The method of lubricating the wheels is interesting. They are provided with an oil chamber and the bushings are made in two sections, between which is placed a felt washer. The felt presents a wiping surface for the spindle and draws the oil from a chamber recessed in the body of the wheel, thus insuring the desired lubrication without flooding. The bushings used are perfectly smooth, without grooves or channels, and thus afford an increased bearing surface over other types in which inserts of graphite or anti-friction metals are placed.

In the pamphlet describing these wheels the manufacturer cites that inasmuch as the bushings contain no lubricating fillers or grooves the entire area of the inside of the bushings is available for carrying current. As a result of this and the continuous oiling of the felt washer the bushings of the new wheels are said to outwear the rims, and, therefore, do away with the expense for rebushing the ordinary types of wheels.

INCREASING USE OF GRAPHITE PAINT.

The most casual observer cannot have failed to notice that within the past decade there has been a very radical change in the color of the coatings applied to railroad bridges, viaducts and other steel structures for the purpose of protecting them from corrosion and the elements. The change has been from reddish brown to grayish black. It is claimed that the reason for this is that the most exhaustive research, both theoretical and practical, has disclosed the fact that the natural form of carbon, graphite, is now recognized throughout the world as the pigment best meeting all of the many and varied requirements essential to the production of paint that will effectually protect under all conditions the surface which it covers.

Graphite is an inert substance said to be absolutely unaffected by extreme heat, frost, steam, water, sulphur fumes, acids, alkali, brine, or, in fact, by any climatic or chemical condition, and these properties, together with its natural affinity for oil, its ability to withstand extremes of temperature, its density, the ease attending its application and the resulting saving of labor, its remarkable covering power and the consequent reduction in first cost, and last, but not least,

its long life, which eliminates the annoyance and expense of frequent repainting, render it an ideal paint for either the primer or weather coats.

But to give this service in the greatest degree it must be pure, finely pulverized and thoroughly ground in the best of linseed oil. Graphite paint is desirable in exact proportion with its purity and to be of unquestionable quality its pigment should analyze not less than 85 per cent of graphitic carbon of the amorphous variety, preferably Mexican graphite, the remaining 15 per cent to consist principally of such silica as is naturally carried by the ore from which it is ground.

The United States Graphite Company, Saginaw, Mich., miner of graphite and manufacturer of graphite paint, has issued a very interesting booklet "About Graphite Paint," which, upon request, will be sent to those interested in this subject.

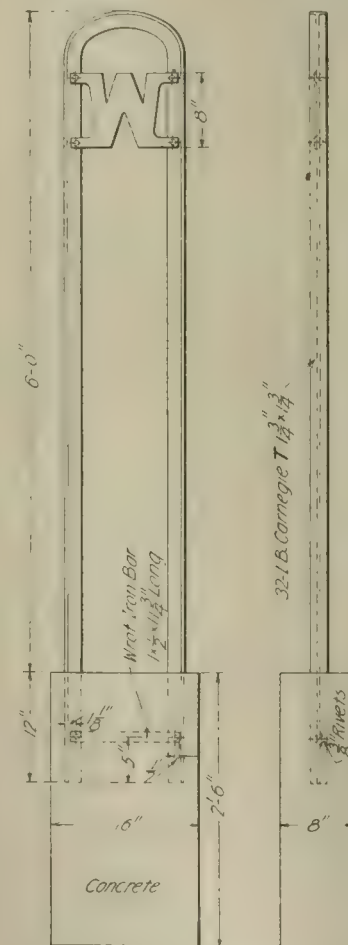
THE CONTINENTAL WHISTLING POST.

It is now possible to replace the familiar white tombstones with their black "W" and "R" that appear along railways at crossings and cuts by durable, cheap and attractive steel whistling posts. The Continental post has been designed especially to reduce the high cost of maintenance, to give longer life to the post and to keep the first cost as near that of the wooden post as possible.

The post is made by bending a Carnegie 32-pound T-section, 1¾ by 1¼ inches, into an inverted U-shape, 7 feet long and 13 inches wide outside, and mounting it in a concrete base. Five inches from the open end a wrought-iron bar 1 by ½ inch is riveted to connect the legs, and this also serves to anchor the arch in the base. The base is 8 by 16 by 30 inches, the steel being embedded 12 inches.

The letters "W" and "R" for these posts are stamped from ¼-inch sheet iron and are 8 inches high with a width of line 1½ inches.

The claims for this post are that, being made of structural steel, it will outlast the wooden post by many years; it will reduce the amount of paint used to maintain the posts by at least 75 per cent; it will reduce the amount of time necessary to properly maintain the posts by at least 75 per cent; the letters will be silhouetted against any background in winter or summer; snow cannot drift against it; letters can be held in stock and new ones attached to a post at any



The Continental Whistling Post.

time; in all weather and under all conditions it will be efficient as a warning to the engineer.

This device is the invention of E. D. Hillman, mechanical engineer of the United States Metal & Manufacturing Company, New York, which company will shortly place the post on the market.

Lawrence Cement Company, 1 Broadway, New York.—"Dragon Portland Cement" is the title of a 128-page illustrated catalogue issued as a 1908 edition. This number is of unusual interest, containing an early history of Portland cement, its normal composition, the discovery and evolution of cement manufacture in the United States, standard tests and the application of breaking strain. The uses and economies of Portland cement are outlined in a concise article, with illustrations showing an unusual application. Several pages are devoted to general information, presenting the correct qualities and quantities necessary to good cement use. A large number of testimonials and a list of over 40 railways which have used the "Dragon" Portland cement are also included.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 23

CHICAGO, DECEMBER 7, 1907

WHOLE No. 241

TABLE OF CONTENTS.

Editorial:	Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	902
Forestalling Accidents in Omaha.....	News of the Week:	
—Conflict of Authority in New York.....	—Traffic Conditions in London.....	903
—The Graftor and the Street Car.....	—New York Public Service Commission.....	903
—Law to Curb Ambulance Chasers.....	—Cleveland Electric Railway Accepts Plan of Settlement.....	903
—Branch Routes and Schedules.....	—Early Operation of New York Tunnels Announced.....	904
—Shorter Stops—Less Crowding.....	Construction News:	
—Progress on a New Accounting System.....	Franchises.....	905
The Milwaukee Northern Railway (Illustrated).....	—Recent Incorporations.....	905
Spokane & Inland Shops (Illustrated).....	—Track and Roadway.....	905
Suggestions for Facilitating Subway Traffic in New York City—	—Power Houses and Substations.....	906
Preliminary Report of Bion J. Arnold.....	Personal Mention.....	907
A Method of Comparing Transportation Facilities.....	Financial News.....	908
Maspeth Car House and Shops, Brooklyn Rapid Transit Company (Illustrated).....	Manufactures and Supplies:	
Additional Statements Regarding the Proposed Central Electric Traffic Association.....	—Rolling Stock.....	909
Work of the Committee on Uniform Accounting System for Electric Railways.....	—Shops and Buildings.....	909
Annual Reports.....	—Trade Notes.....	909
The Dallas Interurban Electric Railroad (Illustrated).....	—Advertising Literature.....	909
Piping and Power Station Systems—LXV. By W. L. Morris, M. E. (Illustrated).....	Works of the General Railway Signal Company at Rochester, N. Y. (Illustrated).....	911
	A Business Man's Letter on Confidence.....	914
	Directory of Electric Railway Associations.....	914

The best method of avoiding an evil is to remove, so far as possible, the probable causes of that evil. The principal cause

Forestalling Accidents in Omaha.

of street railway accidents is carelessness on the part of the passengers. This policy of preventing accidents by eliminating the causes has been adopted by the Omaha & Council Bluffs Street Railway. In a previous issue of the Electric Railway Review was noted the company's plan of educating the public by inserting in the daily papers advertisements calling attention to the proper and improper methods of boarding and alighting from cars. Last week the company instituted a campaign of education for its employees. A smoker for the conductors and motormen employed on one of the day runs was held in the evening at one of the car houses and the men were addressed by four officers of the company, who gave 10-minute talks on the subject of prevention of accidents. Each man was also presented with a 37-page book on the subject, written by a practical street railway man. It is hoped by these meetings to arouse the men to a greater interest in their work and thus to provide greater safety to the traveling public. Similar meetings will be held for the other divisions and all the men will be given an opportunity to attend. The men all showed an interest in the meeting and paid the strictest attention to the suggestions of the officers, and it is believed that the results of the plan will be valuable.

It appears that the courts will settle the intricate question involved in the appointment of both federal and state receivers for the New York City Railway and the Metropolitan Street Railway. The receivers appointed by Judge Lacombe of the United States circuit court on September

Conflict of Authority in New York.

24 are in possession of the property, and Justice Seabury of the New York state supreme court expressly directed the receivers whom he appointed on the petition of the attorney-general to present the question of jurisdiction in an orderly fashion to the United States court; in the meanwhile they are not to interfere with the federal receivers in any other way than by due process of law. The attitude of

the federal receivers is indicated by the statement of Adrian H. Joline, one of the receivers, that if there is any interference the courts will have to settle the questions concerned. In his decision Justice Seabury declares that there is no principle more firmly fixed in English and American jurisprudence than that the state which gave can alone take away the life and privileges of a corporation. He also declared that the proof before the court establishes beyond all question that the New York City Railway Company for several years past had virtually been in a condition of insolvency and that its insolvency had been continuous and progressive. The question at issue rests primarily on the right of the federal court to jurisdiction. The fact of insolvency is not questioned, and the charge of collusive action in the receivership is subordinated to the other issue involved.

A few of the petty difficulties encountered by the public service corporation in its dealings with the public are illustrated by some recent experiences of the Chicago

The Graftor and the Street Car.

City Railway Company. These experiences serve to show to what depths of wantonness and malicious mischief the popular prejudice against corporations permits people to descend. A city ordinance requires the company to provide each car with a thermometer, presumably for the accommodation of patrons who wish to be reminded when the car is too warm or too cold, so that they may complain of the poor service. Of late these thermometers have proved attractive objects for the attention of souvenir hunters or kleptomaniacs and large numbers of them have disappeared. Other persons, in whom the collecting instinct has not been so strongly developed, have discovered an interesting way of getting diversion, as well as a ride for a nickel, by heating the thermometers with lighted cigars until the mercury exercises its natural propensity and bursts the glass. The mother-of-pearl push buttons, placed in the window posts opposite the seats, to enable passengers to indicate their desire to get off, have also presented attractions as souvenirs. Such persons are in the class of the man who vents his spite on the telephone company, in case the apparatus fails to return his coin.

by breaking off a part of the instrument and throwing it away, so that "the company won't make any money out of him." They are worse than the man who is so intent on his paper that he forgets to pay his fare. They belong to the category of sneak thieves. We are gratified to learn that the Chicago detective force is taking steps to stop their operations.

The practice of ambulance chasing will be discouraged by a new law in Massachusetts. This law, which has become

**Law to Curb
Ambulance
Chasers.**

effective, is "an act to prohibit the soliciting of employment by attorneys-at-law." In brief, it provides that no attorney-at-law shall solicit through any agent a person to employ him to present a claim for

damages, nor shall he give to any physician or other person any money or personal advantage in consideration of his employing such attorney to prosecute a claim. While the penalty for violation is not severe, the act will undoubtedly be more effective because of the provision that an attorney who has violated the act may, in the discretion of the court, be disqualified from further acting in the suit, while the court may deny the right to collect costs, wholly or in part, to any party to the suit involved. A law of this character takes nothing away from the legal position of those who have just claims for damages and it affords some protection to corporations; it is a step in the right direction.

BRANCH ROUTES AND SCHEDULES.

Conditions of population and topography determine the location of practically all electric railways built on private right of way. In the choice of routes consideration is seldom given to the arrangement of schedules; for commercial reasons the arbitrary factors must be recognized in planning a road. While few roads can be so laid out as to permit the best possible arrangement of schedules, it is nevertheless interesting to consider the operating advantages offered by a road which, leaving a large city over a single route, divides at, say, 25 miles from the city into two radiating extensions serving more sparsely populated communities than those through which the single route near the city passes.

Such a typical arrangement of lines exists in the instances of the Aurora Elgin & Chicago and the Milwaukee Northern railways. The latter road is described and illustrated on other pages of this issue. Each of these roads has two branches which unite and approach a large city by a single route about 25 miles long; the route, formed like the letter "Y," will appeal to students of operating conditions. It is generally found that more frequent service is desirable on the portion of any railway near a large city and that the headway on the outlying end of the line need not be so short. Should a line not branch, as in the instances cited, a variation in headway can be obtained only by turning some cars at the limits of the more closely settled territory. On an inter-urban line with large cars, designed for fast travel, these short runs sandwiched between through runs complicate the handling of trains and passengers.

If two outlying branches join to approach a terminal city on one track or on a double-track line, the problem of offering frequent service near the large terminus and less frequent service for outlying branches becomes simple; the arrangement lends itself very readily to the running of cars on headways most suitable for the traffic handled.

If service on a 60-minute headway is sufficient for the branch ends of a route the cars may be dispatched from one outlying terminus on the even hour and from the other on the half hour, each car running through independently to the large terminal city. With branch ends of a route of equal lengths the trains so dispatched will pass on the single-route

portion of the system and operate over it on a 30-minute headway. Should traffic not warrant so short a headway the time between trains may be doubled and a 2-hour service given the outlying districts with a corresponding 1-hour service near the large city. The desired feature is accomplished in either instance and a headway varying with the traffic is afforded, while there is the least possible complication of operating conditions.

The increased flexibility of operation attainable on branching routes, as outlined, is worthy of thought when the advisability of building branch lines to connect with interurban roads already in operation is under consideration.

SHORTER STOPS—LESS CROWDING.

The subway traveler in New York City will feel that "seats for everybody" service is far from an immediate realization when he reads the terse summary of operating conditions in his city as presented in the recent report made by Bion J. Arnold, at the request of the public service commission, first district of New York. Mr. Arnold says: "As soon as the service of the subway becomes improved, either by providing additional seating capacity or more rapid service instead of service creating additional comforts to those who are now riding, more people will be attracted by this superior service, and the applicants for seats will outnumber the available seats in practically the same ratio as at present." Underlying this statement is the obvious thought that the traveling public of New York City can ultimately be accommodated only by the construction of more lines of transportation. The report referred to, while preliminary in its nature, includes a number of recommendations and suggestions that throw new light on train-handling methods for overcrowded tracks.

The subway traffic in New York City is such that although the timecard calls for a headway of two minutes between express trains in lower Manhattan, operating conditions have not permitted the requirements of this schedule to be fulfilled. Instead of 30 express trains per hour leaving the Grand Central station at Forty-second street for the north end of the city, but 25 can be operated. This crowded condition, it is thought, can be relieved by a variation in the method of loading and a change in the block signaling circuits at express stations.

A radical method for governing the loading of traffic is suggested. At the present time express trains running north stop at the stations south of Forty-second street long enough to fully load the cars. The time required for this complete loading of trains is about 65 seconds for each stop, while if the schedules are to be fulfilled 45 seconds is the maximum length of stop allowable. By regulating the loading at the Brooklyn bridge and Fourteenth street stations, and, instead of crowding the cars, allowing a train to remain at the platform only a definite length of time, it will be possible to pass more trains over the route. As a result of shortening the time at stations the trains will not be so fully loaded when they arrive at Forty-second street and the present delays occasioned by the slow movements of passengers alighting from crowded cars will not exist to so great an extent. Mr. Arnold in his report to the commission suggests that if this method of limiting the time at station stops were adopted, and if the block signaling system were so changed that a train approaching a station might not be withheld from the platform until the last car of the leaving train ahead had passed the end of the platform, the capacity of the subway could be increased fully 25 per cent.

These recommendations, made after a study of operating conditions on the most heavily traveled line in this country, suggest a lesson applicable to service on city transportation lines. The downtown routes in our larger cities become congested because each car, with few exceptions, must stop at

every intersecting street, and the time required for these stops becomes a large proportion of the total time required for operating through the crowded districts.

Any feasible method for reducing the time required to load and unload passengers will thus tend greatly to relieve congestion and incidentally to reduce the power demand. Here is one of the primary reasons why the open or summer car has won favor wherever operated. Such cars cannot be used in winter, but their desirable feature of quick loading and unloading is approached in cars having extra wide entrances, both front and rear, or center side entrances, as used in a few of the larger cities. The pay-as-you-enter type of car also is said to reduce the total time required for stops about 45 per cent. While it would be impracticable on surface systems to limit the time during which a car should stop to load, the results that may be obtained by this practice on the New York subway illustrate how advisable it is that transportation officials impress upon their car crews the desirability of being on the alert to use every means in accelerating the loading and unloading of traffic.

PROGRESS ON A NEW ACCOUNTING SYSTEM.

Various causes have made necessary the present consideration of a new classification of operating expenses for electric railways. Through committees the American Street and Interurban Railway Accountants' Association has been engaged for some months in the preparation of a new classification. A committee of the Street Railway Association of the State of New York also has formulated a tentative classification. Although the division of statistics and accounts of the interstate commerce commission has been actively at work for over a year upon the new accounting system for steam railways, it has signified on several occasions its intention to prescribe a system for electric railways within its jurisdiction. Whatever action is taken by the interstate commerce commission is of especial importance in New York state because of the provision in the New York public service commissions law that "the system of accounts established by the commission and the forms of accounts, records and memoranda prescribed by it shall conform as nearly as may be to those from time to time established and prescribed by the interstate commerce commission." The New York public service commission must prescribe a system by December 31. All these varied interests are represented on the committee which has been meeting in Washington.

As stated in another part of this issue, the committee has formulated two classifications which will be submitted to the conference called for December 10. One of these classifications is similar to the standard interstate commerce commission classification for steam railways; the other follows more closely the existing practice of electric railways.

The classifications of operating expense accounts which were under consideration by the committee include the tentative classification of the American Street and Interurban Railway Accountants' Association, which is now in the hands of the committee on "Standard Classification of Accounts and Form of Report"; a tentative classification prepared by a committee of the Street Railway Association of the State of New York; and a tentative classification for electric railways submitted by the interstate commerce commission. The classification which represented the views of the New York state committee was submitted in pamphlet form; in parallel columns there were shown the primary accounts and the corresponding primary accounts in the tentative interstate commerce commission electric railway classification and in the standard interstate commerce commission classification for steam railways.

The classification suggested by the New York state committee differs in many respects from the classifications of the Accountants' association and of the interstate commerce com-

mission, either electric or steam. A list of the primary accounts of the tentative Accountants' classification was published in the Electric Railway Review of November 2, 1907, page 735. The principal features of the New York classification are:

The general accounts cover: I. Way and structures. II. Equipment. III. Transportation (power plants). IV. Transportation (operation cars). V. Transportation (miscellaneous). VI. Traffic. VII. General. There are 46 primary accounts, with a number of subaccounts; under "Maintenance, Way and Structures," for instance, there are 12 subaccounts numbered A to L, inclusive. "Removal of Snow and Ice" (which the interstate commerce commission classifies as a maintenance expense) is placed under "Transportation," following the recommended practice of the Accountants' association. Under the primary account, "Maintenance Electric Line," seven subaccounts are given. Under "Buildings, Fixtures and Grounds" there are 11 subaccounts. "Maintenance Power Plant Equipment" comprises nine subaccounts, and under "Maintenance Substation Equipment" are three subaccounts. The maintenance of equipment primary accounts cover (1) revenue cars, (2) electrical car equipment of revenue cars, (3) miscellaneous equipment. Under each of the two former of these maintenance of equipment accounts there are 14 subaccounts numbered A, A-1, etc., and including separate accounts for material and labor for each class of equipment. "Maintenance of Miscellaneous Equipment" covers work cars, snow equipment, electric locomotives, horses, vehicles, automobiles, etc. The primary account, "Wages Power Plant Employees," provides separate subaccounts for different classes of power plants. There is one primary account for "Loss and Damage Traffic"; no subdivision is made between freight and baggage. A primary account for "Injuries and Damages" does not contain the subdivisions given in the interstate commerce commission classifications covering property, stock and persons. "Taxes" is subdivided into: A. Real property. B. Personal property. C. Earnings. D. Special franchises. E. Miscellaneous.

The tentative classification for electric railways prepared by the interstate commerce commission follows closely the form of the classification prescribed beginning July 1, 1907, for steam railways. It contains 103 primary accounts, with the following general accounts: I. Maintenance of way and structures. II. Maintenance of equipment. III. Traffic expenses. IV. Transportation expenses. V. General expenses. This classification provides for the same three primary accounts covering maintenance of different classes of equipment which are embodied in the steam railway classification—repairs, renewals and depreciation.

One point of difference between the New York and the interstate commerce commission classification raises the question of outside operations. The New York classification regards "Dining, Buffet, Parlor and Sleeping Car Service" as an operating expense account. As the interstate commerce commission tentative electric railway classification does not provide specifically for operations of this character, it is presumably the idea of the commission that the revenues and expenses of such cars should be treated under outside operations, following the prescribed practice for steam railways.

The final result of the deliberations in which the various interests are participating will have an important effect upon electric railway accounting.

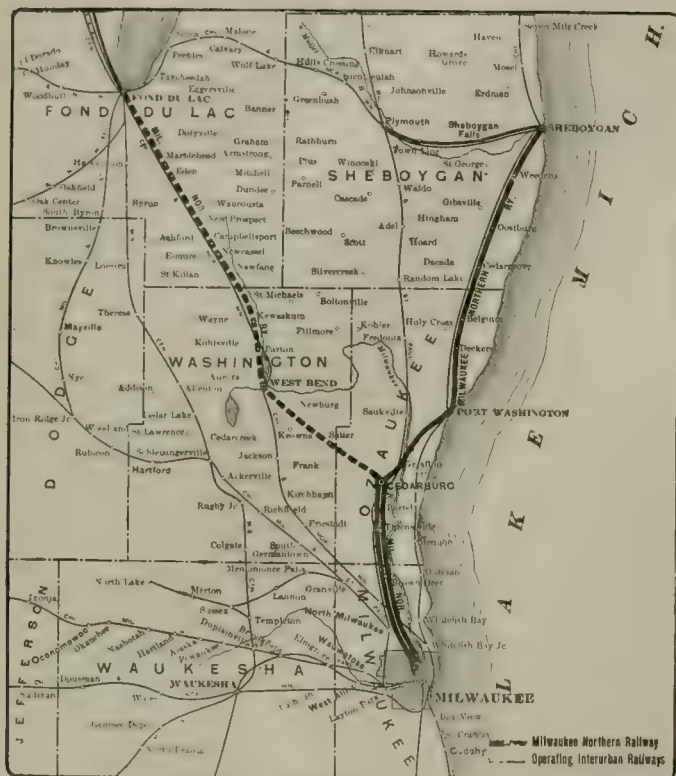
The annual report of the Minneapolis & St. Louis Railroad for the year ended June 30, 1907, says that earnings from the transportation of passengers would have shown a considerably larger increase over the previous year had it not been for active competition by trolley lines for local traffic between the cities of St. Paul and Minneapolis and Lake Minnetonka points and between the cities of Des Moines and Perry, Ia.

THE MILWAUKEE NORTHERN RAILWAY.

The Milwaukee Northern Railway Company began operating cars from its terminal station in Milwaukee to Cedarburg, Wis., on October 28 of this year. A few days later service was extended to Port Washington, distant 28.5 miles from Milwaukee. This system will ultimately connect Milwaukee

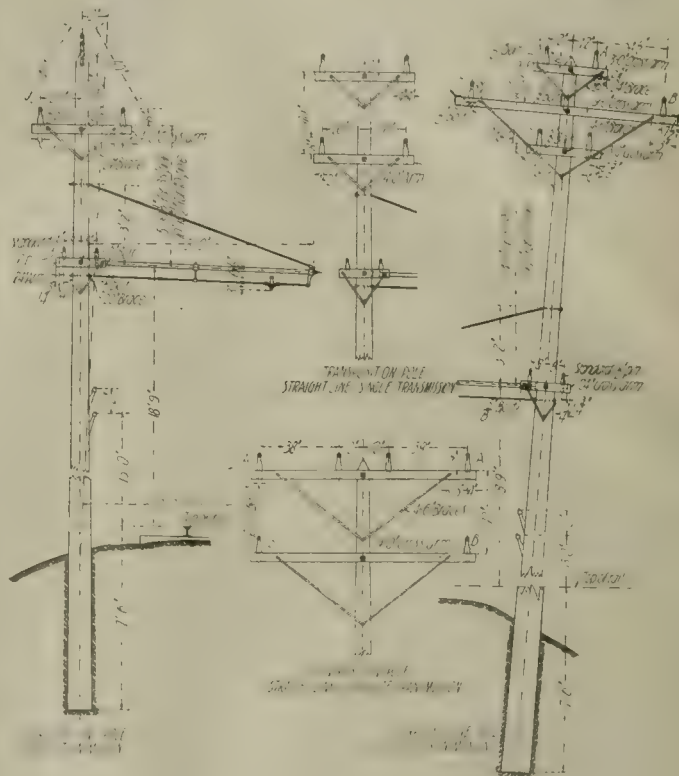
line on the map from Cedarburg Junction to Fond du Lac. The territory made tributary to Milwaukee by that part of the road, now nearly completed, has a population of 100,000 and the northern terminus, Sheboygan, a substantial agricultural and manufacturing center, has a population of about 30,000.

The preliminary surveys for the Milwaukee Northern



Milwaukee Northern Railway—Map of Territory Served, Showing Operating and Proposed Lines.

with Sheboygan and Fond du Lac. Reference to the map of the route will show the territory which the completed system will serve. At the present time one track from Milwaukee



Milwaukee Northern Railway—Details of Pole Top Construction for Single and Duplicate Transmission Circuits.

Railway were begun on October 10, 1905, and during the two years following all franchises, including that for entrance to Milwaukee, were secured, the construction work completed



Milwaukee Northern Railway—Viaduct over St. Paul Railway Tracks and Cedarburg Highway.

to Port Washington is in operation. About 75 per cent of the construction work has been completed on the Sheboygan extension and a second track between Milwaukee and Cedarburg. The distance from Port Washington to Sheboygan is 27.7 miles. All surveys and engineering work have been completed on the 43-mile division indicated by the dotted

and the road placed in operation. The preliminary work and the financing and construction work were executed by the Comstock-Haigh-Walker Company, Detroit, under the direct supervision of F. W. Walker as engineer.

The Milwaukee Northern company is affiliated with the Sheboygan Light Power & Railway Company and the opera-

tion of both roads is under the management of Ernest Gonzenbach, who has been general manager of the Sheboygan properties during the past three years.

Roadbed and Bridges.

With the exception of 3.25 route miles in Milwaukee, 1,000 feet in Grafton and 1,500 feet in Port Washington, all of the track of the new road is laid on a private right of way. The franchise in Milwaukee expires in 1934 and the franchises in Grafton and Port Washington are for a term of 50 years.

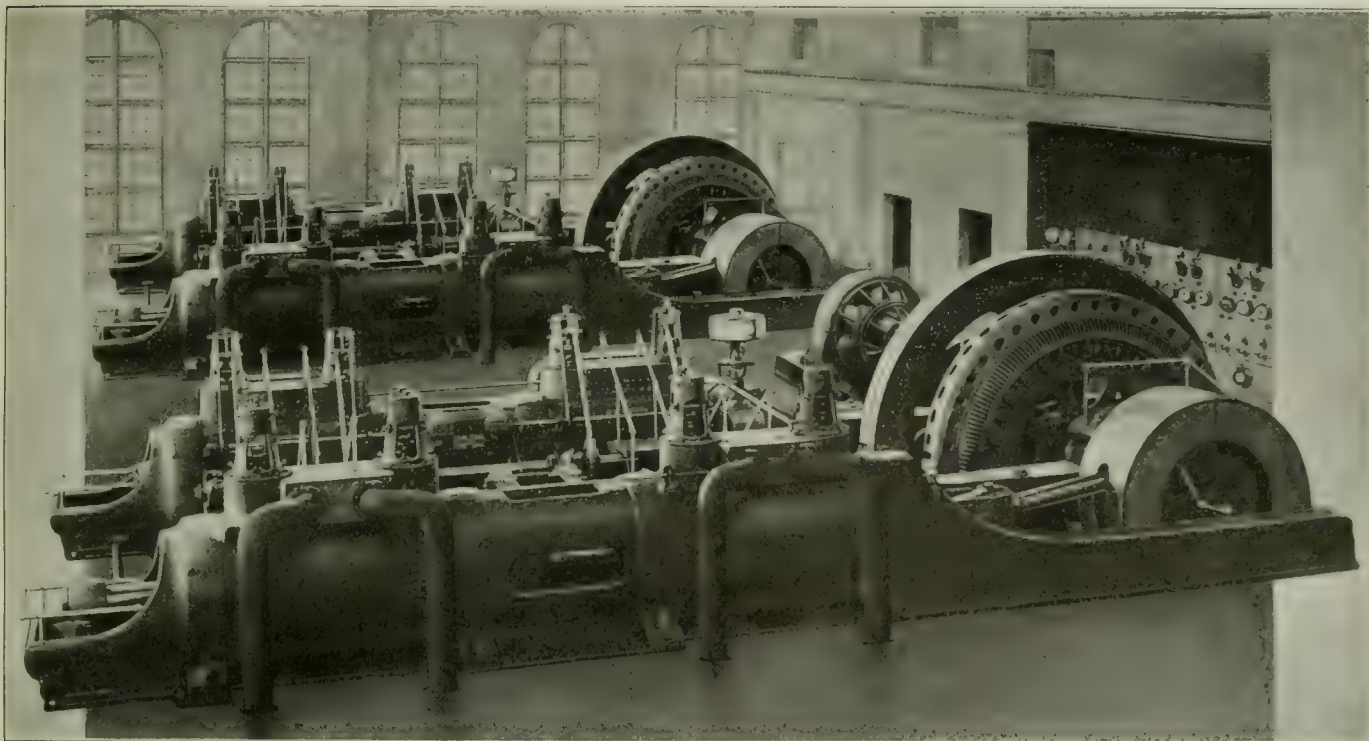
Entrance to Sheboygan will be had over the tracks of the Sheboygan Light Power & Railway Company, so that the cars may operate to the latter company's terminal station in the center of the business district of that city. At Fond du Lac, when the proposed extension is completed, the cars will reach the center of the city over the tracks of the Eastern Wisconsin Railway & Light Company.

The track construction in the city of Milwaukee, which comprises 3.25 miles of double-track structure, is laid with

ments. There are no wooden roadbed structures on the line. The several waterways are crossed by the following types of bridges: Three 123-foot 5-inch through truss spans, one 85-foot and one 75-foot deck plate and a number of similar spans 45 feet and less in length.

Inasmuch as it is expected to double-track the route between Cedarburg and Milwaukee as soon as the Fond du Lac division has been built, the Cedarburg viaduct has additional foundations and gusset plates provided for a parallel structure to carry a second track. It is noted that in the construction of the first track on this section of the route the abutments for bridges and 75 per cent of the grading already have been completed preparatory to double-tracking.

Within the city limits of Port Washington the track of the electric road passes under that of the Chicago & Northwestern Railway through a subway spanned by a ballasted floor through girder structure. The separation of grades at this point required one mile of earth work averaging either a 15-foot cut or fill; but the expenditure in turn provided a high-



Milwaukee Northern Railway—Gas Engines Driving Generators in the Port Washington Power Station.

95-pound 7-inch T-rails having a 3-inch head. The joints are cast welded by the Heil process. That portion of the track construction laid in paved streets is supported on a bed of concrete and outside the pavement the ties are ballasted with six inches of crushed rock. In Port Washington the track built in the city streets has the same design and rail as that in Milwaukee, which is laid in unpaved streets. The Columbia Construction Company built all the track within the city of Milwaukee.

The private right of way outside of Milwaukee has a minimum width of 66 feet and additional land was purchased wherever necessary for wide cuts and fills. The roadbed has been permanently constructed and the steam roads intersected are not crossed at grade. This feature will assist high-speed operation. Two miles south of Cedarburg the electric line passes over the Cedarburg plank road and the Chicago Milwaukee & St. Paul track on a viaduct 765 feet long. An illustration of this structure accompanies this article. The main street of the town of Grafton and the tracks of the St. Paul Railroad are likewise crossed on a viaduct 654 feet long. Both of these structures are of steel with concrete piers and abut-

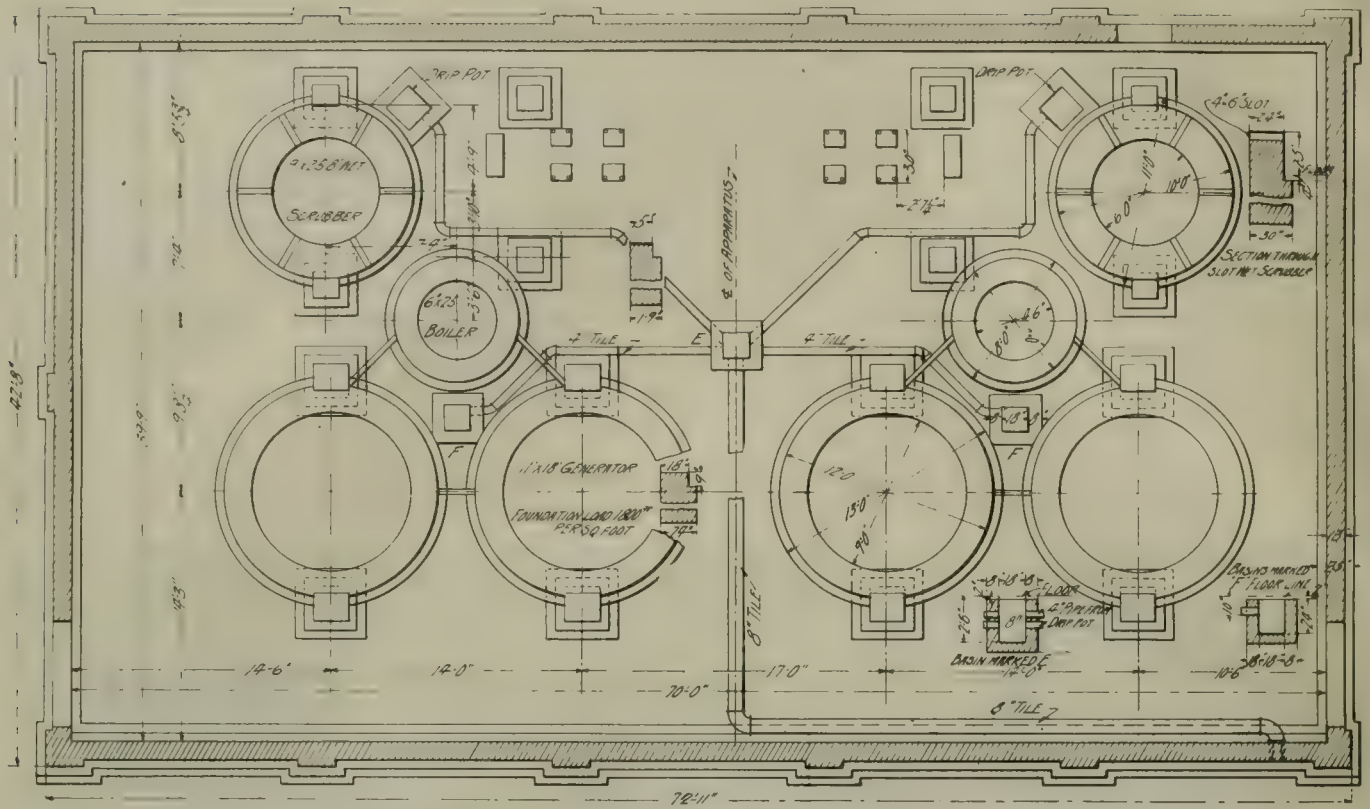
speed entrance on private right of way to the center of the town of Port Washington.

The general alignment of the roadway is remarkably good; the tangents are usually long, many being from three to five miles in length. Outside of cities and villages the maximum rate of curvature is 3 degrees.

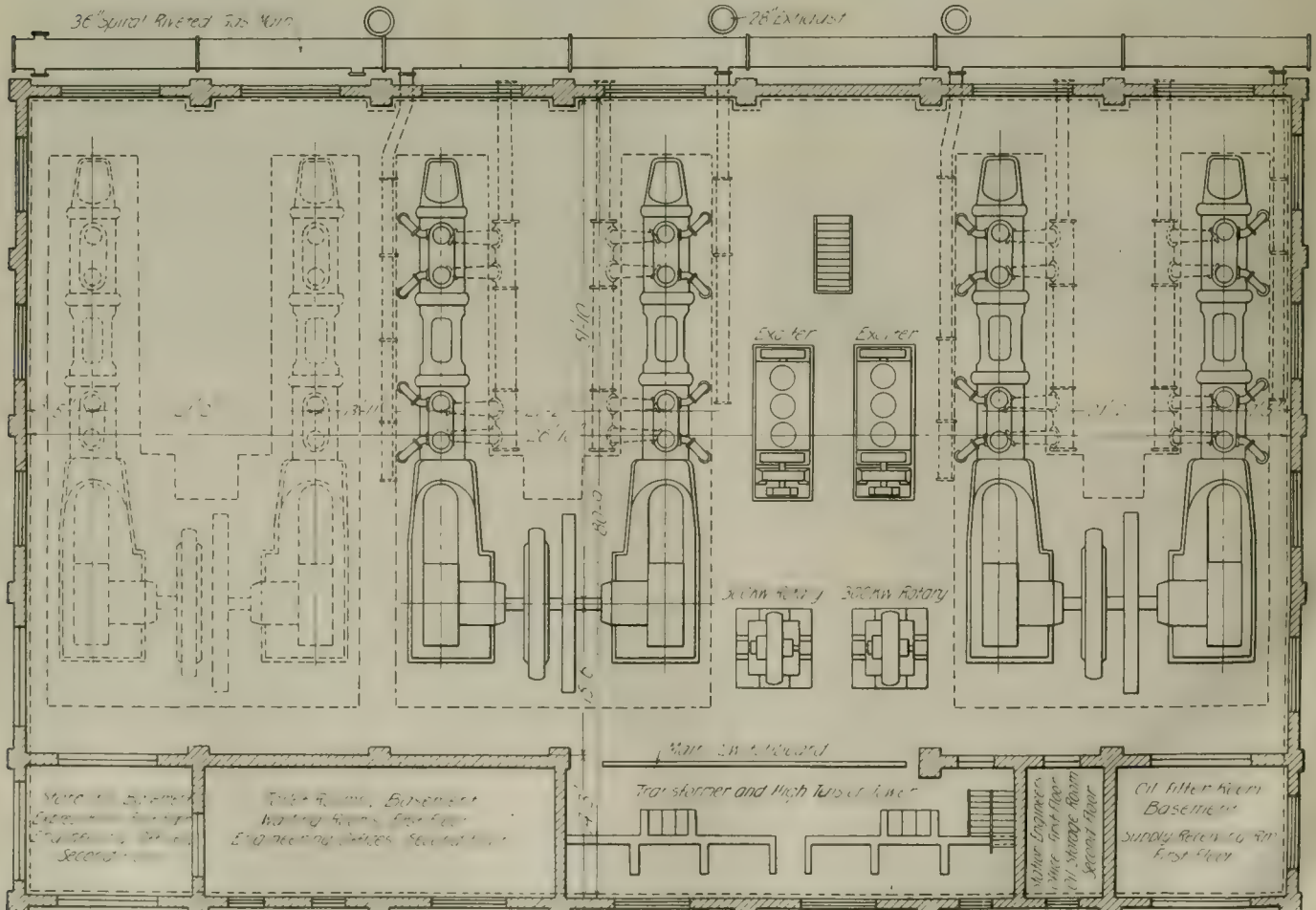
The track is laid with standard 70-pound rails joined with 6-hole angle plates and bonded with soldered bonds supplied by the Flexible Mesh Rail Bond Company. These bonds are placed under the plates and soldered to the web of the rail. Cedar ties are used on tangent construction and oak ties on curves. The track structure is ballasted with 3,000 cubic yards of clean gravel per mile.

Overhead Construction.

Current from substations is distributed on a No. 0000 grooved trolley wire, supplemented by a 300,000 circular-mil copper cable extending throughout the length of the private right of way. A 250,000 circular-mil aluminum feeder supplements the two trolley wires in the city of Milwaukee. Outside of towns the trolley wire is supported from 9-foot "Detroit"



Milwaukee Northern Railway—Foundation Plan of Gas Producer House, Showing Arrangement of Two Gas Producers with Economizers and Scrubbers.



Milwaukee Northern Railway—Floor Plan of Port Washington Power Station, Showing Arrangement of Gas Engine Driven Units and Auxiliaries.

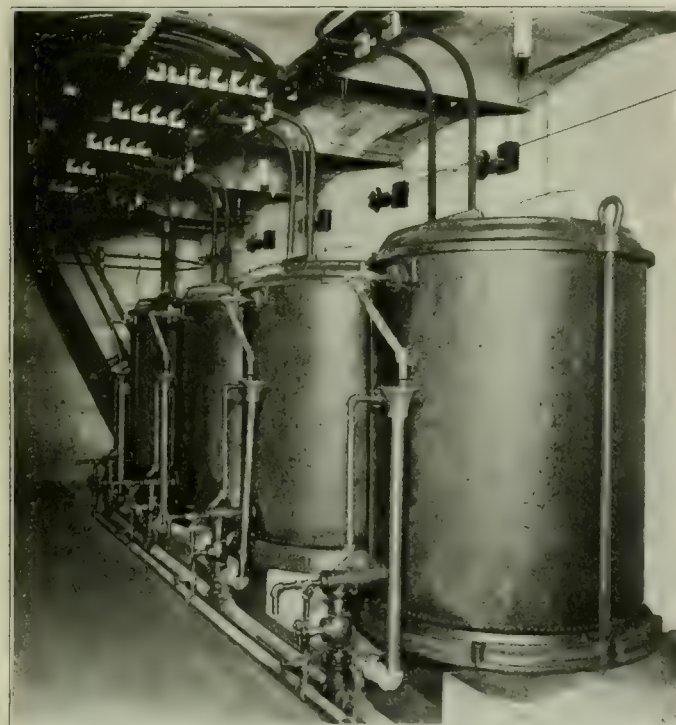
brackets on 40-foot cedar poles. One of the illustrations shows the details of the various pole top designs used in the transmission and distribution system. In the city of Milwaukee the trolley wires are supported on steel poles.

A telephone circuit, comprising two No. 12 copper wires with Stromberg-Carlson instruments in all stations and cars, serves the entire road. Lightning protection for the trolley and feeder system is provided by arresters placed one-half mile apart along the line, and heavy kicking coils with lightning arresters are also placed on each car.

Transmission Lines.

The center of high-tension current distribution for the entire system is at Port Washington. Each transmission circuit comprises three No. 3 copper wires, supported on 40,000-volt Thomas porcelain single-petticoat insulators mounted on locust pins boiled in paraffin. Reference to the earlier mentioned illustrations of the pole-top construction will serve to show the arrangement of the transmission wires with their 40-inch spacing. It is noted that where two transmission circuits are required (one for the Milwaukee division and one for the Fond du Lac division) between Port Washington and Cedarburg Junction, the six wires are carried on three, rather than two, long crossarms. This arrangement comprises one short 2-pin arm above and another below a long 2-pin arm. Crossarms thus arranged have a shorter combined length than would be required if the wires with the same spacing were carried on two long arms, as is the usual method of support.

The potential carried on the transmission system is 22,000 volts, and on the trolley circuit, 600 volts. All the ma-



Milwaukee Northern Railway—Oil-Filled Water-Cooled Step-Up Transformers in Power House.

terial for both the high and the low tension circuits, including insulators, trolley fittings, crossarms, braces, pins, etc., was supplied by the H. W. Johns-Manville Company; and although the circuits have been fully tested no failure on either has occurred.

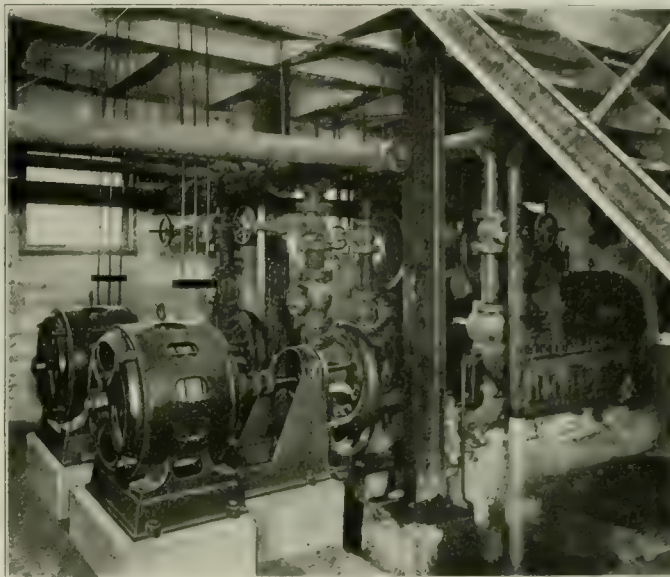
Power Station.

Current for the operation of the entire system, which, when completed, will include 112 miles of track, is generated in a power station located on the water front at Port Wash-

ington, Wis. This location is especially favorable because coal can be received either from a siding of the Chicago & Northwestern Railway or by water from boats plying on Lake Michigan. This plant has attracted especial attention because the power for driving the electric generators is furnished by gas engines of a size heretofore not installed for purely electric railway service.

Gas Producers.

Gas for the engines is furnished by producers operating on the Loomis-Pettibone system and supplied by the Power & Mining Machinery Company of Milwaukee. The present in-



Milwaukee Northern Railway—Engine Cooling Water Circulating Pump Installation in Power House.

stallation comprises two generating units, each consisting of a pair of gas producers connected to a common economizer, wet scrubber and exhauster. The gas is delivered into a holder of 30,000 cubic feet capacity. The normal rating of the present plant is 4,000 horsepower, and it has a capacity of 25 per cent overload for five hours' duration.

The brick building containing the apparatus is divided into a basement, 19 feet in depth and a single story about 14 feet in height to the eaves. A coal tank 50 feet long is located on the operating floor, with openings in front of the charging doors of the gas producers, thus bringing the fuel to points convenient to the man operating the gas plant. Hocking Valley bituminous slack coal, affording about 11,500 British thermal units per pound, is the fuel ordinarily used.

A novel installation has been planned for handling coal between the railroad track on one side of the producer house or coal barges on the other side and the storage bunkers. Any continuous conveyor system to serve these two supplies would necessarily have to be in duplicate. To economically handle the coal a locomotive crane and grab bucket, built by the Industrial Works, Bay City, Mich., is being erected on a system of tracks built on top of the roof. Thus by swinging the boom of the crane the bucket can lift coal from either the water or rail side of the building, raise it to the roof level and swing the bucketful into the storage bunkers.

The gas-generating plant is operated on the down-draft principle, the air being admitted through a charging door at the top of each producer, and the necessary suction being caused by an exhauster located in the train of apparatus beyond the wet scrubber. By this method the volatile matter and distillates are drawn through a deep bed of incandescent fuel and gasified, thus avoiding the use of any tar-extracting machinery, and enabling the system to produce gas containing 80 per cent of the heat units possessed by the fuel used. Re-

verse runs with steam, which is generated by the gas passing through the economizer or waste heat boiler, are occasionally made for the purpose of breaking up the fuel bed. The water gas made by this process mixes with the producer gas in the holder and slightly enriches the mixture. The average calorific value of the gas as delivered from the holder is 125 British thermal units per cubic foot.

Gas mains leading from the holder to the engine house are equipped with Ludlow valves.

Gas Engine Driven Units.

The main generating units are three in number, each of 1,000 kilowatts capacity, two of which are now installed; the



Milwaukee Northern Railway—Substation Wire Tower, Showing Strain Anchors.

third will be erected shortly. Each unit consists of an Allis-Chalmers twin tandem horizontal double-acting gas engine, direct-connected to an Allis-Chalmers 405-volt 25-cycle three-phase alternator. Although the rating of each unit is given as 1,000 kilowatts, both engine and generator were designed with large overload capacities, the engine being capable of developing upward of 2,000 horsepower and the generator having a corresponding capacity. Each engine has four cylinders, 32 inches in diameter by 42-inch stroke, and operates at 107 revolutions per minute.

The valve gear is of the builders' standard cut-off type. The engine operates with constant compression, thus tending to insure smooth running under the highly variable loads to which it is subjected. The inlet gear is extremely simple, consisting of a main inlet valve of the single beat poppet type, eccentric operated. The mixture of the air and gas is thoroughly effected before entering the cylinder in an annular mixing chamber located under the main inlet bonnet; the design and operation of this device are such that, at the instant of closing of the main inlet valve, there is practically no explosive mixture left outside the cylinder.

The gas valve is of the double beat poppet type, controlled by a variable lift rolling lever, operated by a single-link connection to the main inlet gear, the lift of the valve and consequently the amount of gas admitted and the time of admission being regulated by the governor. The exhaust gear is similar to the main inlet gear. Distinctive features of this type of gas engine are the location of the exhaust bonnet with its valve at the bottom of the cylinder, where all the dirt is removed by the action of the exhaust gases, and the provision of a substantial jack to lower the entire exhaust mechanism out of place to allow inspection and regrinding of the valve.

The igniters are electrically controlled and so arranged that the time of ignition may be regulated by a single hand wheel. Direct current at 60 volts is used in the ignition system. Duplicate igniters are provided at each end of the

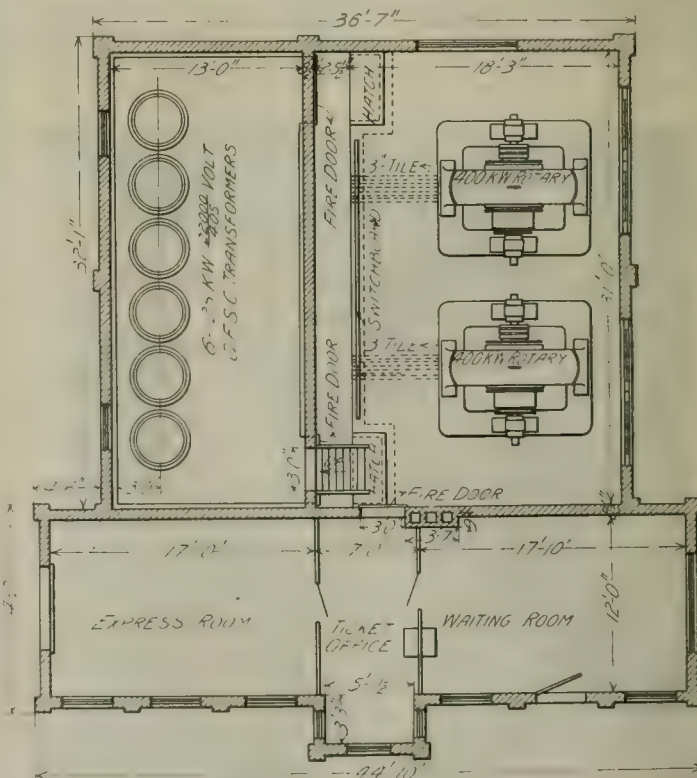
cylinder to insure prompt firing of low heat value gases and also to avoid the danger of shutdown due to short-circuit. A motor-generator set furnishes the current.

For starting compressed air is admitted to each cylinder in turn at what would be the explosion stroke. The engines will start from any position without barring.

The engines are exceptionally heavy and rigid, the weight being concentrated in the frame cylinders and tie pieces in the direct line of the stresses to which an engine of this type is subjected. The frame is designed for a side crank in place of the double throw crank which is the standard practice abroad. Contrary to popular belief, the stresses cared for in the steam engines of the New York subway plant, for example, are as great as any that the gas engine is ordinarily called upon to sustain.

The railway load at the present time is extremely variable, swinging from less than one-half load to 50 per cent overload, with momentary peaks greatly in excess of this. The engine handles the maximum overloads quietly and with freedom from vibration.

All wearing surfaces, including the main bearings, slides, crank and crosshead pins, are arranged for a continuous oiling system and the cylinders are lubricated by carefully timed admission of the cylinder oil, Richardson's sight-feed oil pumps being used with Van Dyck-Churchill oil filters. The water-cooling system includes ample provision for cooling the cylinder walls, cylinder heads, pistons, piston rods, exhaust



Milwaukee Northern Railway—Floor Plan of Combined Depot and Substation.

valves and exhaust bonnets. Water is circulated by means of two Morris and two Deming pumps, motor driven.

Electric Generators.

The electrical features of the equipment may be briefly described as follows: Three-phase current is generated in the power house at 405 volts and 3,000 alternations by direct-coupled alternating-current generators, each of 1,000 kilowatts normal capacity. These machines are of a special type developed by Allis-Chalmers Company for use with gas engines.

The generators are designed to deliver their rated output of 1,000 kilowatts continuously at 90 per cent power factor,

with a rise in temperature not exceeding 35 degrees C.; 50 per cent greater current for two hours following a full load run, with a temperature rise not exceeding 50 degrees C. Current for excitation is furnished by two 50-kilowatt 120-volt direct-current generators driven by vertical gas engines, the complete units being of Allis-Chalmers manufacture.

Current from the main generators is delivered to a 6-panel switchboard, having three generator, one exciter and two

each, in each circuit, in addition to plug switches at each transformer to allow for speedily cutting out any transformer in case of breakdown. From the high-tension bus three transmission lines are led away, each with automatic oil circuit-breakers of 40 amperes capacity in circuit. The station apparatus is protected from lightning by means of an equipment of "low equivalent" lightning arresters and oil immersed choke coils connected with the high-tension bus.

For supplying nearby portions of the line two 300-kilowatt rotary converters are installed in the main station.

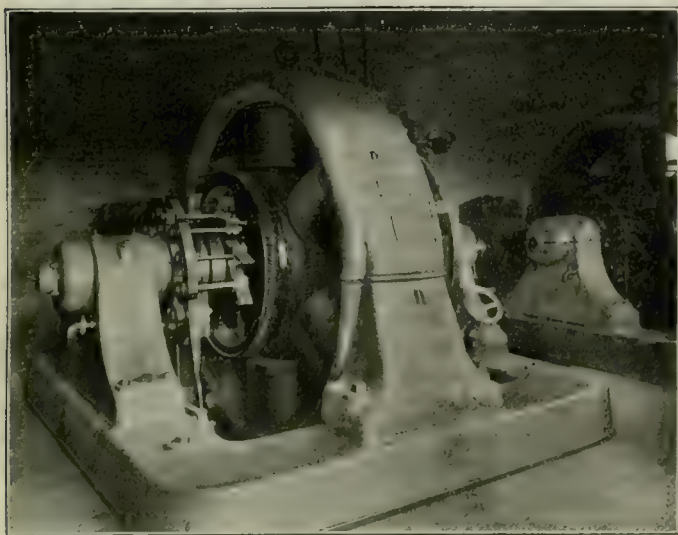
Substations.

Current from the generating station is transmitted at 22,000 volts potential to eight substations. The structures which house the rotary converter apparatus also include passenger station facilities. For this reason each substation is located in a town where the greatest benefit may be derived from the passenger station, rather than that this desirable feature should be outweighed by an attempt at unnecessary refinement in current distribution.

Two of the substations are each equipped with two 400-kilowatt 650-volt rotary converters, fed by six 125-kilowatt oil-cooled transformers. Each of the other six substations has two 300-kilowatt rotaries, fed by six 100-kilowatt transformers. The rotary converters and transformers are of Allis-Chalmers manufacture.

The substation buildings are structures of white brick resting on concrete foundations and have concrete floors. A floor plan reproduced herewith shows the method of dividing these station buildings so that accommodations may be afforded for the electrical equipment and for transportation offices. It will be noted that the part of the structures utilized by the transportation department comprises the section nearest the track. This portion is divided into three rooms: a general waiting room, a ticket office and a baggage and express room.

The waiting room is furnished with benches of antique



Milwaukee Northern Railway—Rotary Converters in Cedarburg Substation.

transformer panels, which contain the necessary switches, circuit-breakers and instruments of Westinghouse manufacture for properly regulating and handling the output.

From the main switchboard the current is carried to step-up transformers and also to a rotary converter switch-



Milwaukee Northern Railway—Substation and Depot at Cedarburg.

board. There are seven Allis-Chalmers step-up transformers of 500 kilowatts capacity each, arranged in two banks of three each, with one held as a reserve, connected to raise the voltage from 405 volts to a maximum of 22,000 volts. Intermediate taps allow the voltage to be varied if desired. The current is carried from each bank of transformers to the high-tension bus through three oil switches of 40 amperes capacity

oak and is heated by Consolidated electric heaters mounted along the baseboard. The operating office in each station has a bay window on the track side, so that the agent can observe approaching trains. At the opposite end of the operating office a fireproof door leads to the substation machine room and doors at the sides of the office lead, one to the waiting room and one to the baggage room. Each agent has a fire-

proof safe, together with a complete equipment of card and other tickets, and accounting forms for freight and express.

The baggage room has a wide door leading to the station platform. Each station is provided with a hand truck and a large platform wheel truck, so that the work of handling baggage and freight may be facilitated. Each station also is provided with platform scales, and small scales for weighing light express packages.

Substation Equipment.

From the illustration of the substation buildings it will be noted that a wire tower is provided. These towers, as well as the entire roofs of the substation buildings, are covered with Keasbey & Mattison asbestos shingles. All high-tension circuits inside the stations are made up of bare wire supported by line insulators mounted on wooden crossarms. The electrical equipment is protected against lightning by means of "low equivalent" lightning arresters, and all substations have 22,000-volt 20-ampere automatic oil circuit-breakers on outgoing transmission lines and on transformer circuits, except at Cedarburg, where this capacity is increased to 40 amperes on the incoming lines from the power station.

The transformers are arranged in a single row, as shown in one of the illustrations, and a complete equipment of piping

rails by soldered copper connections. The other end of the rail extends through a foundation wall and partly under the floor of the machine room, so that only a short connection of copper is necessary to complete the negative circuit.

Shops.

The main repair shop and car house is located at Cedarburg. This will be the operating center of the completed system. A general view of the front of the shop building accompanies this article. The structure is of brick and the roof is supported by a steel framework. The north bay of the building is two stories high, the second story for two-thirds of the way back being finished for operating offices.

These offices are provided with a fireproof vault and are heated by steam from the shop boiler plant. Underneath the offices on the first floor is a large fireproof stockroom with independent cases containing supplies, which are accounted for on the continuous inventory system and which are delivered only on requisition. At the rear of the stockroom is the machine shop, which opens on to two pit tracks extending the length of the building. The shop has a very complete equipment of machine tools, largely supplied by the Niles-Bement-Pond Company.

It is interesting to note that this shop was completed and



Milwaukee Northern Railway—Shop and Office Building at Cedarburg.

is provided for handling the oil to and from the cases. On the low-tension side of the transformers the rotary converters are protected by open fuses mounted on a wooden rack in the transformer compartment. These fuses should prevent any trouble from being transferred between the machine and transformer rooms. The transformers are provided with taps for starting the rotaries on half voltage from the alternating-current end.

An 8-panel switchboard in each substation comprises two alternating-current machine panels; two alternating-current starting panels; two direct-current rotary panels, and two feeder panels equipped with instruments of Westinghouse manufacture. There are also mounted on the base of the board two General Electric recording wattmeters. The switchboard of the Cedarburg substation has a third feeder panel controlling the current supplied to the nearby shop and yards. Circuit-breakers are provided with reverse-current relays.

An interesting detail is introduced in the method of connecting the negative side of the rotaries with the track rails. As the substation portion of the building is not close to the track, the operating office intervening, a considerable length of heavy cable would be required to make the negative connection. To economize in the installation of this conductor lengths of steel rail were laid under the floors of the building, being well bonded together with one end joined to the track

the tools installed prior to the final construction period of the road. It therefore proved itself to be of great value in handling repair work during construction. As no current was available before the construction of the power house, the shop tools were driven by a small gas engine belted to a line shaft.

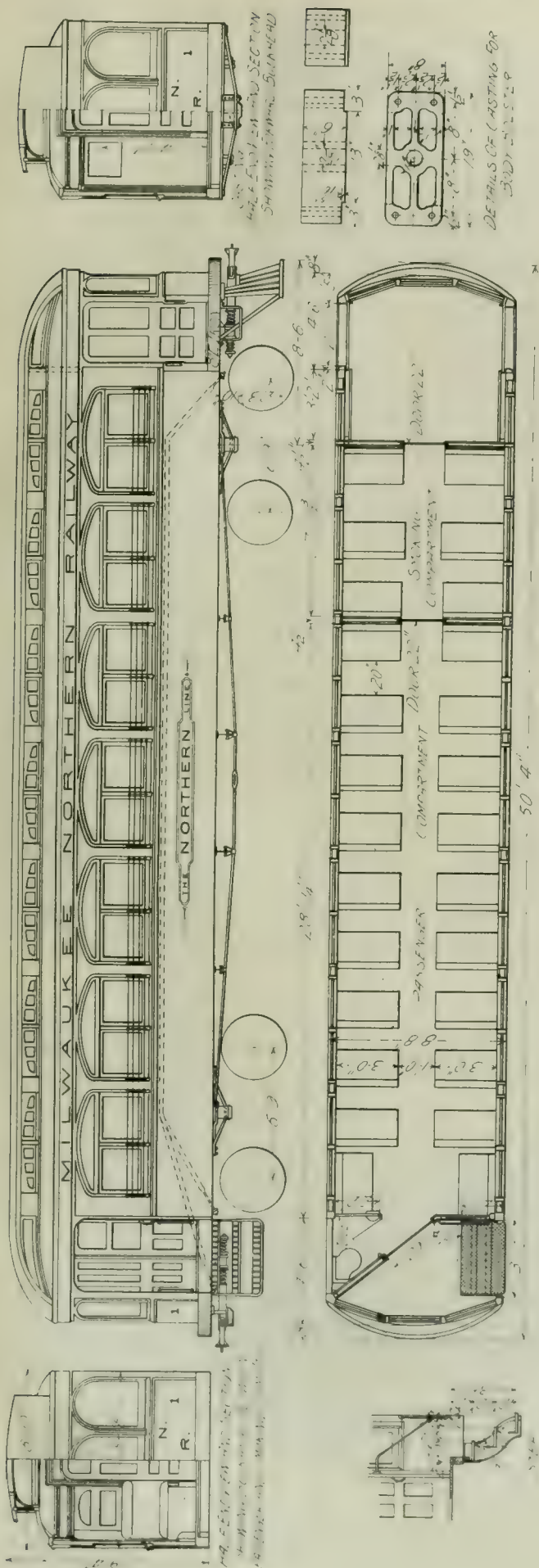
At the rear of the machine shop and separated from it by a partition wall is the blacksmith shop and above the blacksmith shop is a room of generous dimensions set apart for electrical work.

The rails of two of the three tracks entering the shop are supported on piers in an open pit and facilities for handling heavy work are provided by a hand-operated 45,000-pound capacity crane, built by the Whiting Foundry Equipment Company.

To provide for the comfort of the workmen wooden sections of floor have been built in the general concrete shop floor, these sections being located in front of each of the machine tools and along the general work bench.

The second bay of the building is set apart for car storage and inspection. It has four tracks without pits.

At the north limits of Milwaukee, where the city tracks join the private right of way, is an operating barn comprising a steel frame covered with galvanized steel sheets. The capacity of this barn is eight cars and a storage yard is provided for eight additional equipments. To facilitate handling



Milwaukee Northern Railway—Elevations, Sections and Details of 3-Compartment Passenger Coach.

the single-ended Detroit type city cars there is a turning loop located near the city limits and a "Y" track near the sub-station at North Side, Milwaukee. The operating barn includes, other than the storage features mentioned, repair shops, trainmen's room and a superintendent's office.

Rolling Stock.

The present rolling stock equipment includes eight large interurban cars, eight city cars, a Russell double-end No. 3 snow plow, a McGuire-Cummings sweeper and a Ruggles rotary snow plow.

Illustrations are presented showing the general dimensions, floor plan and interior appearance of the large interurban passenger cars. These cars have seating accommodations for 52 passengers; are 50 feet 4 inches long, 8 feet 10 inches wide over all and weigh 70,000 pounds complete. The interurban car bodies were built by the Niles Car & Manufacturing Company.

The car bodies, which are designed for single-end operation, are divided into a forward baggage compartment, smoking compartment and a passenger compartment. A variation from the usual design will be noted in the placing of the toilet room on the rear platform with a diagonal partition into which slides the rear door of the main compartment. This location is such that the pipe below the dry hopper clears the rear truck.

The cars are commodious and fitted with Hale & Kilburn seats upholstered in red plush. Double windows are provided at the head end of the car and two Consolidated heaters similar to those in the body of the car, are placed in the forward compartment. In this compartment are carried, other than the necessary brake and control apparatus, extra red and green lenses for signal lamps, signal flags, a Stromberg-Carlson telephone with hook rods for temporary connection with the telephone line at any point at which the car may stop; torpedoes; extra headlight carbons, and a neat wooden case containing train order blanks.

Reference to the floor plan of the car will show that there is but one passenger entrance. Because of this all sills except one extend from buffer to buffer, thus affording a stiff underframing.

The car bodies are mounted on American Locomotive Company high-speed M. C. B. type trucks with Baltimore ball-bearing center plates. The wheel base of the trucks is 6 feet 8½ inches. The wheels are 36 inches in diameter and mounted on 5½-inch axles with Symington journal boxes. Each truck carries two Westinghouse No. 112 motors with electro-pneumatic multiple-unit control and type 12-D controllers. This system of control has the automatic acceleration features and these particular equipments have been so developed to meet interurban conditions that the rate of acceleration in multiple can be controlled independently of the rate of acceleration in series. The gear ratio on the interurban motors is 22 to 67. The schedule speed at which cars now operate outside of Milwaukee is 25 miles per hour, including stops.

The cars are equipped with straight air brakes manufactured by the Allis-Chalmers Company, including the type OB pneumatic governor placed in the forward compartment, and type G emergency valves.

Especial care has been taken in placing the apparatus under these interurban cars and in protecting the wiring from injury. The four air tanks on each car are arranged in a line along one side to balance the multiple-unit control apparatus hung under the opposite side of the car. In placing the equipment under the car all the parts were accurately weighed and multiplied by the moments through which they would act, the resultants for each side of the car being made to balance.

Some of the special fittings of these cars include wooden locomotive type pilots, Van Dorn couplers, Crouse-Hinds Imperial headlight with inclined carbons, International 2-fare indication register, continuous parcel racks, fire tool case, Cur-

tain Supply Company window fittings, General Electric organ pipe whistle, Peacock hand brakes, Nichols-Lintern sander, Knutson retriever, Lintern markers and classification lights and Hooper-Mudge trolley wheels. A panel board in the forward compartment of the car has switches controlling the various lighting circuits. The lighting of the car is effected by four circuits of five 32-candlepower lamps, wired in series with the arc headlight and the Lintern signals. At night a signal lamp is carried on the dash at the level of and near the headlight.

The eight cars used in the local service in Milwaukee are of the Detroit type, with open rear platforms. Each car is equipped with four Westinghouse No. 112-B motors, with a gear ratio of 15 to 69, and K-28 control. The car bodies are mounted on M. C. B. short wheel base trucks, manufactured by the New York Car & Truck Company. The wheels are 33 inches in diameter and have 3-inch treads and 1-inch flanges. Each car is equipped with Allis-Chalmers air brakes, Consolidated heaters, Peacock hand brakes, Van Dorn couplers, Milwaukee type fenders and rattan covered cross seats. The cars



Milwaukee Northern Railway—Interior of Passenger Car, Showing Smoking and Baggage Compartments Ahead.

are 41 feet long and 8 feet 5 inches wide, single-ended, and have the motorman's vestibule entirely separated from the platform.

Operation Details.

The present service offered by the interurban line is operated on a 60-minute headway between the terminal station in Milwaukee and Port Washington. This run of approximately 29 miles is made in 1 hour and 24 minutes. It is expected that the service will be extended from Port Washington to Sheboygan in April, 1908. Baggage is carried on all cars.

Mileage is offered in book form in mile books of 1,000, 500 and 100 miles, sold at stations at \$13, \$7.00 and \$1.50, respectively. The 100-mile book is sold by conductors as well as station agents. The rates of fare are so graded as to offer every inducement for the purchase of tickets. Cash fares paid on the cars are at a rate of 2 cents per mile. For such fares the conductors issue receipts, which are redeemable at the ticket offices for 10 per cent of their face value, if enough receipts are offered at one time to afford the passenger more than a 5-cent refund. One-way tickets are sold at stations only for $1\frac{3}{4}$ cents per mile and round trip tickets are similarly sold for $1\frac{1}{2}$ cents per mile.

The operation of all trains is handled by a train dis-

patcher with a Stromberg-Carlson board at the Cedarburg operating office. A very complete rule book has been compiled for the instruction of trainmen and employees. The dispatcher keeps a train sheet similar to those used on steam roads and in addition he records the number of passengers carried on each car in and out of the city of Milwaukee. This information is telephoned the dispatcher when orders are given at the North Side station. The "No. 31" order is used as in steam railroad practice. Profiting by a recent accident occurring on a steam road in Michigan and attributed to careless transcribing and reading of the order, the "31" order blanks are ruled, so that a similar mistake can hardly occur.

One of the provisions of the franchise granted by the city of Milwaukee to the Milwaukee Northern Railway stipulated that 3-cent fares should be granted within the city limits of Milwaukee on the city cars. It was provided, however, that the cash fare on both city and interurban cars should be five cents, and that the company should sell strips of tickets, eight coupons to the strip, for 25 cents, good only on the local city cars, thus making the cost of each ride $3\frac{1}{8}$ cents. These tickets are being sold by the company at its stations, and by conductors on the cars. While the franchise makes this stipulation only for transportation within the city limits of Milwaukee the company has taken an unusual step in extending the privilege granted by this low rate. The run of the city cars includes about a mile outside of the city limits and the company will accept these 3-cent tickets good over the entire run of its city cars, a distance of 4.3 miles. The regular city service is on a 10-minute headway.

Baggage and express are carried on all interurban passenger cars. Packages are called for and delivered free of charge anywhere within the city limits of Milwaukee and Cedarburg. The charge for handling between these cities is based on a rate of 35 cents per 100 pounds and excess weight over 100 pounds is charged for at $3\frac{1}{2}$ cents for each 10 pounds.

Between Milwaukee and Port Washington the express rate is 40 cents per 100 pounds and excess weight is charged at the rate of 4 cents for each 10 pounds. Milk is carried between Port Washington and North Side station, Milwaukee. A charge of 10 cents is made for each 8-gallon can handled and 15 cents for cans holding 8 to 12 gallons. Empty cans are returned free and milk tickets are sold in quantities up to 100.

The officials active in the operation of the Milwaukee Northern Railway are: W. A. Comstock, vice-president; Ernest Gonzenbach, general manager; H. J. Pagel, superintendent.

Suggestion to Develop Iowa.

"The best way to develop Iowa now, in my opinion, would be for the citizens of the county seats or best towns of that class to build electric lines to tap the section or community that belongs to them in a trade sense," remarked President H. H. Polk of the Inter-Urban Railway Company of Des Moines in a recent newspaper interview. "All of them couldn't do this, but in many instances short electric lines would be paying investments in addition to immensely helping the community which they tap. If this were done it would be only a few years until some one or some parties would arrange to build the connecting links between these numerous small systems, paratively cheaply and the additional service would be of great benefit to the various communities and to the state at large.

"I think that the present time, despite the financial stringency, would be suitable for doing preliminary work in this direction. This work is not very expensive, simply requiring time. As soon as this can be accomplished it is certain that the country will have attained its financial equilibrium and the bonds can be floated to secure the money needed for the actual construction."

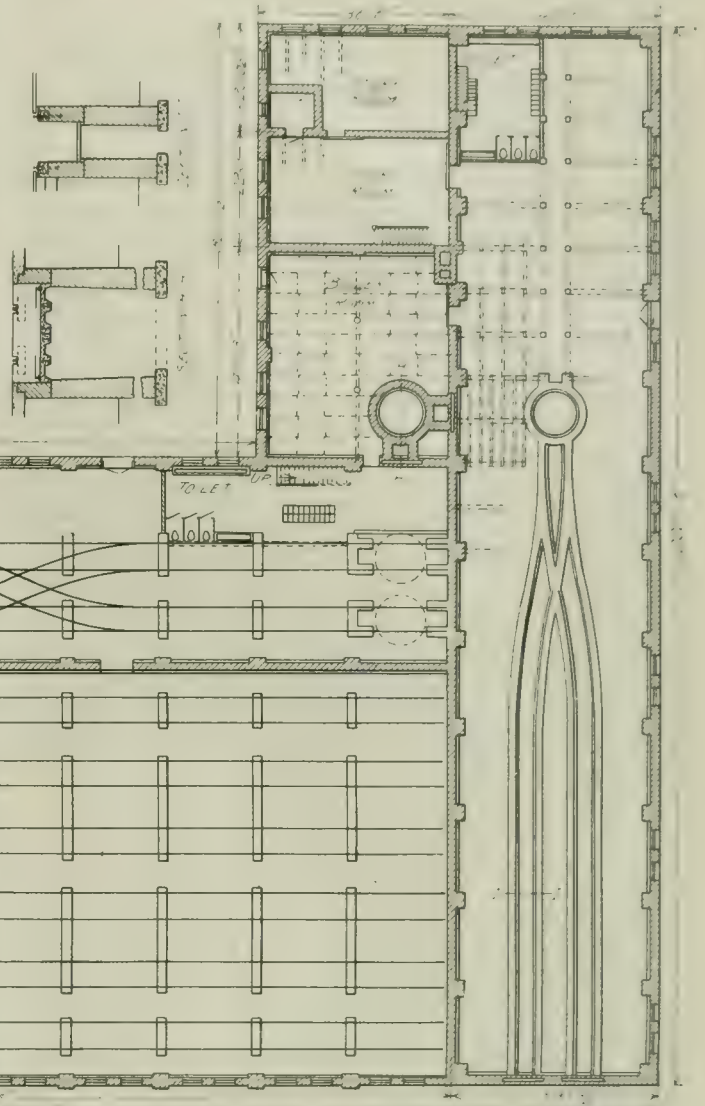
SPOKANE & INLAND SHOPS.

The repair shops of the Spokane & Inland Railway are located at Spokane, Wash. Inasmuch as the interests owning this extensive single-phase system operate a local service in Spokane the shops are designed to care for two classes of equipment. The floor plan and the relative arrangement of the various rooms in the shop structure are shown in an engraving accompanying this article. It will be noted that the structure includes a car house with six storage tracks 200 feet long, adjoined by two long, narrow shop bays, 40 by 202 feet and 40 by 200 feet. An ell adjoining the two shop bays accommodates a boiler room, blacksmith shop and two store-rooms.

The bay devoted to repair work on the city cars has two tracks extending its entire length, with double crossovers provided near the center of the building.

The shop devoted to interurban cars is two stories in

the bay as one track, with work space on either side. To facilitate the handling of trucks and material four turntables,



Spokane Shops—Floor Plan and Sections of Pits and Turntables.



Spokane Shops—Exterior of Interurban Portion of Building.

height and has two pit tracks for about half its length. In the center of the shop these tracks unite and continue along

9 feet 6 inches in diameter, interconnect the interurban repair shop, blacksmith shop and city car repair shop.

SUGGESTIONS FOR FACILITATING SUBWAY TRAFFIC IN NEW YORK CITY—PRELIMINARY REPORT OF BION J. ARNOLD.

On October 4 of this year Bion J. Arnold of Chicago was engaged by the public service commission, first district, state of New York, to make a study of the subway in New York City operated by the Interborough Rapid Transit Company. The object of this study was to afford suggestions which would lead to improved service. For this purpose, and to enable specific questions asked by the commission to be answered, a skilled force has assisted Mr. Arnold in the work of making an investigation of the subway, including stations, cars, tracks, signal system, ventilating system, terminal and shop facilities, as well as the speed and method of operating trains.

On November 26 Mr. Arnold submitted to the commission preliminary conclusions and will later furnish a complete report. The preliminary report makes certain recommendations and suggests that the commission allow the Interborough company to adopt them, because upon the results of the methods recommended will depend later conclusions. The preliminary report, in abstract, follows:

As the changes hereinafter suggested are those which relate to methods of operation only, and involve but small changes in the signal equipment of the subway, they can be put into effect in a short time with little expense, and thus enable the subway to better meet the constantly growing traffic. These changes, if effectively introduced and maintained, should be the means of causing about 25 per cent more cars than at present to leave each express station within a given period of time during the rush hours, thus somewhat increasing the capacity of the subway, and at the same time adding to the comfort of the passengers carried in these cars by relieving, in a measure, the present crowding.

Present Conditions.

It is but fair to say that, taking into consideration the circumstances under which the subway was built, and is now being operated, it is one of the best constructed and best operated railways in existence. On the other hand, the service demanded of it is far in excess of that of any other road, and as a consequence conditions are now such that, although the timecard calls for a time interval or headway of two minutes between trains south of Ninety-sixth street during rush hours, in actual operation the trains fall behind this schedule from 12 to 30 seconds under normal conditions during these hours. This results in only about 25 express trains per hour leaving Grand Central station instead of 30 trains as called for by the timecard.

I am convinced that the 2-minute headway, as given by the timecard, can be maintained under normal conditions during rush hours. Many of the present delays are due entirely to the excessive time taken for loading and unloading trains at the platforms, and are caused largely by the policy in vogue at the time I began studying the situation of holding the trains at the stations until all the cars were jammed full of passengers, in an attempt to clear the platforms. This policy should be changed to one of starting the trains within a fixed time after they have stopped in order that the maximum number of cars may be made to pass through the stations after allowing reasonable time for loading. This time of loading and unloading the express trains should be limited to 45 seconds instead of an average of 65 seconds taken at present at Grand Central station.

Improvements in Loading Methods.

In view of the fact that northbound evening express trains leaving Grand Central station carry away approximately 25 per cent more passengers than are brought into this station from Fourteenth street, I suggest that a system of loading be adopted which will regulate the loading at Brooklyn bridge and Fourteenth street in such a way that there will be capacity left in the cars for the increase of load at Grand Central station.

At the present time the cars come into Grand Central station fully loaded, and the delay at the station platform is caused largely by the passengers getting off slowly from crowded cars and the difficulty of loading so many additional passengers into the cars which are already full. The delay caused by this extra time consumed on account of the congested condition of the cars at Grand Central station soon backs the trains up in the subway as far as Fourteenth

street, and as the trains are held at Fourteenth street they are naturally loaded more fully, and thus automatically the congestion increases, which can only be remedied by a combination of systematic loading and prompt movement of the trains.

In other words, if part of the passengers who are ready to enter the trains at Fourteenth street are cut off all trains can be moved on time, and therefore more trains operated than at present. Thus additional speed and comfort can be obtained for all of the patrons of the subway by a small amount of inconvenience to a few patrons who are slightly delayed in taking the cars at Fourteenth street, and on the principle of the greatest good to the greatest number this policy should be adopted.

Dispatchers on Platforms.

On each express platform there should be stationed a train dispatcher provided with two stop watches, one for the local, the other for the express service, with instructions to give the signal for closing the doors not later than 40 seconds after the train has come to a stop, thus allowing five seconds to close the doors and start the train within a 45-second period.

Subsequently indicators visible to the passengers can be installed which will show them the time in seconds remaining before the closing of the doors.

Opening and Closing Doors.

The guards upon the cars should be instructed to open the doors as soon as the train has stopped. The train guard should also be instructed to listen attentively for the closing signal. When the doors are once closed they should be kept closed instead of being opened occasionally to let off a delinquent passenger. Train guards should be instructed to keep themselves more alert, and to promptly transmit the starting signal.

The station attendants should be given positive instructions to act promptly when the signal is given for closing the doors. This can be done by positively regulating the stream of passengers entering the car so that the last passenger in will not obstruct the closing of the door.

I believe the railway company's officials will put these suggestions into effect provided the co-operation of your commission and the public can be secured.

To secure better service police regulation upon the platforms of the stations should be provided in order to properly control such individuals as may, through selfish motives, interfere with the prompt closing of the doors.

The foregoing suggested improvements are not intended to provide a better service than called for by the present timetable, but if carried out they will, in my opinion, insure that this timetable will be more closely followed and more trains per hour will be operated through each express station than at present.

Block Signaling.

By making other improvements I find it will be possible to reduce the headway still further, and as the present signal system is arranged so that by slightly changing it at the stations trains can be easily operated on a 90-second headway, if such a headway were not prohibited by excessive station stops, I would suggest that the railway officials be requested to prepare a timetable or train schedule on the basis of a 105-second headway during rush hours, which is a reduction of 15 seconds from the present schedule. This saving of 15 seconds in the headway as indicated can be secured at once by changing the block signaling system at the express stations. At the present time the station block is not cleared until the leaving train has nearly left the platform. With an 8-car train upon the express tracks it requires from 22 to 25 seconds after a train starts to get the signal which allows the following train to proceed. It then requires a certain length of time for the following train to pull in to the platform and come to a stop. For example, at Grand Central station this time amounts to 50 seconds for a northbound train. If the signal to the following train can be given at or about the time the leaving train starts rather than waiting until the train has cleared the platform, a saving in headway of about 15 seconds can be effected at express station stops, which will permit the operation of a 105-second headway.

From my study of the Ninety-sixth street situation it does not yet seem to me necessary to make any changes other than those relating to the signal system as indicated above, or at any rate until after the headway between trains is made less than two minutes.

Type of Car.

I am carefully studying the necessity of changing the design of the present cars so as to provide one or more

openings in the side of the cars, but I cannot reach a just conclusion on this important subject until I have had an opportunity of observing the effect of the improvements which have been hereinbefore suggested or the result of such other methods as the railway company may see fit to promptly adopt whereby the passengers will be carried with the present end door cars, and at the same time limit the station stops to not more than 45 seconds, which limit is essential to get the greatest practical capacity out of the subway.

There will always be the problem as to where to draw the line between seating capacity and standing room. At the present time during rush hours there are practically twice as many people standing as there are seated. If more seats were provided in the present cars one seat would displace two standing passengers, and either the carrying capacity of the car would be reduced or the standing passengers would be more crowded than at present, which seems practically impossible. As it is impracticable to use wider cars, due to the lack of clearance in the present subway, the only method of providing more seats is to provide more cars of the present type of cars of the same size as the present cars and provide them with more cross seats, which latter method would tend to greatly increase the time required for loading and unloading.

As soon, however, as the service of the subway becomes improved, either by providing additional seating capacity or by more rapid service, instead of the service creating additional comforts to those who are now riding, more people will be attracted by this superior service, and the applicants for seats will outnumber the available seats in practically the same ratio as at present. It is, therefore, evident that a decision must be made, relative to the general nature of the service to be supplied, before the proper type of car can be determined. The desirability of providing a certain number of passengers with a maximum number of seats, and thereby limiting the capacity of the subway to practically the number of seats that can be made to pass any given point within a given time, must be compared with the desirability of providing transportation to the greatest number of passengers possible, even though a large majority are compelled to ride for a short time without being provided with seats.

Seating Capacity.

If the policy is adopted of providing seats to the majority of those who ride during rush hours it will result in a material decrease in the total number of passengers which it is now possible to transport in the subway, and would, therefore, result in the turning away of many passengers who now make use of its service.

If the principle of a slight reduction in the seating capacity of the present cars can be accepted as permissible and adopted increased carrying capacity can be obtained by eliminating all or a part of the present cross seats. The elimination of these cross seats makes it practicable to introduce center side doors into the present cars should this change be found necessary later. In case it is found that the traffic cannot be properly handled and the 45-second limit for station stops mentioned maintained with the present end-door cars the use of these center doors in connection with the absence of the cross seats will make it practicable to load and unload so rapidly that this limit can be maintained.

There are good arguments to be advanced in favor of both these policies. No one having the best interests of the public at heart will deny that, if it were possible to provide each passenger with a seat throughout his entire journey, he should be so provided, but as it is practically impossible during rush-hour periods in most transportation systems now existing in the principal cities of this country, the question of just how far this principle can be departed from and still serve the best interests of the public by providing as many seats as practicable, and at the same time utilize the carrying capacity of the subway to its greatest extent by giving to those who are willing to stand the advantage of its transportation facilities, is one that requires most careful consideration.

The hardship imposed upon those who are compelled to stand in the subway cars during the rush-hour period is not so great as it at first appears to be, for the reason that the personnel of each car changes so often, due to the transferring at express stations, that many of those who stand at first soon get seats, compelling the newcomers to stand, who for like reasons and in turn soon find seats.

In further support of the policy favoring increased standing room in the cars it is but proper to point out that the reason for diminishing the number of seats is for the purpose of providing greater aisle space so that a system of circulation of passengers from the entrances toward the exits of the cars may be more easily maintained, resulting in greater comfort, not only to those standing, but also to those seated, and at the same time avoiding the confiction of streams of pas-

sengers with its resulting discomfort now so evident at the express stations during the rush hours. As an additional result of maintaining a definite circulating of passengers greater expedition will be possible in loading and unloading, station waits will be reduced, and the average speed of travel materially increased, so that the discomfort of standing is further lessened by being shortened.

The question, then, tersely stated, is as follows:

Having 60,000 people to carry per hour, shall we, by following one policy, provide seats for 40,000 people with standing room for possibly 10,000 more, and turn away 10,000 to other and slower means of transportation, or by adopting, at least until further subways can be built, the other policy, whereby increased standing capacity is obtained, provide seats for 20,000 and carry the 40,000 standing for short intervals of time, and thus furnish transportation to the entire 60,000?

Inasmuch as an answer to this question involves a decision based upon public policy, rather than upon engineering feasibility, I feel that your commission should first pass upon it and instruct me accordingly.

A METHOD OF COMPARING TRANSPORTATION FACILITIES.

An interesting problem in connection with the development of a new interurban line is to compare the transportation facilities of different regions in which enough similarity of conditions exists to enable relative services to be gauged in figures. A recent example of this kind of analysis is afforded by a statement submitted by John H. Bickford of Boston, chief engineer of the proposed Boston & Eastern Electric Railroad, to the Massachusetts railroad commission. Mr. Bickford desired to show that the present transportation facilities in the territory to be served by his road are less than obtain in similar territories of equal area, and the points made were as follows:

The only method of any value with which to make a comparison of the transportation facilities of different territories is the one which takes each individual city or town in a territory and compares its facilities with those of another city or town of practically the same relative nearness to a metropolitan center, assuming that the facilities are in proportion to the respective populations.

The cities and towns in Zone 3 of the Boston & Eastern (Revere, Chelsea and Everett) are best comparable with other places in the vicinity of Boston. The cities and towns beyond Zone 3 (Lynn, Peabody, Danvers, Salem and Beverly) are not collectively comparable to any territory in the United States. The lower portion of Westchester county, New York, is the nearest approximation. The lower part of this county, up to a line between Port Chester and Dobbs' Ferry, has a population of 135,000, with a density of 1,900 per square mile. The territory in question, beyond Zone 3, has a population of 152,000, with a density of 2,250 per square mile. In addition to the present numerous lines, the New York Westchester & Boston Railway, a high-class, high-speed electric line, is now under construction in that territory.

The number of round trips per 1,000 population in Beverly, Salem, Peabody, Danvers and Lynn ranged from 2.12 to 4.40, the average for all the towns being 3.21.

The number of round trips per 1,000 population in Yonkers, Mt. Vernon, New Rochelle, Portchester, Pelham and Mamaroneck ranged from 5 to 129, the average being 8.02.

The number of round trips per 1,000 population in Hyde Park, Quincy, Braintree, Waltham, Woburn and Wakefield ranged from 5.10 to 15.60, the average being 7.64.

The number of round trips per 1,000 population in Revere was 39.93; in Chelsea, 23.25; in Brookline, 51; in Cambridge, 23.80.

The number of round trips given in this table is the number between the city or town and Boston or New York. More than twice as many round trips per 1,000 population are made daily between lower Westchester county and New York City than between the north shore territory outside Boston and that city, as investigated.

MASPETH CAR HOUSE AND SHOPS, BROOKLYN RAPID TRANSIT COMPANY.

A description and plan of the car house and shops at Maspeth, N. Y., on which the Brooklyn Rapid Com-



Maspeth Car House and Shops—Runways and Jib Cranes with Air Hoists.

pany had at that time begun construction, were presented in the *Electric Railway Review* of February 9, 1907, page 190. The building is now completed and the shop equipment in-

As was stated in the previous article, the car house and shop building occupies a triangular tract of land, so that the frontage is only 50 feet, but the depth is 400 feet and at the rear the triangle broadens out so that there is room for eight tracks and the shop equipment. The track room in the house is sufficient for 45 cars, but 76 cars is the average regular equipment of the lines operated from Maspeth. The summer equipment varies and the number of cars is somewhat larger. The surplus at all times is to be stored in an adjoining open yard with a capacity for 105 cars, which is nearing completion. The building is of fireproof construction throughout, and, as it stands with a frontage on three streets and with the company's own property on the fourth side, there is little danger from exposure to the fire hazards of other property.

The exterior is of a fine grade of red pressed brick, the floors are of concrete and the ceilings of steel. The barn is well lighted from two sides and from roof skylights of saw-tooth construction, metal frames and sashes and wired glass being employed throughout. An inspection of the building discloses other features of modern fireproof construction, such as a fireproof oil house with a Bowser oil storage system and the entire absence of wood in the building construction. On the ground floor the only wood used is that in the partitions for the office of the shop foreman.

Shop Equipment.

The shop equipment is ample for making practically any repairs to cars or other rolling stock aside from a thorough overhauling and it is intended that the equipment and operation of this and six other shops of the company shall be such that the principal shops at South Brooklyn, where 1,200 men are employed, and the company's other large shops shall be relieved of all work, except general overhauling and rebuilding of equipment, and be free from much of the present necessary congestion.

Seven of the tracks have inspection pits and at the rear of the building each of the entire eight tracks is served with a jib crane of 4,000 pounds capacity, having a 2,000-pound



Maspeth Car House and Shops—Interior of Car House Before Placing Tools.

stalled, and as the structure may be fairly said to be a model of its kind the accompanying views of the interior and a further description of the building will be of interest.

capacity Q & C air hoist. The arrangement of jib cranes is such that two cranes may be available for each track and as a traveling crane of ample capacity runs the entire width of

the building at the rear there is no lack of facilities for handling heavy parts.

The shop machinery, aside from the air compressor, is driven by a 20-horsepower motor manufactured by the Northern Electrical Manufacturing Company, which is connected by belt to overhead shafting.

The Bury air compressor, which furnishes the operating medium for the air hoists and a Quincy-Manchester-Sargent air hammer, is driven by a 45-horsepower Northern motor, controlled by a Cutler-Hammer starting box, so that its operation is entirely automatic after it is once cut in.

The other shop machinery includes Niagara shears manually operated, a Blount double emery grinder for small tools, a large wet tool grinder, a 22-inch Millers Falls hack saw, a Rahn-Mayer carpenter lathe with a 36-inch swing, an Aurora drill press, a Fay & Egan circular saw, a Dreses radial drill, a National bolt cutter for handling either right or left hand $\frac{3}{8}$ -inch to 1 $\frac{1}{2}$ -inch bolts, and two Buffalo down-draft forges.

From the equipment it may be seen that the shop is provided for handling all but extraordinary repairs and in general it has been the policy here, as well as at other new shops and buildings of the Brooklyn Rapid Transit Company, to erect buildings which should be thoroughly modern in construction, on which a low insurance rate could be obtained, and to install modern equipment adequate for handling all necessary work with facility under all conditions.

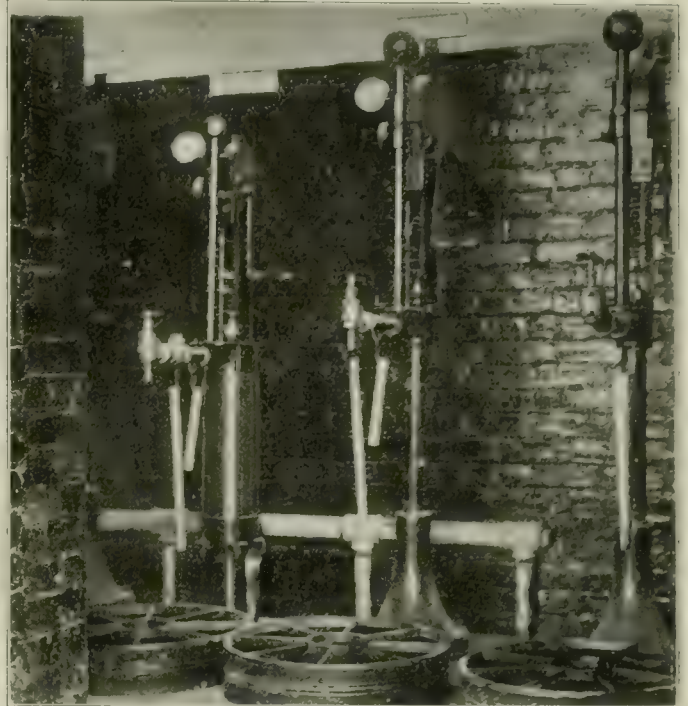
The building is heated and ventilated by a blower system installed by the New York Blower Company, and each inspection pit has sufficient vents to insure the rapid removal of snow and ice from the trucks of cars in winter. The same system also serves to dry the sand in the sand house adjoining the car house.

Oil Storage System.

The oil storage problem has been given the most careful study and attention. The heavy losses by fire in car barns in the past year have encouraged railway as well as insurance companies to minimize to the fullest possible extent the danger from fire incident to the handling and storage of oils. This has been done at Maspeth to the satisfaction of all

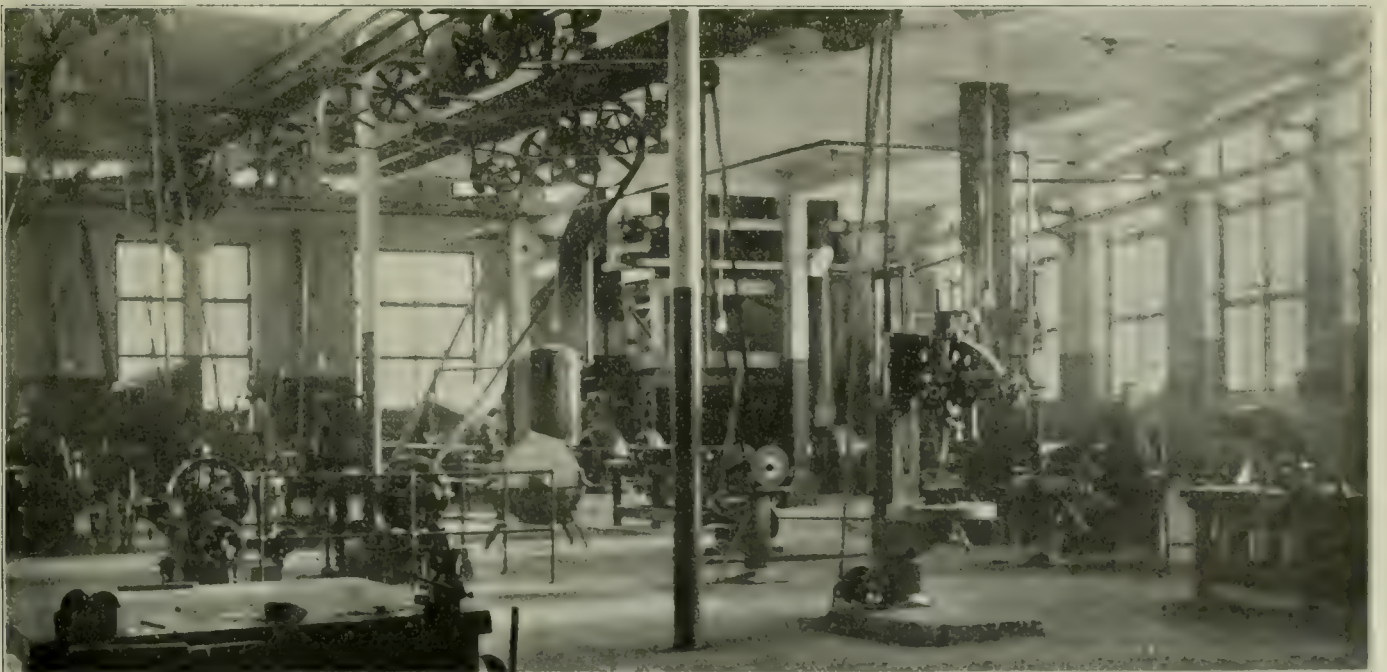
the building proper, although 30 barrels of six different kinds are stored therein and are accessible at all times. All tanks are buried two feet under the concrete floor of the building, and are filled at a point outside of the building by means of a gravity pipe line. This arrangement affords economy in space, as well as reducing the fire risk.

It is proposed to buy oil in tank cars, deliver it by grav-



Maspeth Car House and Shops—Oil Pumping Equipment.

ity into tank wagons, and then in turn distribute the oil to barns similarly equipped with buried tanks. Each tank is accessible through a manhole, fully protected against fire.



Maspeth Car House and Shops—General View of Shop Equipment.

interested, including the New York board of underwriters and the New York bureau of combustibles. The arrangement at Maspeth obviates the necessity of a barrel of oil ever entering

The equipment is such that the amount of oil in the tank, as well as the amount which may be placed therein, is accurately shown, thereby affording at all times a positive

check on the amount of oil bought, received and on hand.

The oils are withdrawn from the tanks by means of self-measuring pumps. These pumps are located in a fireproof room, 4 feet 6 inches by 10 feet, at a point in the barn more accessible to the workmen. This room is amply large to provide for waste soaking boxes, shelves for lanterns, etc. The room is part of the storeroom, and is under the storekeeper's care.

Each oil has a separate pump, which can be set to discharge directly into an oil can or other receptacle any predetermined quantity of oil, from one-half pint to 100 gallons, which it will do at the rate of five gallons each 40 seconds. Each pump is equipped with a mechanically operated meter, which records the quantity of oil discharged by the pump. The meter cannot be improperly manipulated by anyone. Each pump locks itself automatically and can be operated only by the person having its key.

Provision is made for returning to the tank any oil that may be accidentally spilled. The actual amount of oil above the ground and in the pump room is only that in the pumps themselves, which quantity does not exceed one gallon of each kind of oil.

The equipment was installed by S. F. Bowser & Co. (Inc.), Ft. Wayne, Ind.

The force of men at the car barn, aside from the superintendent, dispatcher and shop foreman, is regularly 16 men during the day and two at night, and, as before stated, the number of cars handled varies from 76 in winter to over 100 at times in summer.

ADDITIONAL STATEMENTS REGARDING THE PROPOSED CENTRAL ELECTRIC TRAFFIC ASSOCIATION.

In addition to the letters regarding the proposed traffic association in Central Electric territory, published in last week's issue of the Electric Railway Review, page 865, we have received the following statements from traffic officials interested:

George S. Henry.

George S. Henry, traffic manager Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.: "I think there is little doubt that a permanent traffic organization will be formed as a result of the meeting in Indianapolis. The formation of such an association will, however, require time, and its territorial scope is at present rather uncertain. There is assuredly an ample field for the association in the states of Illinois, Indiana, Kentucky, Michigan and Ohio, just as there has proved to be a useful field for the Central Electric Railway Association, which has devoted itself largely to engineering and transportation questions. The chief object of a traffic association would, or should be, in the first instance, the promotion of traffic, the matter of freight and passenger rates being a means to that end. The interchange of ideas between the various members of the association would be of great value to each company represented, as regards its local business; but the chief use of the association would lie in the fact that it would make possible interline arrangements, which would otherwise not be practicable. This would naturally apply to excursions, as well as to regular passenger and freight traffic. Not only as an agent in putting into effect interline arrangements would the association be of great value, but also as a means of bringing traffic officials together to discuss among themselves the best methods of getting the business to justify such arrangements. On the whole, I think that the early organization of a traffic association is greatly to be desired, although time should, and undoubtedly will, be taken to insure that it does not cover too little or too much territory, and that it shall be effectively organized."

Charles G. Lohman.

Charles G. Lohman, general superintendent Chicago South Bend & Northern Indiana Railway Company, South Bend, Ind.: "It is my opinion that an organization of this character will be formed, because it would not only be beneficial to the interurban lines of this territory, but is becoming an actual necessity. There are numerous matters that an organization of this kind could dispose of in addition to freight and passenger rate schedules. One of its functions should undoubtedly be the promotion of traffic. I believe that any organization or meeting of railway men, and especially traffic men, is a good thing

for the companies they represent, for it has been my experience that at every meeting for the purpose of the exchange of ideas, I have picked up one or two good pointers which, when adjusted to local conditions and put into effect, have not only improved the service, but have increased the receipts. I sincerely hope that this organization will be formed as soon as possible."

J. H. Crall.

J. H. Crall, general passenger and freight agent Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.: "It is too early to tell whether or not a permanent traffic organization will be formed as a result of the meeting that was held here recently, as a committee was appointed to take this matter up and until a report is made it will be impossible to say just what the outcome will be. I think there is a field in the Central Electric territory for an organization of traffic officials, and I think if such an organization would settle matters pertaining to tariffs, freight and passenger rates, it would accomplish all that would be required of it. As for the promotion of traffic, that is a matter which each road will probably take up individually."

Charles F. Price.

Charles F. Price, general passenger agent Western Ohio Railway Company, Lima, O.: "I believe that a permanent organization of this kind would be a great benefit to the electric railways, and there is a field for an organization of this kind. In addition to determining matters relative to tariffs and schedules for freight and passenger rates, it is my opinion that any other matter bearing upon either subject could be rightfully brought before such an association; but it remains to be seen whether it would be advisable for an association to determine and lay down rules and regulations governing anything strictly local in its character, that is, local party rates, excursions, etc. The point I desire to make is that I doubt if an electric railway traffic association should have the authority to govern the regulation of excursions, etc. The subject of promotion of traffic, while not properly coming under this head, I believe could be taken up and the interchange of ideas which would result therefrom would be of very great value."

WORK OF THE COMMITTEE ON UNIFORM ACCOUNTING SYSTEM FOR ELECTRIC RAILWAYS.

The result of the work of the committee appointed to formulate a new accounting system for electric railways was the preparation of two classifications at its meetings in Washington, D. C.; one following the lines of the standard interstate commerce commission classification for steam railways, and another following more closely the existing practice of electric roads. Unless there is some change in the programme these two classifications will be submitted at a conference in Washington on December 10, to which there will be invited by the interstate commerce commission representatives of the American Street and Interurban Railway Association, the American Street and Interurban Railway Accountants' Association, some state associations and some individual companies.

The committee was in almost continuous session at the office of the interstate commerce commission, Washington, from November 29 to December 3, except Sunday. The names of the members of the committee as originally appointed were published in the Electric Railway Review of last week, page 864. As it was found that W. Caryl Ely of Buffalo, N. Y., would be unable to attend the meetings of the committee as representative of the American Street and Interurban Railway Association, Charles O. Kruger, second vice-president and general manager of the Philadelphia Rapid Transit Company, was appointed in his place, with G. H. Harries, vice-president Washington (D. C.) Railway & Electric Company, as alternate. The committee organized by electing General Harries chairman, with the understanding that he should vote for the American association when Mr. Kruger was not present.

It was found later that Mr. Kruger would be unable to attend the meetings and Alexander Rennick, third vice-president Philadelphia Rapid Transit Company, was appointed to take his place, and, together with General Harries, repre-

sent the American Street and Interurban Railway Association.

At the opening sessions of the committee there were present C. Loomis Allen, representing the Street Railway Association of the State of New York; C. F. Balch, representing the interstate commerce commission; W. O. Seymour, representing the Connecticut railroad commission; W. J. Meyers, representing the second district public service commission of New York; W. F. Ham and F. R. Henry of the American Street and Interurban Railway Accountants' Association, only one being entitled to a vote; and General Harries representing the American association.

Invitations were extended to various street railway officials to attend the meetings and express their views. After discussion in sessions lasting all day Friday and Saturday a recess over Sunday was taken to permit Mr. Balch, representing the interstate commerce commission, to prepare a revised interstate classification, and the street railway interests to prepare a revised tentative electric railway classification.

We have received the following from our Washington correspondent:

In the committee's discussion of the subject in hand the following divergence of opinion was developed. Representatives of the interstate commerce commission were found to favor such modifications of the system of accounts as would result in bringing electric railway accounting more nearly into harmony with the uniform system devised for steam railways. In particular equipment depreciation accounts, such as have been devised for steam railway accounting, were urged for the electric roads. On the other hand were represented the opinions of the purely intrastate and street railway accountants, to the effect that it would be asking too much to request them to conform all the details of their accounting systems to the details of the steam systems. The interstate commerce commission finds as the result of inquiry that 20 per cent of the electric railways do an interstate business.

At the first informal meeting held on the subject in Washington on November 29 the meeting organized by electing Prof. H. C. Adams chairman. The resolution which provided for the appointment of the committee was offered by Milo R. Maltbie of the New York public service commission, second district. It provides "that a committee be appointed by the chairman of this conference to consider and draft a tentative classification of accounts for street and interurban railways to be submitted to this conference on Tuesday, December 10."

BRANFORD-STONY CREEK LINE OF THE CONNECTICUT COMPANY.

The Connecticut Company on July 4, 1907, commenced service on the Branford-Stony Creek line extending from the terminus of the old Branford line at Branford Green to Stony Creek, Conn., a distance of six miles. The line is laid with 80-pound steel rail, 6 by 8 inch ties 8 feet long, and gravel ballast and the overhead is No. 0000 round trolley wire.

The line follows the highway for about one-half mile, then turns on to private right of way, crossing Branford river on a 40-foot plate girder bridge, the double-track Shore Line division of the New York New Haven & Hartford Railroad on a through truss of 157 feet span, and a highway on a 20-foot plate girder. Two miles from its starting point it enters the highway, where for one-fourth mile it is within a stone's throw of the shore of Long Island sound. Then follows a short stretch of private right of way and the line again enters the highway and for three-fourths of a mile runs through the wealthy shore settlement of Pine Orchard. Again on private right of way it cuts through two rock ledges, one having a length of 500 feet and a maximum depth of 18 feet, the other nearly 600 feet long, with a depth of 31 feet. Preceding the first, between the two and beyond the second of these cuts the line is on salt meadow. In the fifth mile it enters the settlement of Stony Creek and runs down the main street for practically a mile and terminates at the sound, fac-

ing the Thimble islands. The grading was made difficult by the fact that although not a large amount was handled for the length of the line, approximately 60,000 yards, it was bunched in very heavy cuts, two of the heaviest being solid rock.

The fills across the salt marshes are for the most part carried on the surface of the marsh, there being very heavy sod. At one or two points, however, where old creek channels had cut through, it was necessary to fill to hard bottom, some 20 feet below the marsh surface. With the exception of these two or three weak spots the marsh sections have given no trouble.

The river, railroad and highway bridges have concrete abutments and are designed, as are the others, for 50-ton cars, being old railroad bridges modified slightly where necessary. A number of small streams in the marshes are carried through the fills by wooden boxes, the extreme depth to solid bottom making a masonry or concrete structure undesirable. Just east of the heaviest rock cut, however, the line crosses Stony creek by a through truss of 100 feet span. Owing to the uncertainty of its foundation and the behavior of a somewhat similar bridge in the vicinity, this structure is carried on pile clusters at each end surrounded by a heavy rock fill, which goes down to the solid bottom below. It is the intention when this fill has come to rest to cap it with a small concrete abutment.

Although a comparatively short line, this extension passes through a very beautiful section and its patronage demanded a revision of the timetable almost before it was put into effect. At present cars are run on a 48-minute headway during the morning and a 24-minute headway during the afternoon.

ANNUAL REPORTS.

Massachusetts Electric Companies.

The combined income accounts of the companies controlled by the Massachusetts Electric Companies of Boston compare, for the last three fiscal years, as follows:

Year ended June 30—	1907.	1906.	1905.
Gross earnings	\$7,758,511	\$7,518,240	\$6,734,127
Expenses	5,000,653	4,883,552	4,456,303
Net earnings	\$2,757,858	\$2,634,688	\$2,277,824
Charges	1,702,623	1,594,503	1,543,514
Balance	\$1,055,235	\$1,040,185	\$ 734,310
Dividends	880,773	710,406	372,448
Surplus	\$ 174,462	\$ 329,779	\$ 361,862

An abstract of the statement of Gordon Abbott, the president, to stockholders, follows:

The net results have been nearly identical with those of last year. There has been a certain amount of variation in the items—gross earnings increased \$240,271, winter expenses were larger, cost of accidents was smaller—but the final result of all these variations is that net divisible income increased \$15,050, or, in other words, remained substantially the same as last year. The freight and express business has shown a gratifying increase on those parts of the Old Colony Street Railway where it has been put in operation, but it has not been possible even yet to secure all the necessary rights to carry freight over the whole of that system. Still less has it been possible to do so on the Boston & Northern Street Railway. Delays have been numerous because town and city governments have in many cases demanded concessions which it has been impossible to grant. The officers of the operating companies are giving these matters their attention, and have no doubt of ultimate success, but at present the freight receipts, though they have increased rapidly in the restricted area where the business has been done, are but a small part of the total gross earnings.

With respect to the physical condition of the property, the trustees can again repeat what they have said each year for some time past: It has improved over that of last year. Liberal charges to operating expenses for maintenance have been supplemented by the expenditure of \$1,574,680 for construction, reconstruction and the purchase of additional rolling stock and other property. Whether or not it will be judicious to spend during the coming year the balance required to com-

plete the reconstruction of the property will depend upon the general business situation, and the trustees do not intend to approve of any considerable new expenditures until that situation shall be clearer than it is at present.

The above-mentioned expenditure of \$1,574,680 during the year just closed has been divided in round figures as follows: Track construction, \$158,000; track reconstruction, \$393,000; cars and electrical equipment, \$555,000; wire and bonding, \$42,000; power stations, \$294,000; land and buildings, \$111,000; sundries, \$20,000.

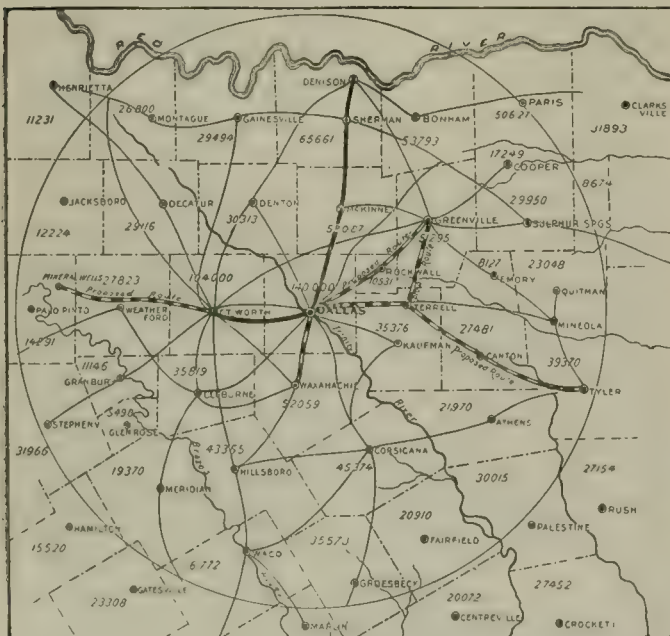
Twelve miles of track have been built, 24 miles of old track rebuilt, 91 new cars, 25 snow plows and 558 motors have been bought, and 25 miles of new wire strung.

In the last annual report it was stated that additional machinery was in process of installation at Salem and Haverhill, and that it had been found necessary to order more for Lynn and Chelsea. The first-mentioned additions are not yet completed, owing to some mechanical difficulties which developed in the machinery after it was installed. The installations at Lynn and Chelsea have been finished, and it is expected that those at Salem and Haverhill will not be much longer delayed. When these stations are completed, there will be no considerable additions required for power anywhere on the system until there has been a large increase in business. Similarly, the purchases of cars have supplied sufficient rolling stock.

It was of the utmost importance that the work outlined two years ago should be done as quickly as possible. Without it the system could not have been operated economically and successfully. And in view of the developments of the general financial situation during the past year, the trustees are of opinion that the wisdom of omitting the payment of dividends has been sufficiently demonstrated. The failure to pay dividends during the past year was not due to lack of earning power, or to disastrous losses from accidents. The earning power has proved excellent. The trustees expect that, when the operating companies shall have completed the reconstruction of their property, they will be in such physical condition as to require only ordinary annual expenditures for maintenance and reconstruction, and that they will then be able to finance their needs without drawing from the treasury of the Massachusetts Electric Companies the dividends they pay in.

THE DALLAS INTERURBAN ELECTRIC RAILWAY.

The Dallas Interurban Electric Railway Company was incorporated several months ago with a capital stock of \$2,800,000 to build about 30 miles of street railways in Dallas, Tex.,



Operating and Proposed Interurban Lines Out of Dallas, Tex.

and also interurban lines from Dallas to Sherman, Denison, Greenville, Terrell and Tyler, Tex. The immediate purpose, however, is to build from the Santa Fe depot in Dallas to Terrell via Orphans' Home, Forney and Mesquite. Surveys have been made and valuable franchises and right of way

have been secured, including a franchise for 23 miles of city lines in Dallas. The American Engineering Company of Indianapolis, Ind., has made a favorable report on the project and has been awarded a contract for the construction of the line. It is proposed to build the road on a private right of way with independent terminals and the estimated cost is \$25,000 per mile.

Dallas is said to offer unusual opportunities for an interurban line and the steam roads now serving it are taxed to the limit of their capacity. The population tributary to the proposed line between Dallas and Terrell is estimated at 1,200 per mile, including the territory for three miles on either side of the survey, and giving a credit of 18 per cent to the city of Dallas, which has a population of 85,000. The company has no intention of carrying freight.

The physical condition of the route is very desirable, permitting of favorable grades and curves. Most of the territory is level prairie. The Trinity river will be crossed at two points. Through the lowlands of the east fork near Forney there will be required $\frac{1}{2}$ mile of 8-foot trestle and about 1,000 feet of similar trestle will be necessary through the bottoms near Lawrence. It is proposed to locate the power house at Dallas.

The accompanying map gives a good idea of the interurban situation around Dallas at the present time. The Northern Texas Traction Company is operating a line from Dallas to Ft. Worth and the Ft. Worth-Mineral Wells Interurban Railway has started grading on a line to Mineral Wells. Another company has secured a franchise for a line to Waxahachie. The Texas Traction Company of Dallas is now making rapid progress on its line from Dallas to Sherman and expects to have cars operating shortly after the first of the year. Much of the track has been laid and the power house at McKinney is nearing completion.

The officers of the Dallas Interurban Electric Railway are: President, D. E. Waggoner; first vice-president, I. J. Willingham; second vice-president, J. Mercer Carter; third vice-president, Charles T. Alexander; secretary, S. A. Stemmons; treasurer, M. H. Wolfe, all of Dallas.

The British Columbia Electric Railway, Vancouver, B. C., has purchased a charter for the construction of an electric railway between Vancouver, B. C., and the international boundary line at or near Blaine, B. C. The company also has secured an option on the Lillooet river power plant, the water rights for which were secured two years ago by Hermon & Burwell, engineers and surveyors of Vancouver. It is said that an electric road, backed by James A. Moore of Seattle, Wash., will meet the proposed Vancouver line at some point on the boundary, affording direct communication between Vancouver and Seattle, Wash. The charter also covers a branch line to Chilliwack. If built the line will parallel the Great Northern for the greater part of the distance. The charter originally was granted to other interests of Vancouver, but on account of the death of the principal promoter, Dr. Lefevre, the British Columbia Electric Railway Company purchased it and its officials have been elected to office in the new company. It is stated that contracts for the grading and construction of the line from New Westminster to Chilliwack will be let some time this month and work will be started within the near future. The line when completed will be 62½ miles long and will serve the towns of Delta, Surrey, Langley and Matsqui. It is said that the line will be constructed and placed in operation as far as Cloverdale by the end of December, 1908. Work on this section was begun on August 26 last. The cost is estimated at \$2,500,000, the money being subscribed almost entirely by English capitalists.

The Wells-Fargo Express Company on December 1 began handling express matter over the Pittsburg & Butler Street Railway between Pittsburg and Butler, Pa.

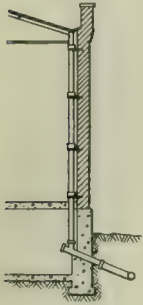
PIPING AND POWER STATION SYSTEMS—XLV.

BY W. L. MORRIS, M. E.

Class U 2—Tile Sewers from Roof Conductors.

The main branches that carry the roof water are subject during a heavy rain to sufficient pressure to raise water out of the basement catch basins. If possible the roof should be divided so that a small surface will drain into the closet sewers and flush out the soil pipe.

The conductors from high or hot roofs should be run on the inside of the building in a warm place. The heat of the roof often will melt the snow in cold weather and therefore the conductor should be protected from low temperatures. Figure 381 (U 2-1) shows a conductor for flushing joined to a section of copper spout which is run down into the iron conductor. The iron conductor may be of light cast-iron soil pipe with calked joints and a cast-iron Y built into the wall to receive the lower end of the down spout. The different pipe sections should have substantial wall anchors and the Y at the bottom should have a cap with a cemented joint, so that it can be removed if it becomes necessary to clean out the conductor or branch to the sewer.

Figure 381
(U 2-1).

The outside sewer connections should be of tile pipe, as there is no advantage in the use of metal pipes unless they pass under walls or foundations. In establishing the depth at which sewers are to be placed it must be remembered that water may pass from the roof, even though the temperature be very low. Also the heat of the power plant and water passing in sewers raises the temperature. Waterworks lines are generally located 5 feet below the surface. Sewers close to the buildings laid three feet below the surface would be quite as safe as the water lines. If the plant is large it may be necessary to use large sewers with a slight pitch, so that the highest connection will not be less than three feet from the ground surface and the discharge of sewer above normal water level.

It is not necessary that the entire sewer system discharging to a river lie above extreme high water. As high water conditions are of short duration water may be allowed to back into the main as long as it does not overflow any of the floor drains. The fall, however, must be given careful consideration if paper is to be discharged into the sewer, as a slight obstruction where the flow is very slow will cause the paper to block the line completely. The sewers from soil pipes should not be retarded by water rising and filling the discharge end of the sewer.

Class U 3—Tile Sewers from Plumbing Fixtures.

Sewers from the lavatories are generally difficult to lay out. If the condenser discharge waterway is built of concrete then a separate soil pipe may be carried in the concrete, as shown in Figure 382 (U 3-1). Sewer tile or a collapsible wood frame could be used to form the soil pipe opening. Probably it will be found cheaper to lay the soil pipe in the fill over the concrete; or if this brings it too close to the surface of the ground it might be laid alongside, as dotted at A, in Figure 382. This separate sewer pipe should extend beyond the blow-off cistern in the waterway, otherwise it will contaminate the condenser discharge waterway. By this method there will be no fumes rising from the waterway into the station.

The lavatory should be located in the basement at the outside wall, as shown in Figure 383 (U 3-2). If the conductor should be at a corner, as A, then it can be run back along the wall or the sewer can make a loop to include the conductor. Plumbing fixtures should be so arranged that the

water from the wash basins, shower bath and a small roof conductor are made to pass through the line that leads from the closets. This will insure that the line will be well flushed.

Another detail in connection with the sewers from water closets is that as they are liable to become blocked they

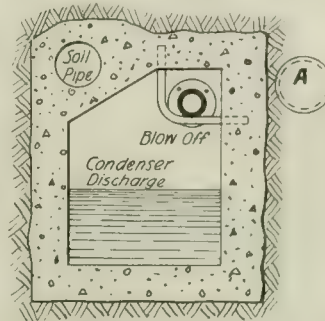


Figure 382 (U 3-1).

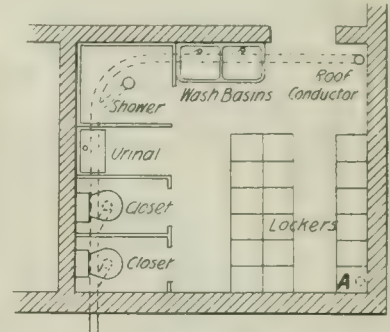


Figure 383 (U 3-2).

should not be run under engine foundations, boiler rooms, or with many branches and bends in places where they cannot readily be taken up.

Class U 4—Tile Sewers from Floor Drains.

The boiler room and basement floors should be so arranged that they can be cleaned with a hose. To do this satisfactorily it is necessary to have a large number of catch basins and ample pitch to the floor. Figure 384 (U 4-1) shows a floor with the pitch run to suit the catch basins. The pitch boards should be set on the lines A and the gutter strips placed at B, both strips to be removed after the concrete and cement top is in place, previous to finishing the surface. The slots, A, are to be filled with cement and sand. The gutters, B, should be about two inches deep, with the corners well rounded. The pitch of the gutters and floors should be about $\frac{1}{4}$ inch to the foot, which makes it necessary to place the top of the catch basin below the surrounding floor level, as shown in Figure 385 (U 4-2). The distance, A, in many cases is as much as four inches, and with the catch basin set low a bad hole in the floor is made. If an extension side drainer is used as shown, then the grating can be placed in the top and the floor concrete floated to the top of this extension

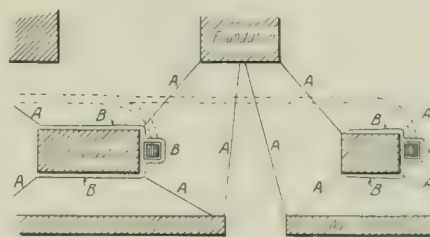


Figure 384 (U 4-1).

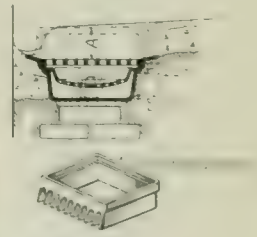


Figure 385 (U 4-2).

piece, thus making the floor level. Water will discharge between the fingers at the side of the extension piece and above the fine sieve grating. The catch basin has a side outlet, and no trap. This allows the connection to the basin to lie high and also be entered easily with a rod or hose when being flushed.

These floor drains should not empty into the lavatory sewers, unless a trap is used, with means available for cleaning out sand or other material that may be washed in from the floor. If the floor drains in the basement are on practically the same level as the sewer, it may be necessary to use a non-return sewer check valve, as shown in Figure 386 (U 4-3). The check discharges into a cistern which has its sides carried above the floor to prevent overflowing in case of the sewer running full under a slight back pressure. This check is always open to inspection and should it fail to close

It might be closed by hand. Floor drain outlets should be placed in this well just above the bottom of the main sewer, so that the well will drain itself as soon as the sewer becomes empty.

Sewer checks are so made that they can be placed in a line outside of the well but when so placed their operation cannot be observed. A trap similar to that in Figure 386 would be suitable for use if the floor drains discharged into the lavatory sewer, the check being omitted and some form of manhole plate and frame placed at the floor line.

Wherever ashes are wet down in front of boilers a cistern is useful if located in a central position so that the

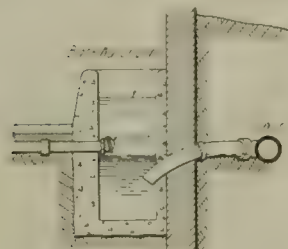


Figure 386 (U 4-3).

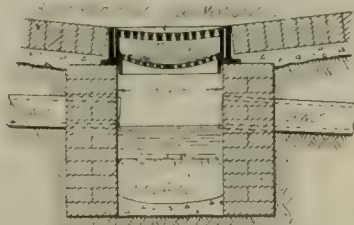


Figure 387 (U 4-4).

different catch basins may be separately drained into it. In a large plant it may be necessary to use a number of these cisterns, having a small well at each sewer grating and carrying the discharge from one to the next, and so on, as shown in Figure 387 (U 4-4), with the iron gratings carried in a square frame. The runs from basin to basin should be short and straight. The last cistern in the series should be much larger and deeper than the others, to protect the sewer from that point on. If necessary, a fine wire cylindrical screen can be placed at the last discharge.

If the engine room floor is of cement or tile the drain would be laid level because in washing the floor but little water would be used. The drains then might be small and located under the hose valves. A small catch basin should be placed below the surface of the floor, as shown in Figure

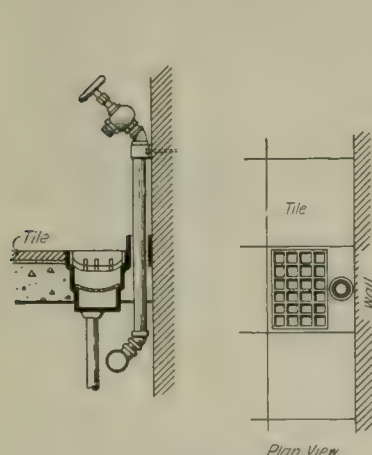


Figure 388 (U 4-5).

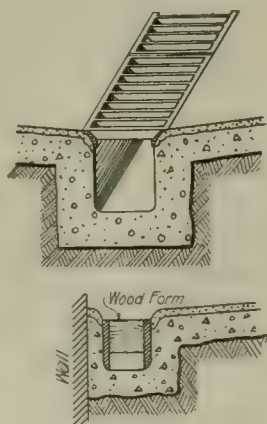


Figure 389 (U 4-6).

388 (U 4-5), with the water connection as passing through a raised boss in the small drip sink. This boss prevents the drips from running down the water pipe. If the floor is marble or tile then the body of the sink should be galvanized to prevent its rusting and staining the floor. The shape and size of these sinks should correspond with the size of the tile to be used. The water valve should be attached to a 45 degree elbow so that the hand wheel will clear the wall.

In many plants where the basements have practically no fall, an open sewer can be used. Figure 389 (U 4-6) shows two open sewers, one covered with a grating, so it may be stepped on, and the other next to a wall and without a cover. The

wooden form as shown in the uncovered sewer is required for placing the concrete flooring. An advantage of this type of sewer is that but little pitch is required. Tile sewers should not be used if the pitch be less than $\frac{1}{4}$ inch per foot.

Class U 5—Tile Sewers from Ash Wetting Floor.

The catch basin which receives ash laden water should be so designed that the tendency will be for heavy cinders to fall away from the sewer pipe discharges while fine particles rise and are carried by the slow movement of water in the catch basin to the more rapid current in the sewer pipe. These requirements are well provided for by the catch basin shown in Figure 378.

Ordinary sewer details as employed for carrying away water will not handle ashes without becoming blocked. A sufficient flow to carry away the precipitation is impossible. Heavy materials such as ashes should be stored in the sewerage system where they can be reached and not forced into the main line.

Class U 6—Tile Sewers from Boiler Washouts.

Tile sewers leading from boiler washouts are shown in Figures 373 and 374. These have catch basins similar to that shown in Figure 385. If water and scale were discharged on to a floor or the bottom of pit as shown in Figure 374, and if the drain from this discharge were allowed to flow over a wide surface to a sewer a considerable distance away, then the velocity of the water passing over the floor would be less

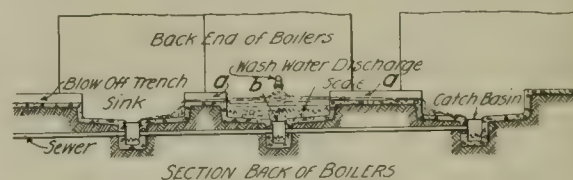


Figure 390 (U 6-1).

than through the sewer and the fine particles carried by the slow-moving water would not be carried with sufficient force to pass them through the sewers.

An illustration of this principle is shown in Figure 390 (U 6-1). The middle boiler is shown discharging water and scale into the pit, the heavy particles falling and water overflowing through the blow-off trenches at A. In operation the pit, B, is shut off before the workman begins to clean the boiler. Thus the pit becomes a precipitation chamber. The light material rises to the surface and passes the overflow, A, reaching the sewer in a flow of high velocity. The catch basins here shown have the same design as those shown in Figure 388. If the cleaning of the catch basin shown in Figure 387 is neglected it fills up to the level of the discharge sewer and the particles will work into the main line.

Another form of catch basin, and one that shuts off the water discharge whenever it becomes choked with deposits, is shown in Figure 391 (U 6-2). This design is similar to that shown in Figure 387, but it has a central cone-shaped feeder which will become choked when the lower end comes in contact with the deposits at the bottom of the catch basin. The basin shown in Figure 391 can be used as shown in Figures 387 and 390, with the sewer passing through it, or all the branches can be run to a sewer line with Y fittings, thus offering little or no chance for anything getting into the line that will not pass through it. The cone-shaped feeder is similar in operation to the coal feeders used in hard coal stoves, the amount of material in the cone having no effect in raising the deposits in the cistern above the bottom of the cone. The inside grating has a handle and can be taken out quickly to allow the removal of cinders.

Class U 7—Tile Sewers from Economizers and Heaters.

Since loose scale is discharged with the wash water, the sewer arrangement for economizers and heaters should be

much the same as for boilers. Rather than build complicated catch basins to keep scale out of sewers, it may be found cheaper to use some portable separating device which may be placed at any washout outlet and the discharge from this separator allowed to flow to a simple form of catch basin. If the washout outlets are two feet or more above the floor line, then it will be possible to have such a separator mounted on wheels so that the scale collected can be removed to a convenient place for dumping. The simplest device for this purpose, however, would be a long, narrow box, say 3 feet wide, 12 inches high and 8 feet long, designed to allow the water to overflow its edges. Any material washed away with the water would be carried through the sewers. This box should be made of metal and if made of No. 12 plate

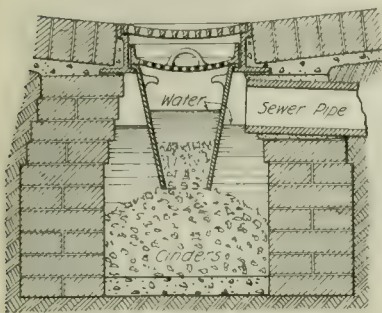


Figure 391 (U 6-2).

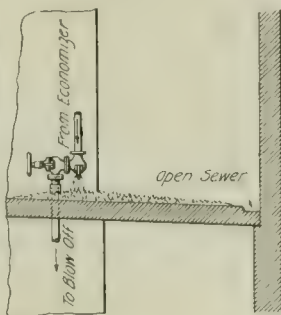


Figure 392 (U 7-1).

could be readily handled, if not mounted on wheels. A practical arrangement is shown in Figure 392 (U 7-1). The discharge from the washout which drops on to the pitched floor will run to an open drain connected to a catch basin.

Class U 8—Tile Sewers from Blow-Off and Grease Tank.

The sewer from the blow-off tank should be arranged as shown in Figure 377, so that steam may escape and the water be discharged under control of a valve. Floor drains from catch basins, as shown in Figures 385 and 387, should not be run into a line that carries the blow-off water unless a trap is used to prevent the steam from passing back into the building.

Class U 9—Tile Sewers from Pumps.

Steam cylinder and pan drips should be led to a grease trap through the grease sewer, as shown in Figure 378. The catch basins can then be used as floor drains. If two pumps stand close together it is generally possible to make one catch basin serve both. The relief valves of such pumps should be piped to a point about three inches above the grating of the catch basin. Pumps having outside packed plungers should have a pan, as shown in Figure 380. Instead of water and oil being allowed to drip into the pan and mix, there should be a dividing partition, the drips from the water end discharging into the catch basin and the drips from the steam end running into the grease sewer. This division allows the water drips to discharge at all times.

Class U 10—Tile Sewers from Filters.

The cold water filters can be drained to the sewer if the waste water is discharged into a well or basin open to the air. A sealed connection should not be used if the discharge is under pressure, because a pressure of one or two pounds would be sufficient to cause damage to the ordinary sewer. If the filter is to discharge under pressure, then it should be connected to the blow-off system. Oil filters and tanks should discharge their grease, together with the hot wash water, into the grease sewer. The automatic water discharge shown in Figure 356 should discharge to the tile sewer. There will be no grease in this water and the connection can be open to the atmosphere at all times.

The washings from the precipitating tank, Figure 357,

should also be run to the grease sewer. It may seem at first that it is poor operation to discharge the contents of a grease trap into a precipitation tank, then wash the grease that hangs to the side of the precipitation tank back into the grease trap. This clinging grease, however, is no more refuse than that which is drawn off to be used, and if it is not reclaimed at one time it will be at another if returned again to the grease trap.

Class U 11—Drain Tile Sewers.

The tendency of drain tile is to produce a uniform moisture condition of the soil by draining water from wet to dry soil. To prevent damp walls the following features should be considered: (1) As much water as possible must be removed from the soil lying against wall. (2) The wall must be made impervious to water. (3) The inside face of the wall should be sufficiently well ventilated to carry off the moisture.

The first requirement is the only one that can be improved by the use of drain tile, and the more open the soil the more essential becomes the use of tile. With regard to the second requirement, a wall may be watertight through certain portions and yet afford regular channels at frequent intervals. Concrete laid at different times offers fissures through which water can flow. Brick work and stone work have enough open joints to keep moist the entire surface of a wall. Plastering the outside of the wall, if done all at one time, will serve best to make the wall watertight. If drain tile is used at the bottom of the wall, as shown in Figure 393 (U 11-1), then the different sections of ground would have varied amounts of moisture. The different days' work of concrete

are shown by the lines at B. If a course must be stopped before finishing it should be run down at an angle as shown and the step maintained as though it were longitudinal. The drain will prevent water from filling the soil and the joints are "weathered" so that water cannot flow through.

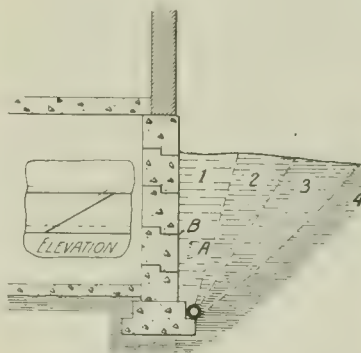


Figure 393 (U 11-1).

The drain tile at the bottom of the wall will drain only the ground

above it, so it is necessary to place the drain well below the floor line. If the sewer that the drain tile empties into lies high, necessitating placing the drain at A, then all the concrete below the joint, B, should be laid at one time.

(To be continued.)

The Railroad Gazette presents figures for the total number of persons injured by the third rail in England from 1904 to 1907. The return undoubtedly shows that as people become more accustomed to the third rail, the number of accidents tends to decrease, in spite of the steady increase in the electrified mileage. While in 1904 there were 28 accidents, eight of which were fatal, during the first eight months of the present year there were only 14 accidents, two of which were fatal, and even this small number of accidents was largely made up of trespassers. The grand total, 1904-1907, is 16 killed and 71 injured, but out of this number 12 of the fatal accidents and 25 of the injuries were to trespassers. On the whole, in view of the increase of third-rail mileage which has taken place, more especially in the London district, the number of accidents from this source seems small.

The Evansville & Southern Indiana Traction Company has recently opened its new passenger and freight station at Princeton, Ind. The structure is of brick and stone and presents a very handsome appearance.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Passenger Holding Articles and Not Steadying Herself by Her Hands on Entering Car.

Randall v. Providence & Danielson Railway Company, 67 Atlantic Reporter, 419.—The supreme court of Rhode Island says that it was contended that the verdict of the jury in this case in the plaintiff's favor might be sustained on the ground that there was evidence tending to show that the car was violently started when the motorman saw that she was standing without support from her hands. But the court thinks that the evidence so strongly preponderated against the verdict that a new trial should be granted. It says that the plaintiff herself said she had both hands filled with articles she was carrying, and did not steady herself by her hands as she entered and approached the seat. All the other witnesses who were on the car either testified that there was no extraordinary violence in the start or that they did not notice any. Her fall would seem to have been caused by her neglect of such ordinary precautions as a prudent person would take in entering a car about to start.

Curved Rail Connections Cannot be Arbitrarily Removed by Board as Nuisance.

North Jersey Street Railway Company v. Board of Street and Water Commissioners of City of Newark, 67 Atlantic Reporter, 691.—The court of chancery of New Jersey holds that the power of the board of street and water commissioners of a city over nuisances does not extend to the removal arbitrarily or until after trial in a competent court of a structure of the character of curved rail connections of street railway tracks on two streets, maintained under a claim of right derived from legislative acts, or city ordinances, or both. It says that the construction and operation of the tracks in question, if made under legislative authority, could not be a nuisance, and the principle of lack of power in the city officers or common council to acquiesce in a nuisance did not apply. The principle which did apply was the principle relating to an acquiescence in a location of the tracks by both city and company.

Liability for Insult to Passenger—Conductor Enforcing Law Requiring Separation of Races—Calling White Man a Negro.

Wolfe v. Georgia Railway & Electric Company, 58 South-eastern Reporter, 899.—The court of appeals of Georgia holds that it was error to sustain a demurrer to a petition in an action for damages for an alleged insult by one of the defendant's conductors insisting that the plaintiff sit with the negroes, because he thought he had seen him with some colored people.

The court holds that a common carrier is responsible for the proper treatment of its passengers, and is bound to protect them from insult, as well as from physical injury. Where the insult is offered by one of the carrier's servants, the duty of protection is even stronger and more binding than where the offending party is a fellow passenger, and for humiliation or wounded feelings caused by such insult a passenger is entitled to recover. It is immaterial whether the insult is caused by malice or is the result of negligence on the part of the carrier's servant. Injury caused by omission to protect is none the less actionable than that by commission.

In enforcing Section 527, penal code of Georgia of 1895, requiring the separation of races, the conductor is still the agent and servant of the corporation, and the liability of the corporation for his acts as such is not diminished by the delegation of police power. The police power is granted to better enable the corporation to discharge its duty of protecting its passengers, but the burden of exercising extraordinary diligence in the protection of the passenger is not

lightened. If an honest mistake be made after extraordinary diligence has been exercised, the carrier would not be liable. Good faith, unaccompanied by freedom from fault (that degree of freedom from fault recognized by law as applicable between carrier and passenger), is no excuse for an insult offered by a servant of the carrier to a passenger who suffers injury. The good faith of the transaction can only be considered in mitigation of the damages.

To call a white man a negro, or to intimate that a white man is of African descent, under certain circumstances, may be an insult, and, dependent upon the circumstances, may be actionable.

Validity of Contract for "Necessary Ballast."

Blue Grass Traction Company v. Hedges & Adair, 104 Southwestern Reporter, 370.—The court of appeals of Kentucky holds that in a contract to furnish a traction company necessary ballast for its track in a certain county, the words "necessary ballast" made the amount of ballast contracted to be delivered sufficiently certain. It says that if the contractors had failed to carry out their contract, the company could have sued them and recovered damages for all over \$1.00 per cubic yard (the contract price) they were required to pay for the ballast reasonably necessary to complete the road. That being the case, it was manifest that they would be entitled to recover damages if the company broke the contract. That the size of the ballast was not specified would not be fatal where they had already furnished a large amount of ballast when the breach of the contract occurred, the presumption following that the ballast for the remaining portion of the track was to be of the same size, or of the size usual and customary for the purposes for which it was needed.

Negligence in Maintaining Night Signal on Center Pole—Invitation to Cross Tracks—Signal and Response Make Passenger.

Karr v. Milwaukee Light Heat & Traction Company, 113 Northwestern Reporter, 62.—The supreme court of Wisconsin says that the defendant, an interurban common carrier operating its electric cars by the center pole overhead system, had on one of the poles at a station a device for holding up a rod or lever closing an electric circuit, causing an electric light to appear 10 or 12 feet up on the pole, thus enabling prospective passengers to signal approaching cars at night. On this night signal device there were printed instructions for such passengers in these words: "Hold up handle until car is in sight." This same signal was employed for northbound and southbound cars, but the southbound cars stopped within 25 feet, and before reaching the signal light, while the northbound cars ran 25 feet past the signal light to reach the stopping place. Taking the position of the signal light in the center between the tracks, the printed directions thereon, and the necessity of boarding the car on the side of the car opposite to the signal light, there was an invitation to night passengers to cross the track to the signal light in order to give the signal, and to cross the track again after giving the signal in order to board the car.

The plaintiff, on a dark, foggy night, intending to board a northbound car, crossed the east track to the signal light. When he heard the car approaching, he pressed on the rod and displayed the signal light standing on the east side of the pole. As soon as he saw the headlight of the approaching car, he let go the signal light, which immediately extinguished, and started eastward briskly, crossed the east track, and was struck by the car. When he in good faith signaled the approaching car in the regular and recognized manner, and the motoneer responded to that signal by whistle or the act of setting his brake, the plaintiff became a passenger.

The jury was authorized to infer from the evidence that the plaintiff, as a reasonably prudent man, understood that he was obliged to cross the east track in order to board the car in question, and to cross at the time and in the manner in

which he did cross, and that due care would be exercised by the defendant for the safety of those so crossing by stopping the car south of or at the signal light. The jury had also the right to consider that the plaintiff was so near the inner rail and in such a position in giving the signal that an ordinarily prudent man, knowing that the car would stop only for a moment to permit him to embark, might have considered it the proper course to cross the track at the time, and in the manner in which he did cross it in order to enter the car. There was therefore evidence to sustain the finding of the jury negating contributory negligence, and there was also evidence to sustain the finding of the jury that the defendant was guilty of negligence in maintaining this signal for the use of passengers at the place and under the circumstances in question, and also in the operation of its car on the night in question in approaching such a place.

Condemnation and Other Powers of Interurban Railways Incorporated Under General Railroad Act—Statement of Termini—System of Street Railways Not Authorized.

Gillette v. Aurora Railway Company, 81 Northeastern Reporter, 1005.—The supreme court of Illinois says that interurban railways, which have generally been incorporated under the general railroad act, but which are largely devoted to the carriage of passengers, would fail of their usefulness if they were not permitted to make such arrangements with cities, villages and towns as would enable them to carry passengers, baggage and express on the streets, without carrying freight. Such a road may enter or pass through a city, and the right to lay the tracks in streets may be granted, subject to the conditions agreed upon, and the corporate authorities may limit the use of a street to the carriage of passengers, express and baggage. The corporate authorities may consent to the use of a street upon such terms as they see fit to impose, and, if this company were otherwise authorized to exercise the power of eminent domain, the fact that it does not carry freight, but is only authorized to carry passengers, express and baggage in the street, and is to stop at the street corners, does not prevent it from condemning property.

But the act under which the company was organized, the court says, authorizes incorporation for the purpose of building a line of railroad with fixed termini, between places named in the articles of incorporation. It is neither designed for nor adapted to the construction and operation of a system of street railways within a city. In this case the articles of incorporation stated the routes and termini of the road, as follows: "It is proposed to construct the said railroad from and between points in the city of Aurora, Kane county, Illinois, to points outside of said city and adjacent thereto, connecting with lines of its railroad running around said city." Where a railroad is incorporated with one terminus at a city, it is sufficient, and the charter would authorize fixing the terminus at any point in the city. But here the articles provide for an indefinite number of lines from points within the city to points outside. If there were, in fact, lines outside of the city and running around it, the power assumed by the articles would not be exhausted by building a line on Galena street, or any other number of lines; but they would authorize building a whole system of street railways. As the lines are to connect with belt lines adjoining the city, they would be wholly within the city. The general act under which the company is organized does not authorize anything of that kind.

As before stated, an interurban road organized under the general act may enter a city or pass through it, and, if it shall be permitted to occupy a street, it may be required to carry only passengers, mail or baggage on the street, or be otherwise limited as to carrying freight, or the location of its freight depot; but the legislature never intended that a system of street railways should be built within a city by a commercial railroad, even if the termini in the company's articles of incorporation could be held sufficient.

News of the Week

Traffic Conditions in London.

Sir J. Clifton Robinson, managing director of the London United Electric Tramways Company, who is making a trip around the world and was a visitor in New York last week, in an interview in regard to traffic conditions in London said:

"The people of New York are seeking to do away with straphanging, while the masses in London, who are now beginning to realize the value of time, are trying to introduce it. The police there rigidly enforce the old stage coach laws, which were framed for animal and not for electric traction. Passengers who are found standing in a car are fined \$2.50, as well as the conductor, and, besides, they have to waste half a day in court.

"Efforts are being made now to harmonize the different transportation interests in London, and nothing will be as effectual in this respect as the creation of the royal traffic commission, which to some extent corresponds to the former rapid transit board here. It is quite likely that this royal traffic commission will be created during this coming session of parliament, that is to say, in the spring. This will be a great help and of immense advantage to the Underground Electric Railways Company of London."

New York Public Service Commission.

The investigation of the Brooklyn Rapid Transit Company by the New York public service commission was continued on Monday of this week. President Winter and Vice-President Williams testified, Mr. Williams doing most of the talking. He was called upon to explain a large number of vouchers which the commission's counsel, Mr. Ivins, had, showing payments of large sums to politicians and others, and charged to general expenses. Several of these were identified as for legal services. The testimony showed that \$5,000 had been contributed to the National Civic Federation, \$20,000 to Adelphi College, said to have been solicited by a prominent politician, and that \$1,350 had been paid to E. H. Harriman as the company's share of the cost of litigation to test the constitutionality of the 8-hour labor law.

Mr. Williams stated that the cost of accident claims had amounted to \$1,100,000 in one year. He also said in the course of his testimony that the company lost \$1,000 a day through the dishonesty or carelessness of conductors.

The commission last week issued an order to the Interborough Rapid Transit Company to show cause, at a hearing on December 11, why it should not increase the number of cars operated in both the local and the express service of the subway by approximately 20 per cent. The New York City Railway was also ordered to show cause on the same date why it should not increase the service on the Eighth avenue line.

The commission has also ordered the Interborough Rapid Transit Company to file reports of its hourly and monthly ticket sales at all stations.

On November 28 the commission appointed a committee to examine into the causes of accidents as they occur, to inspect safety appliances and to recommend other appliances it thinks should be installed.

On December 2 the commission ordered the Interborough company to appear on December 12 to show cause why the block signal system should not be used for local as well as express trains throughout the subway.

The City Club has made a suggestion that nickel-in-the-slot ticket selling machines should be installed in the subway stations to assist the ticket sellers to accommodate large crowds.

Cleveland Electric Railway Accepts Plan of Settlement.

The Cleveland Electric Railway Company on Wednesday of this week agreed to accept the "holding company" plan as a settlement of the prolonged controversy with the city and the 3-cent fare companies. The settlement was effected through the mediation of F. H. Goff, an outside attorney, whom the company had appointed on Tuesday to represent it in the negotiations with the city, with full authority.

It will be remembered that the holding company plan was agreed upon last winter, but was abandoned because of failure to agree on a valuation of the property. In brief, the plan provides for a merger of the Cleveland Electric Railway and the Forest City Railway under a holding company, which shall represent both the stockholders and the city and which shall pay a rental of 6 per cent on an appraised valuation of the property, plus one-ninth. The Cleveland Electric Railway is to be given a security franchise under which it may operate its property in case the holding company defaults on the lease.

This plan of settlement was decided upon at a public

meeting of the city council on Wednesday morning. President Andrews of the Cleveland Electric and President du Pont of the Municipal Traction Company were named as appraisers to determine the value of the property. The rate of fare is still to be decided upon. Mr. Goff has the option of refusing to accept the plan if the valuation or the rate of fare is in his opinion, placed at too low a figure.

On November 29 the work of laying track for the new loops around and through the public square for the purpose of relieving the congestion of cars in that district was started under the direction of the board of public service. The money for the construction of the loops was recently appropriated by the city council and it is proposed that the tracks shall be owned by the city and leased to the Cleveland Electric Railway and Forest City Railway companies. The plans for the track work were agreed upon at a conference of officials of the city and of both companies, but the Cleveland Electric Railway protested against the city ownership of the tracks, claiming that it was illegal. Mayor Johnson, however, held that it was legal for the city to own the tracks, without operating over them, as in the case of the tracks on city viaducts and bridges. He said the object of the city in paying for the work was to prevent the Cleveland Electric from shutting out the low-fare companies by injunction. The Cleveland Electric directors held several meetings to decide upon a plan of action, but no announcement was made. On December 2 the council appropriated additional funds for track construction in the public square district, the title to remain with the city. The ordinance provides for a 6 per cent rental, the proportion to be paid by each company to be decided by the city auditor.

Early Operation of New York River Tunnels Announced.

On November 27 a 3-car special train, carrying a large party of capitalists, engineers, city officials, public service commissioners and newspaper men, was operated through the north tube of the Brooklyn tunnel of the Interborough Rapid Transit Company, extending under the East river from Bowling Green in Manhattan to the Borough hall in Brooklyn. A train carrying a number of company and city officials had run half way through the tunnel on November 16, but this was the first trip through the entire tunnel. About 15 minutes was required for the trip of 1.6 miles, but the running time was purposely made slow in order to allow the visitors to inspect the tunnel. Much quicker time was made on the return trip and it was announced that when regular operation is started, about January 1, only about four minutes will be required. The south tube is not yet completed.

The distance from Bowling Green to Borough hall is 1.6 miles and the length of each of the tubes is 1.2 miles. The inside diameter of the tubes is 15 feet 6 inches and the lowest part of the tubes is 40 feet below the bed of the river. The grade on each side is 3.1 per cent and there are numerous curves. Ventilating shafts are provided at each terminal. There are three sumps, one at the middle of each grade, and one at the lowest point, equipped with pumps sufficient to handle a large amount of water. The tunnel is equipped with a telephone system and a lighting system independent of the main power supply.

The signaling system through the tubes is being rapidly installed, and will be of the same type as the track circuit overlapping block signals, but will be equipped with automatic train stops. In the office at the south end of the Bowling Green station there are several ingenious safety devices for the purpose of controlling the movement of trains and the ventilation of the tube. The man in charge of this office will have a miniature track layout with the train signals thereon. These will indicate by means of colored lights the place of each train as it moves through the tube.

Closely following the opening to the public of the Interborough tunnel will be the beginning of operation in the Hudson Companies' tunnel under the Hudson river. The work on this tunnel was begun in 1874 and the first tube, the northern, was not completed until 1904. The south tube was completed in 1905. Since that time a large force of men has been engaged in erecting the stations along the route and building the extension of the system from Christopher and Greenwich streets, through Christopher street to Sixth avenue and Ninth street and up Sixth avenue to Thirty-third street. Another spur is being built from Ninth street and Sixth avenue to Astor place and Fourth street. Each tube has a diameter of 15½ feet and a length of 5,700 feet.

In January the section between Nineteenth street and Sixth avenue, Manhattan, and the Lackawanna station in Hoboken is expected to be opened, and in March trains are expected to run to Exchange place in Jersey City.

To Consider Pay-As-You-Enter Cars.—It is reported that the Philadelphia Rapid Transit Company will send representatives to Chicago to investigate the operation of the pay-as-you-enter cars which the Chicago City Railway Company installed

on its Cottage Grove avenue line on November 24. It is reported that the company is contemplating ordering some new cars for delivery late next year and that before placing the order the adoption of the pay-as-you-enter type will be considered.

Tirey L. Ford Acquitted of Bribery Charge.—Tirey L. Ford, general counsel of the United Railroads of San Francisco, was acquitted on Tuesday of this week of the charge of having bribed a city supervisor to vote for an overhead trolley franchise. This was Mr. Ford's second trial, the jury having disagreed at the first trial.

Western Society of Engineers.—A regular meeting of the Western Society of Engineers was held at the society rooms in the Monadnock block, Chicago, on Wednesday, December 4. Following a business meeting George B. Springer presented a paper, illustrated by lantern slides, on "Tunnels Under the Chicago River for Electric Cables."

Open Cars Prohibited.—The Chicago City council at its meeting on Monday, December 2, passed an ordinance prohibiting the operation of open street cars between November 1 and May 1, when the temperature is below 50 degrees F., and ordered a public hearing for Thursday on a proposed ordinance requiring destination and indication signs on elevated trains.

Indiana Commission's Rules for Interlocking.—The Indiana railroad commission has adopted amended rules in regard to derails and interlocking devices, requiring that hereafter, when interlocking devices are installed, in the case of a steam road they shall be located at least 500 feet in advance of the crossing and in the case of electric lines at least 200 feet in advance of the crossing.

Indiana Commission to Require Stops at Crossings.—The Indiana railroad commission has ruled that railway trains and interurban electric cars be required to stop at all crossings outside of city limits where the crossings are not guarded by a watchman or mechanical devices. The commission holds that within cities and towns it is the duty of the city council or town board to control the operation of trains.

Trolley Freight Privileges Approved.—The Massachusetts railroad commission has approved the trolley freight privileges granted to the Berkshire Street Railway in Cheshire, Mass., and to the Springfield & Eastern Street Railway in Brimfield, Mass., but declined to approve the grants to the Berkshire Street Railway in Lee, Great Barrington and Stockbridge on account of the special conditions attached.

Missouri Electrics Under Commission's Jurisdiction.—In reply to a request from the railroad and warehouse commission Attorney-General Hadley of Missouri has given an opinion that suburban and interurban electric roads in the state are under the jurisdiction of the commission, the same as the steam railroads, and that they are amenable to the statutes regarding reports to the commission, safety appliances, etc.

Detroit United May Adopt Pay-As-You-Enter Car.—F. W. Brooks, general manager of the Detroit United Railway, has announced that if the experiments of the Chicago City Railway and of the New York City Railway with the pay-as-you-enter car result successfully one of the Detroit lines will be equipped with the cars. Mr. Brooks personally believes that the car is a success, but desires to wait until it has been tested further.

Court Prevents Municipal Railway Purchase.—Judge Sturtevant of the superior court at San Francisco on December 2 ruled that the board of supervisors cannot legally appropriate \$750,000 from the tax fund for the purchase of the Geary Street Park & Ocean Railroad. The company's franchise expired in 1903 and the road has since been operated under a permit from the board, paying to the city a percentage of the gross receipts.

Five-Cent Fare Declared Unprofitable.—In an address at Waltham, Mass., last week J. L. Richards, president of the Newton & Boston Street Railway and other lines comprising the Boston & Suburban Electric Companies system, predicted that many Massachusetts street railways outside of the large cities will soon go into the hands of receivers unless they increase their rate of fare. "I believe," he said, "that few realize how unprofitable the street railway business is outside of the large cities, and especially in this community. One of the reasons, I believe, is the greatly increased cost of material and labor, and the increasing demands of the public for free transfers and longer rides for a 5-cent fare."

Special Police for New York Elevated and Subway Stations.—The Interborough Rapid Transit Company of New York, following a recent suggestion of Theodore P. Shonts, has organized a force of 50 special police, who will be sta-

tioned at the downtown subway and elevated stations for the purpose of facilitating the handling of crowds at rush hours and to give protection to passengers. Half of the force is stationed in the subway and half on the elevated lines. The men were selected by Police Commissioner Bingham and wear uniform, but are paid by the Interborough company. The special police will be on duty at all hours and are expected to effect a considerable improvement in the conditions at the stations by directing the movements of intending passengers, by preventing rowdiness and by preventing passengers from trying to enter the trains while the gates are being shut.

Indiana Supreme Court Decisions Affecting Interurbans.—The Indiana supreme court has rendered two decisions of considerable interest to interurban roads in the state. One is to the effect that a town or city may by ordinance require railroads to maintain at street crossings electric lights of sufficient power to light the entire crossing, and to keep said lights burning five minutes before the arrival of every train or car. The decision applies to interurban roads as well as steam lines. The other holds that a steam railroad is not entitled to an injunction to prevent an interurban railway from crossing its tracks in a public highway. The right of crossing the highway in the beginning by the steam line is subject to any proper use to which the highway may afterward be put, and the crossing thereof by an interurban line is held to be a proper use of the public highway if the interurban line puts in a proper crossing.

Massachusetts Commission to Investigate Fares.—An interesting inquiry of importance to electric railways as well as to steam roads will be started by the Massachusetts railroad commission at a public hearing on Friday, December 13, looking toward a plan for the equalization of fares on the steam roads. The board acts in this matter under a resolution of the Massachusetts legislature, which reads: "That the board of railroad commissioners is hereby directed to investigate the matter of fares charged for passenger transportation upon railroads within the commonwealth, and to report what changes if any are required to remove inequalities therein, and to make the rates paid for travel upon such roads more uniform." It is the intention of the board to include in this general inquiry several specific complaints as to suburban and other fares which have been filed at its offices within the past three or four months.

New Limited Service on Michigan United Railways.—The Michigan United Railways Company last week inaugurated a limited car service between Kalamazoo and Battle Creek, which reduces the time between those cities to one hour instead of an hour and a half, as under the local service. The timetable on the Jackson-Battle Creek division will also be changed so that close connections can be made in Battle Creek going both ways. Cars from Jackson will arrive in Battle Creek so that there will be a wait of but 15 minutes for the Kalamazoo car, while passengers going from Kalamazoo will be compelled to spend but 10 minutes in Battle Creek waiting for a car to Jackson. This will give limited car service from one terminal of the Michigan United Railways to the other, and will be the means of quicker transportation between the three principal cities on the lines than was ever afforded before. A number of the traction company's cars have been rebuilt and equipped with higher powered motors, especially for the limited service.

Present-Day Problems.—The Empire State Gas and Electric Association and the Street Railway Association of the State of New York have jointly published in pamphlet form under the title, "Present-Day Problems," the addresses of the speakers at the meeting of the two associations held in the concert hall of Madison Square Garden on October 1, 1907. The address of Henry J. Pierce, president of the International Railway Company, Buffalo, N. Y., on "The Electric Railway Situation of Today" and the address of Everett W. Burdette of the National Electric Light Association, Boston, Mass., on "Public Control from the Corporate Standpoint" were published in the Electric Railway Review of October 5. The other addresses included in the pamphlet are those of Alexander C. Humphreys, president of Stevens Institute of Technology on "Control of Gas Companies by State Commissions" and the "Relation of the Public Service Commission to Corporations," by Frank W. Stevens, chairman of the public service commission of the second district of the state of New York.

The Washington Baltimore & Annapolis Electric Railway of Baltimore, Md., last week removed its general offices from the Maryland Trust building to the company's new terminal station on Liberty and Marion streets. The general offices and waiting rooms occupy the first floor of the building, while the executive offices are on the second floor.

Construction News

FRANCHISES.

Mineola, L. I.—The New York & North Shore Railway Company has applied for a franchise to build an electric railway along the North Hempstead and Flushing turnpike from Roslyn to the eastern limits of New York City at Little Neck. The company now has a line running from Mineola to Roslyn and will soon have it connected with Port Washington and down through Mahasset to Great Neck and Little Neck.

Oakland, Cal.—The California Railway has applied for a 50-year franchise.

Salt Lake City, Utah.—A franchise similar to that granted some months ago by the city council and rejected by the Utah Light & Railway Company has been passed with the following amendments: The clause providing that the company sprinkle the paved streets without cost to the city is stricken out; the company is allowed to extend its tracks on Eleventh East to the city limits and must grade the street between Third and Fourth streets on both sides of the track; cars may be operated over a new route to Warm Springs for the accommodation of high school pupils; any interurban railway company having permission to operate its cars on any of the streets occupied by the Utah Light & Railway Company may use the tracks jointly, provided an equitable arrangement is made for sharing the cost of construction, maintenance, etc. This provision applies only to such interurban roads as are not competitors of the Utah Light & Railway Company within the city limits and which operate lines from points more than 10 miles from Salt Lake City. The franchise as passed has not been accepted by the company.

RECENT INCORPORATIONS.

Akron & Youngstown Railway.—Incorporated in Ohio with a capital stock of \$100,000. Thomas L. Child is one of the incorporators. The road as proposed will be an air line between Youngstown and Akron and will furnish the final link by trolley between Cleveland, O., and Pittsburg, Pa. It is stated that work will be started within 30 days.

Keokuk & Columbus Junction Transit Company, Keokuk, Ia.—Incorporated in Iowa to own and operate electric railways. Capital stock, \$10,000. Incorporators: J. E. Peterson, Ira W. Willis, W. J. Francey, Theodore Brinik, G. W. Mattern, D. B. Hamil, D. B. Weil, Frank L. Darrow and W. Mullen. J. E. Peterson is president; Theodore A. Craig, secretary.

TRACK AND ROADWAY.

Ambridge & Baden Street Railway, Harrisburg, Pa.—This company has been authorized to build an extension 700 feet long on Ohio View avenue in Ambridge.

Atlantic Northern & Southern Railway, Atlantic, Ia.—The work of grading between Atlantic and Kimballton, Ia., has been completed and tracklaying has been started. It is stated that cars will be operated during January, 1908. Further extensions are planned. J. W. Cuykendall, president.

Boston & Worcester Street Railway, Boston, Mass.—The Massachusetts railroad commission has approved the location for a 2-mile branch from Natick to the main line, which will permit of a fast through service from Natick to Boston. Natick already has a Boston connection over the chain of old local street railways recently combined in the Boston Suburban Electric Companies' system, but the new line will be much quicker for the reason that the old lines follow the town roads. In its order the commission declares the state policy to allow a duplication of this sort, thereby adjudging the connected lines running at present through Natick to be still, in effect, local. It says the new line may affect these existing companies, but that the result cannot be such that the net outcome will be harmful to the public interests.

Central Valley Electric Railway Light & Power Company, Zanesville, O.—This company, which has secured the right of way for an interurban line from Zanesville to Duncan Falls, O., is reported to have purchased from H. D. Blodgett, Zanesville, additional right of way from Duncan Falls to Beverly, O. The line ultimately will extend from Zanesville to Parkersburg, W. Va., 79 miles. It is stated that bids will soon be asked for by H. A. Williams, Rogge hotel, Zanesville. J. F. Townsend, Canal Dover, O., is interested.

Columbus Delaware & Marion Railway, Columbus, O.—Tracklaying on the Marion-Bucyrus extension has been completed to a point 6½ miles north of Marion. George Whysall, Marion, general manager.

Dothan, Ala.—A bonus of \$50,000 and the necessary right of way are said to have been secured for the proposed electric railway project between Dothan and Geneva, Ala., which is being promoted by Richard Tillis, Montgomery, Ala.

Enterprise, Ore.—A movement has been started in this city to organize a company for the purpose of building an electric railway to form a junction with the proposed electric line from Walla Walla, Wash. One of the proposed routes to be surveyed will start at a point about 25 miles north of this city, thence down Courtney canyon to the Grand Ronde river and up the Little Salmon river. The road from Walla Walla is projected up the Mill Creek valley to a point near the headwaters of the Little Salmon, which would furnish the power for operating both roads. The length of the proposed route from Enterprise to Walla Walla is 115 miles. It is stated that one resident along the route has subscribed \$5,000 toward building the Enterprise line. This would serve a large timber district in eastern Oregon.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—This company has decided to build an extension of the Evansville city lines through the northeastern part of the city. R. H. Cole, chief engineer.

Greenville & Interurban Railway, Greenville, S. C.—This company, which was incorporated last August, has begun a survey of its proposed line from Greenville to Williamston, S. C., and is securing right of way for another line from Greenville to Spartanburg. It is announced that financial arrangements have been made for building the roads. Officers have been elected as follows: President, John C. Carey; vice-president, A. A. Gates; secretary and treasurer, C. C. Good; general manager, H. H. Prince, all of Greenville.

Henderson, Ky.—T. Bethell of Henderson, promoter of the Evansville Henderson & Uniontown Traction Company and the Evansville Green River & Owensboro Traction Company, writes that work on those projects has been suspended on account of the financial situation and that work will be resumed in the spring as soon as the weather permits.

Hutchinson (Kan.) Interurban Railway.—It is announced that the directors have decided to extend the Main street line in Hutchinson south to the river bridge. Emerson Carey is president.

Illinois Traction System, Campaign, Ill.—Satisfactory progress is reported on the Lincoln-Mackinaw extension of this company's line. Tracklaying has been completed from Lincoln to within three miles of Mackinaw and it is expected that the remainder can be finished within a few days, when the connection will be afforded with the Peoria-Bloomington line.

Los Angeles & Owens Valley Railroad, Los Angeles, Cal.—This company proposes to begin construction work about April 1, 1908, on its proposed line to connect Los Angeles, Randsburg, Independence and Bishop, Cal. Surveys have not been completed. S. P. Jewett is president.

Mattoon Shelbyville Pana & Hillsboro Railroad, Charleston, Ill.—The directors of this company have engaged men to secure the right of way for a line between Mattoon and Shelbyville, Ill. Surveys have been completed from Mattoon to Hillsboro, 60 miles, but financial arrangements have not been made. W. R. Patten, president.

Meadville Conneaut Lake & Linesville Electric Railway, Meadville, Pa.—Superintendent Kellenbaugh is quoted as saying that this company will build an electric line from Linesville, Pa., south to Greenville, 21 miles, if the Mahoning & Shenango Railway & Light Company will extend its line from Sharpsville, north to Greenville, 11 miles, to complete a through line from Youngstown, O., to Greenville.

Pekin Peoria & Bloomington Interurban Railway, Pekin, Ill.—This company has certified to the secretary of state the dissolution of the corporation and has surrendered its charter.

Rochester Scottsville & Caledonia Electric Railroad, Rochester, N. Y.—Le Grand Brown, chief engineer of this proposed electric line from Rochester, N. Y., to Portage Falls, 52 miles, and including branches, 74 miles, writes that surveys for the preliminary route have been completed for the entire distance. The road will start from Rochester and serve the following towns: Scottsville, Caledonia, Le Roy, Pavilion, Castile and Portage, with branches from Pavilion to Warsaw, 12 miles, and from Le Roy to Batavia, 10 miles. The grade will not exceed 3 per cent and there will be only slight curves. The road will be built for high-speed service on private right of way and will be laid with 70-pound rails. The bridges will all be steel structures. Work on construction will be started as soon as the bonds have been disposed of. D. C. Salyerds, Scottsville, N. Y., is president.

Sangamon Valley Electric Railway.—J. E. Melick, president and chief engineer of this company, writes that grading on the 4-mile section between Hillsboro and Butler will be started inside of 30 days and the remainder early next spring. Six miles of track have been laid since January 1, 1907, comprising the section between Springfield and a point near Rochester, Ill., and through the cities of Rochester and Hillsboro. The overhead work has been completed on those portions of the line. The line will be 53 miles long and will serve the following towns: Rochester, with a branch to Clear Lake, Pawnee, Raymond, Butler and the city of Springfield. The bonds of the road will be disposed of to local interests and the line will be built by the company.

Twin City Rapid Transit Company, Minneapolis, Minn.—Announcement is made that this company has completed arrangements for electrifying and operating that portion of the Minneapolis & St. Louis Railroad operating between Manitou and Tonka bay, Lake Minnetonka. The company intends to build a mile and a half of line from its present terminus at Excelsior to Manitou and improve the mile and a half of the Minneapolis & St. Louis track from that point to Tonka bay. There will be one trolley station at Manitou and one at Wildhurst on the extension, the upper lake steamers starting from the latter station instead of from Birch Bluff, as originally planned. At Tonka bay, where the hotel is already controlled by the Lowry interests, it is stated extensive improvements will be made, among which will be the removal of the old turntables. It is stated that a new terminal also will be established at this point.

Veblen, N. D.—Citizens of this and neighboring towns have organized a company with \$500,000 capital stock to build an electric railway from Veblen to Lidgerwood, N. D., and it is planned to make surveys at once. The directors are: E. A. Movius, J. H. Movius, of Lidgerwood; B. P. Hammerstead, Aaron Anderson, O. P. Akre, J. B. Holsey, H. J. Hanson, P. L. Peterson and George F. Anderson.

Washington Baltimore & Annapolis Electric Railway, Baltimore, Md.—It is reported that unexpected delays will prevent the proposed opening of the line from Washington to Baltimore and Annapolis this month, as proposed, and that the work cannot be completed before January 1. It is stated as probable that the line will not be ready for operation until late in January.

Washington Railway & Power Company, Vancouver, B. C.—This company is pushing the work on its city electric lines and it is stated that if the money situation is relieved so that capital is available for the work, the line will be finished and in operation by March of next year. Tracklaying within the city limits is nearly completed and by the first of December work on the extensions will be started. From 50 to 75 miles of interurban road will be built by the company.

York, Pa.—The new electric line between York and Hanover, Pa., will be completed about January 1. A portion of the road is being built by Dodge & Day of Philadelphia, and the other portion by John Dobbling of York. The company will expend about \$250,000 in the construction of this new extension, which will serve Spring Grove, Manges Mills, Bear's Station and other smaller towns and villages along the route. The line will be 18 miles long. It is said that four cars a day will be operated between York and Hanover.

Ft. Worth Weatherford & Mineral Wells Interurban Railway.—G. R. Turner, who is promoting the interurban railway from Ft. Worth to Mineral Wells and Weatherford, is quoted as saying that arrangements have been completed for the sale of the bonds of the company and that work will be pushed from now on. The grading, which has been suspended for some time, will be resumed within a week or 10 days and continued through the winter. It is stated that a charter of incorporation will soon be applied for.

POWER HOUSES AND SUBSTATIONS.

Camden Interstate Railway, Huntington, W. Va.—This company has just completed a new power station at Ironton. The equipment includes two 500-horsepower Buckeye engines, two 400-kilowatt generators and two 750-horsepower Stirling boilers. Gas will be used for fuel.

De Kalb-Sycamore & Interurban Traction Company, De Kalb, Ill.—We are advised that this company has ordered draft apparatus for 1,000-horsepower boilers for its new power house equipment from the Green Fuel Economizer Company, Matteawan, N. Y., instead of from the Green Engineering Company, Chicago, as reported in a previous issue.

United Railroads of San Francisco.—This company has installed new equipment in the North Beach power house, which will enable it to add 100 cars to the number now in service.

Personal Mention

Mr. C. F. Sherrod has been elected president of the Columbus Railway, Columbus, Miss., succeeding Mr. Robert E. Watson, resigned.

Mr. F. W. Bueltzingslowen has resigned as auditor of the Chicago South Bend & Northern Indiana Railway of South Bend, Ind., effective on January 1.

Mr. Theodore P. Shonts, president of the Interborough-Metropolitan Company of New York, has been elected president of the Chicago & Alton Railroad, succeeding Mr. S. M. Felton, resigned.

F. W. Coen, general manager of the Lake Shore Electric Railway, Norwalk, O., has been appointed a member of the executive board of the Central Electric Railway Association, succeeding F. J. Stout, deceased.

Mr. A. G. Mitten, who was recently appointed auditor and head of the claims department of the Chicago City Railway, has been appointed general claims agent and Mr. J. J. Duck has been appointed auditor.

Mr. Warren S. Hall has resigned as vice-president and general manager of the Lehigh Valley Transit Company of Allentown, Pa., effective on December 1, and the duties of his position will be assumed by President R. P. Stevens.

Mr. William Jennings, heretofore superintendent of the mechanical and power departments of the Los Angeles Interurban and Pacific Electric railways, Los Angeles, Cal., has resigned, effective at once, and has moved to El Paso, Tex.

Mr. G. C. Killeen has resigned as master mechanic of the New Jersey & Pennsylvania Traction Company of Trenton, N. J. Mr. Killeen has had an extended mechanical experience in both city and interurban service and was connected for six years with the Public Service Corporation of New Jersey.

The auditing departments of the various divisions of the Illinois Traction System have been consolidated, effective on December 1, at the Champaign headquarters of the system, and will hereafter be under the direct charge of Mr. B. E. Bramble, general auditor, and Mr. G. M. Mattis, assistant treasurer.

Mr. William J. Smith, heretofore general manager of the Titusville Electric Traction Company, Titusville, Pa., has been elected president and a director of the company. He has been general manager of the Titusville company since 1903 and previous to that time was superintendent of the Staten Island Midland Railroad.

Mr. J. E. Jarvis, heretofore assistant superintendent of the Illinois Traction System at Peoria, Ill., has been transferred to Bloomington, Ill., and his former duties will be performed by Mr. W. W. Waterson, superintendent of transportation of the Springfield & Northeastern Traction Company division, with office at Springfield.

Mr. E. J. Dickson, who recently was appointed general manager of the Uxbridge & Blackstone Street Railway and the Milford Attleboro & Woonsocket Street Railway, with headquarters at Franklin, Mass., was born in Illinois in 1872 and was educated in the public schools of that state. He began his railroad career with the Chicago Burlington & Quincy Railroad, having been connected for 14 years with that company in its mechanical, freight and operating departments. He also served for three years in the mechanical department of the Northern Pacific Railway, and 2½ years in the same department of the Lehigh Valley Railroad. For the past 10 months he has been associated with the New England Investment & Securities Company in the office of the vice-president at Boston, Mass.

Mr. John B. Crawford, whose appointment as general manager of the Lexington & Interurban Railways, Lexington, Ky., was announced in the Electric Railway Review for November 30, 1907, was born at Georgetown, Colo., in 1876. In June, 1895, soon after leaving St. Michael's College, of which he is a graduate, he entered the service of the Hartford (Conn.) Street Railway Company, serving an apprenticeship in the various departments of that company until 1901, when he resigned to enter the testing department of the General Electric Company at Schenectady N. Y. He remained with this company one year and spent the succeeding year in traveling abroad. Upon his return he was engaged by the Condor Power Company to build a high-tension transmission line for its power plant on the Pacific Coast, and upon its completion he returned to Connecticut to become general superintendent

of the Groton & Stonington Street Railway at New London, Conn. He remained with this company until last December, when he was appointed superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company's lines, with headquarters at Ft. Wayne, Ind., which position he has held until his present appointment. During his connection with the latter company Mr. Crawford adopted and perfected the merit system for the government of employees on the lines of that company, with very satisfactory results.

The joint traffic office of the Terre Haute Indianapolis & Eastern Traction Company and the Indiana Union Traction Company at Indianapolis has been discontinued, effective on December 1, and Mr. F. D. Norveil, general passenger and freight agent of the two companies, has been appointed general passenger and freight agent of the Indiana Union Traction Company at Anderson. Mr. J. H. Crall, district passenger and freight agent for both companies, has been appointed general passenger and freight agent of the Terre Haute Indianapolis & Eastern, with office at Indianapolis. Mr. C. S. Kitch of Lebanon, Ind., division passenger and freight agent of the Northwestern division of the Terre Haute Indianapolis & Eastern, will be district passenger and freight agent of that company at Indianapolis. Mr. M. E. Graston of Muncie will be division passenger and freight agent of the Indiana Union Traction Company at Indianapolis.

Mr. F. T. Thomas has been appointed general foreman of the Elyria shops of the Cleveland Southwestern & Columbus Railway, succeeding Mr. Charles Heslet, transferred to the Galion shops of the Ohio central division. Mr. Thomas formerly was connected with the Illinois Traction System at Staunton, Ill. Mr. S. A. Foltz, general manager of the Mansfield Railway Light & Power Company, Mansfield, O., has been appointed general superintendent of the Ohio Central division, succeeding former superintendent D. H. Lavenburg; effective on December 1. Mr. Foltz will retain his position as general manager of the Mansfield Railway Light & Power Company. Mr. J. K. Gray, formerly superintendent of the Western Ohio Railway Company at Wapakoneta, O., has been appointed superintendent of the Ohio Central division of the Cleveland Southwestern & Columbus Railway and the Mansfield Railway Light & Power Company; effective on December 1.

Mr. Martin Plunkett, who recently was appointed master mechanic of the Illinois Traction System, with headquarters at Staunton, Ill., obtained his first experience on electric railways with the Cedar Rapids & Marion Electric Railway at Cedar Rapids, Ia. He remained with this company for two years, serving successively as motorman and conductor, resigning in 1894 to become connected in a similar capacity with the Austin Dam & Suburban Electric Railway at Austin, Tex. During the last three years of his connection with this company he was assistant superintendent of its city and suburban lines. From January, 1898, to April, 1901, he was employed on the lines of the San Antonio (Tex.) Traction Company. His connection with the Illinois Traction System dates from August, 1902. Since April, 1904, he has been foreman of the company's car barns at Riverton, Ill., his present appointment as master mechanic being effective on November 15. He succeeds Mr. F. T. Thomas, who, as noted elsewhere, has resigned to accept a position with the Cleveland Southwestern & Columbus Railway Company.

Mr. John Blair MacAfee, who recently was elected vice-president of the Lexington Interurban Railways, Lexington, Ky., has had a wide experience in the construction and direction of public service corporations. He was born in Canada, but has lived practically all of his life in Philadelphia. He is a graduate of the University of Pennsylvania and is a member of the Philadelphia bar, having served as attorney for several street railway companies. He became interested in construction work and for the past 16 years has been identified in this capacity with several of the important steam and electric railway enterprises of the country. Among the latter was the building some years ago of the Blue Grass Traction Company's lines, operating between Lexington and Paris, Ky., and the more recently completed line of the Ohio River Electric Railway Company, of which he is vice-president and general manager. He was one of the organizers of the Railways Company General, New York City, and the American Engineering Company, and at one time served as president of the Augusta-Aiken Railway & Electric Company, Augusta, Ga. He succeeds Mr. Louis des Cognets as vice-president of the Lexington & Interurban Railways.

A score of persons are said to have been injured in an accident on the Dayton & Xenia Transit Company's line near Xenia, O., on December 3. The car got beyond the control of the motorman on a steep hill and overturned on a curve.

Financial News

Bucks County Electric Railway, Newtown, Pa.—Shareholders of the Newtown (Pa.) Railway and the Newtown Langhorne & Bristol Trolley Street Railway have approved the plan for sale of the properties to the new Bucks County Electric Railway.

Chicago Railways Company.—The time for the deposit of securities under the plan for reorganization of the Chicago Union Traction Company properties has been extended to December 11.

Evansville (Ind.) Railways.—This company, which was formed in June with \$1,000,000 capital stock to control the Evansville & Mt. Vernon Electric Railway and the Evansville & Eastern Electric Railway, has filed notice with the state authorities of an issue of \$500,000 of preferred stock.

Interborough Metropolitan Company, New York City.—The \$3,000,000 of 6 per cent six months' notes sold in May, 1907, have been provided for by the payment of 30 per cent of the total loan in cash and the extension of the balance for five or six months at 6 per cent interest.

New York City Railway.—On motion of Attorney-General Jackson of New York, Supreme Court Justice Seabury has appointed Paul Fuller, Melville G. Palliser and J. Hampden Dougherty receivers for the New York City Railway and the Metropolitan Street Railway. In taking this action Justice Seabury directed the receivers named by him to apply to the federal court, on behalf of the state court, to relinquish its control over the property involved. When A. H. Joline and Douglas Robinson were appointed receivers by Judge Lacombe of the United States circuit court Attorney-General Jackson argued that the federal appointment was in the nature of collusive action and was secured to protect the companies from suits in the state courts, where, if anywhere, he maintained, insolvency proceedings should have been brought. Judge Lacombe took cognizance of this contention, but, in making the receivership permanent, ruled that the action, though admittedly friendly, was properly brought in the United States court, since the defendants were New York corporations and the petitioning creditors residents of New Jersey. Justice Seabury said in his decision appointing state receivers: "Corporations owning and operating public franchises owe primarily a duty to the state which created them. Such being the case, they are subject, as has been repeatedly held, to governmental regulation and supervision. But the effective exercise of the power of regulation and supervision depends upon the continuance of state control over the franchise which the corporation enjoys. To assert that a federal court, which has appointed receivers of these franchises, will refuse to grant the request of the state court, that it should surrender its possession to the state court, to the end that the state may bring about their forfeiture and in the meantime to keep within the hands of its own agents the governmental powers which it has granted, is to contend that when the state seeks to take away the corporate existence the federal court may keep it alive and continue its existence. If this be so, then the rights of the state to forfeit the charter of a corporation may be suspended at the pleasure of the federal court, and the sovereign power, which the state alone is authorized to grant, is exercised by the receivers of a federal court against the will of the state." Justice Seabury holds that the suit in the federal court is based on the assumption of the continued existence of the corporation, and seeks to liquidate its affairs only in so far as is necessary to protect the interests of those who asked the aid of that court, while the state court's action is primarily for terminating the existence of the corporation by the forfeiting of its charter.—Solomon H. Kohn, a shareholder of the Metropolitan company, has filed a petition in the United States circuit court to intervene as a party defendant in the suit instituted by the Pennsylvania Steel Company and the Degnon Contracting Company against the New York City Railway and the Metropolitan Street Railway and to have the order appointing Messrs. Joline and Robinson receivers for the Metropolitan company annulled and new receivers appointed for that company.

Quebec Railway Light & Power Company.—Application will be made to the Canadian parliament for amendments to the acts of incorporation of this company providing for an increase of the capital stock and the division of such stock into common and preferred shares.

Underground Electric Railways of London, Ltd.—Speyer & Co. of New York City and their European correspondents have agreed to purchase at their face value the coupons due

on December 1, 1907, on the 5 per cent profit-sharing notes. The directors of the company have been considering for some time with these firms a plan for providing for the notes and this plan is now in course of preparation. Owing to the financial conditions the directors feel that it is inexpedient, at the present moment, to take steps necessary in order to carry through the plan. As soon as necessary arrangements have been made the plan will be published and submitted to the noteholders and shareholders for their approval. A statement of the affairs of the company will also be published.

ELECTRIC RAILWAY EARNINGS.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y.

Quarter ended September 30—	1907.	1906.
Gross	\$125,450	\$116,024
Expenses	66,107	57,992
Net	59,343	58,032
Other income	341	542
Total income	59,684	58,574
Charges	21,297	17,434
Surplus	38,387	41,140

Detroit United Railway.

October—	1907.	1906.
Gross earnings	\$569,460	\$507,522
Expenses and taxes	379,419	346,823
Net earnings	190,041	160,699
Other income	5,065	3,718
Total income	195,106	164,417
Charges	116,857	105,857
Surplus	78,249	58,560

Kansas City Railway & Light Company.

October—	1907.	1906.
Gross earnings	\$559,822.19	\$531,671.77
Operating expenses	271,190.65	250,023.20
Net earnings	288,631.54	281,648.57
Interest and taxes	153,575.04	150,244.39
Net income	135,056.50	131,404.18
June 1 to October 31—	1907.	1906.
Gross earnings	\$2,647,647.53	\$2,406,769.61
Operating expenses	1,344,187.85	1,184,231.99
Net earnings	1,303,459.68	1,222,537.62
Interest and taxes	773,466.11	724,194.42
Net income	529,993.57	498,343.20

Lake Shore Electric Railway, Cleveland, O.

October—	1907.	1906.
Gross earnings	\$78,459	\$71,813
Expenses and taxes	45,937	39,174
Net earnings	32,522	32,639
Interest	25,188	22,812
Surplus	7,334	9,827
January 1 to October 31—	1907.	1906.
Gross earnings	\$799,849	\$736,619
Expenses and taxes	431,958	400,903
Net earnings	367,891	335,716
Interest	243,430	208,590
Surplus	124,461	127,126

Rochester Syracuse & Eastern Railroad, Syracuse, N. Y.

Quarter ended September 30—	1907.	1906.
Gross	\$68,287	
Expenses	36,548	
Net	31,739	
Other income	11,206	
Total income	42,945	
Charges	38,208	
Surplus	4,737	

Toledo Railways & Light Company.

October—	1907.	1906.
Receipts	\$219,915.30	\$214,912.63
Operating expenses	122,319.81	118,781.75
Net earnings	97,595.49	96,130.88
Miscellaneous income	875.26	816.12
Gross income	98,470.75	96,947.00
Deductions	67,533.39	59,375.81
Net income	30,937.36	37,571.19
January 1 to October 31—	1907.	1906.
Receipts	\$2,108,236.77	\$1,999,469.60
Operating expenses	1,214,538.38	1,009,012.07
Net earnings	893,698.39	990,457.53
Miscellaneous income	9,339.19	9,814.77
Gross income	903,037.58	1,000,272.30
Deductions	652,596.35	591,794.35
Net income	250,441.23	408,477.95

Dividends Declared.

Chicago City Railway, quarterly, 1½ per cent.
South Side Elevated, quarterly, 1 per cent.

Manufactures and Supplies

ROLLING STOCK.

Gary & Interurban Railway, Gary, Ind., is reported to be in the market for some cars.

Mitsui & Co., New York, are asking prices in this country for equipments for 12 cars to be used on a road in Japan.

Philadelphia Rapid Transit Company, Philadelphia, Pa., according to press reports, is contemplating the purchase of a number of pay-as-you-enter cars. It is said that representatives of the company have been sent to Chicago and New York to study the operation of the new type of cars.

SHOPS AND BUILDINGS.

Manchester (N. H.) Street Railway.—Car barns will be erected by this company at the corner of West Central and Franklin streets.

New York City Railway, New York.—Plans have been filed with the building superintendent of New York City by Adrian Joline and Douglas Robinson, receivers for this road, for a new office building and car house, to be erected for the Metropolitan Street Railway at Lenox avenue and One Hundred and Forty-sixth street, adjoining the power station and car shops which were damaged by fire last April. The new building will be a 2-story structure, of brick construction with terra cotta trimmings, having a frontage on Lenox avenue of 200 feet and a full depth of 469 feet. This building will cost about \$400,000. We understand that the American Bridge Company has been awarded the contract for its construction. The structure will require about 3,500 tons of steel. The power station and shops will also be completed at a cost of \$25,000.

TRADE NOTES.

John C. McMynn has resigned his connection with Robert W. Hunt & Co., Chicago, taking effect on December 1.

General Electric Company, Schenectady, N. Y., has declared the regular quarterly dividend of 2 per cent, payable January 15 to stock of record December 7.

McGuire-Cummings Manufacturing Company, Chicago, has had plans prepared for the erection of a 1-story office building, 50 by 85 feet, at 122 North Sangamon street.

Detroit Steel Products Company, Detroit, Mich., manufacturer of railway and motor car springs and drop forgings, has increased its capital stock from \$75,000 to \$300,000.

Northern Engineering Works, Detroit, Mich., has installed in the power station of the St. Clair Tunnel Company, Port Huron, Mich., one 15-ton 43-foot span traveling crane.

Rail Joint Company, New York, exclusive maker of base supporting rail joints, announces that its rail joints are now in use from ocean to ocean, the Panama Railroad being the latest equipment.

American Brake Shoe & Foundry Company, New York, has declared the regular quarterly dividend of 1½ per cent on the preferred stock and 1 per cent on the common stock, both payable December 31.

W. L. Primm has been placed in charge of the Chicago office of the Danville Car Company, Danville, Ill., with headquarters at 904 Fisher building. The intention to open this office was announced in the Electric Railway Review of October 26.

Cincinnati Car Company, Cincinnati, O., has commenced the delivery of 200 cars for the Public Service Corporation of New Jersey. One hundred and fifty of these cars have been designed and are being constructed for operation on the pay-as-you-enter plan.

Central Inspection Bureau, 17 State street, New York City, has closed a contract with the American Railways Company of Philadelphia covering the inspection of a number of single-truck cars to be built by the G. C. Kuhlman Car Company at Cleveland, O.

Charles M. Reese, formerly connected with the American Locomotive Company at its Richmond, Va., plant, has been appointed general superintendent of the W. J. Oliver Manufacturing Company of Knoxville, Tenn., and will assume his new duties at an early date.

E. B. Noye has been appointed western representative of the Warner & Swasey Company, Cleveland, O., with headquarters at 605 Commercial National Bank building. Mr.

Noye was formerly manager of the Cleveland office of Manning, Maxwell & Moore, Incorporated.

Expanded Metal & Corrugated Bar Company's product, the Johnson corrugated bar, has been awarded the gold medal by the jury of awards of the Jamestown exposition. This is the fourth gold medal that the corrugated bar has been awarded, the last one having been given at the International exhibition at New Zealand.

Wile Power Gas Company, 1688 Columbus road, Cleveland, O., announces that it has removed its general offices from the Cutler building, Rochester, N. Y., to the works at Cleveland, O., where all communications in future for complete gas power plants, including gas engines and gas producers for gas power and fuel purposes, should be addressed.

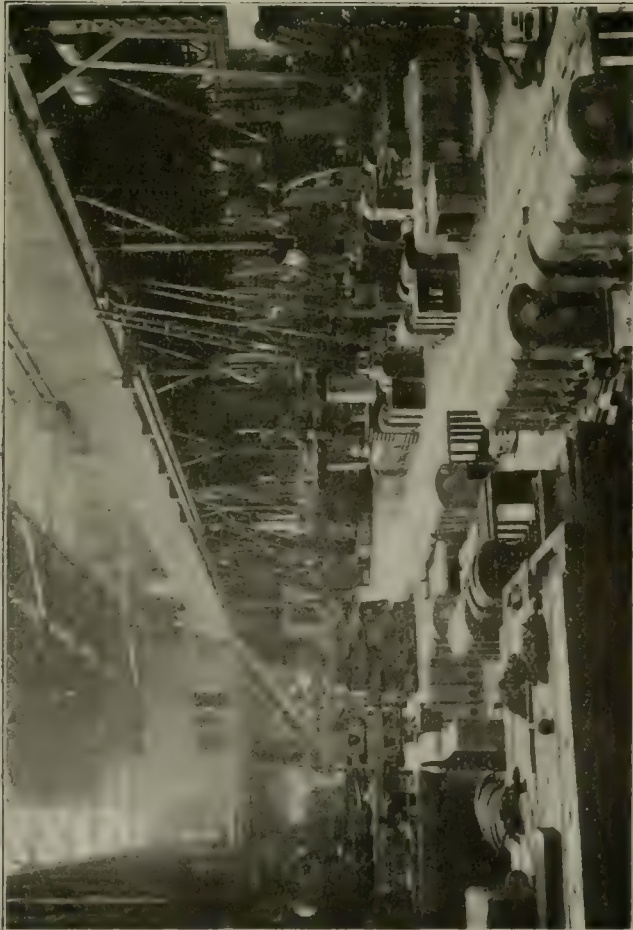
Ransome Concrete Company of California has appointed C. W. Whitney purchasing agent, with headquarters in the Crocker building, San Francisco, Cal. Mr. Whitney has resigned as manager of the publicity department of the Abner Doble Company. He will have charge of the advertising of the Ransome company in addition to his other duties.

William Wharton, Jr., whose death on November 26 was noted in the Electric Railway Review of November 30, was born in 1830 in Philadelphia and was educated at the Philadelphia Friends School. Being of a mechanical turn of mind, he early gave his attention to the construction of tracks for railroads and the street railways which were just being introduced. In 1859 he became engaged in the business of manufacturing street railway track material, thus laying the foundation for the business of the company which still bears his name, William Wharton, Jr., & Co. of Philadelphia. This company he formed in 1881, in conjunction with Edward Samuel and others; and remained its president until his death. He was the inventor of the Wharton switch and was for several years connected with the Wharton Railroad Switch Company, the business of which was later taken over by William Wharton, Jr., & Co., Incorporated. He also originated the use of cold bent rolled steel grooved guard rails for street railway curves and was one of the first to introduce girder rails for street railway track. In 1884 he was one of the organizers of the North Branch Steel Company of Danville, Pa., at whose mill the first 9-inch girder rail was rolled. In the development of the street railway he was an important factor as manufacturer, contractor, inventor, experimenter, owner and operator of railways. Through his personal business and in his connection with William Wharton, Jr., & Co., he for many years gave his special attention to the laying of street railway tracks, and many daring and remarkable feats in this line are to his credit. He built the first street railway tracks in Philadelphia and in New York. During the civil war he was engaged in laying tracks for railroads and street railways in New York, Washington and Virginia. During the Centennial exposition in Philadelphia he did some remarkable track-laying, besides building and operating roads on his own account especially for the occasion. He built the first tracks on Broadway in New York in 1884. In the early stages of electric traction he experimented extensively, especially with storage batteries. He built, owned and operated the Lehigh Avenue Railway in Philadelphia, which for several years was operated especially for the purpose of developing electric traction on these lines. Many other valuable enterprises came under his direction. His versatility, ability to master and personally go into the most minute details were most remarkable. His ability to surround himself with men of integrity and loyalty to carry out his ideas enabled him in his later years to keep in touch with his many interests without attention to details, but even in his old age his energy and ability as to details were often aroused by his interest in a special undertaking. His untiring labors in connection with the exhibit of the Manufacturers' Association at the Philadelphia convention in 1905 will be remembered. His last years were especially devoted to the development of the Philadelphia Roll & Machine Company, an auxiliary of William Wharton, Jr., & Co. For nearly a year before his death he had been in ill health, which incapacitated him for business.

ADVERTISING LITERATURE.

Milloy Electric Company, Bucyrus, O.—A new leaflet in colors illustrates this company's recently completed factory, in which are manufactured the well-known Milloy trolley base and Milloy trolley retriever.

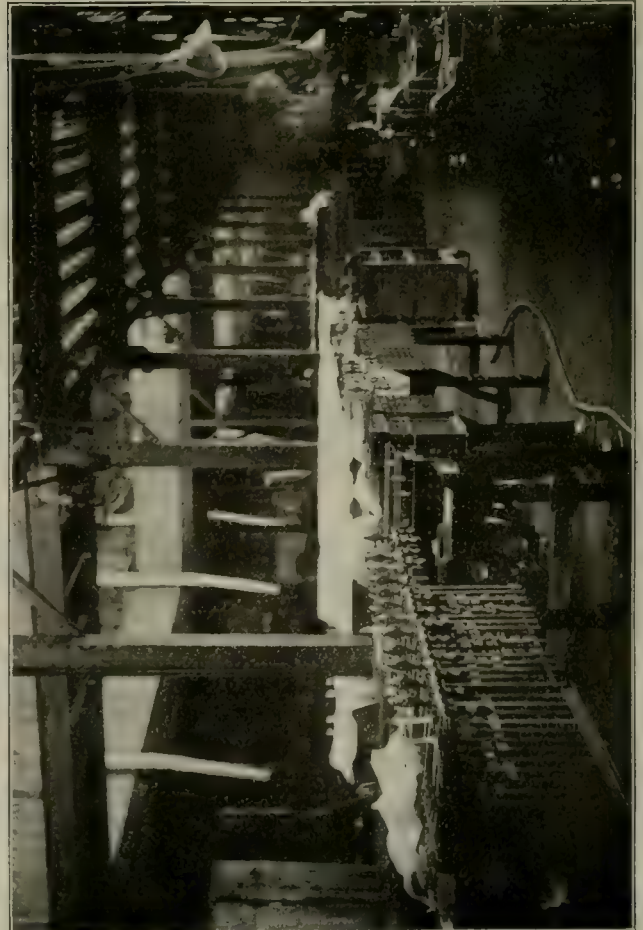
Allis-Chalmers Company, Milwaukee, Wis.—Bulletin No. 1501, entitled "Belted Corliss Engines," is devoted to the Reliance pattern of the Reynolds-Corliss engine, which was designed to meet the demand for a strong and serviceable machine which would occupy less floor space and run at somewhat higher speeds than is usual in Corliss engine practice. The bulletin contains a number of excellent illustrations of these engines.



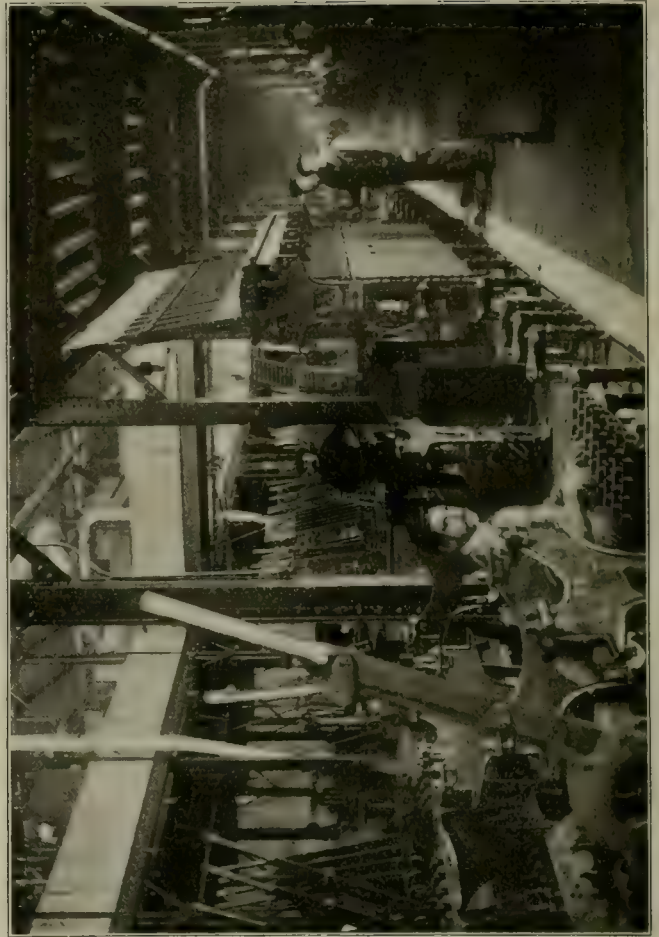
Section of Machine Shop No. 1.



Armature and Field Winding Department.



Assembling Department for Electric Interlocking.



Assembling Department for Mechanical Interlocking.
General Railway Signal Company's Plant.

WORKS OF THE GENERAL RAILWAY SIGNAL COMPANY AT ROCHESTER, N. Y.

It is quite probable that even officials of railways which during the past 10 years have been making the largest expenditures for signal equipment have little idea of the growth of the plants for manufacturing signal apparatus which has been required to keep pace with the development of signaling in this country. Accordingly it is believed that some account of the works of the General Railway Signal Company, which in many respects is typical of progress in signaling, and is an example of modern manufacturing practice, will be of interest. Signaling equipment for all conditions of service is manufactured by this company. In addition to the contracts for the signal equipment of the New York Central electric zone, the company is also manufacturing at the present time the equipment for the Hudson Companies' tunnels. Another class of work of especial interest to electric railway interests is that this company is a large manufacturer of small electrical parts. Its equipment for insulating armature and field coils is very complete and it makes a specialty of the high quality of its insulation which is so necessary in the successful operation of electric signals over an extended period. In this work the vacuum impregnation process is used.

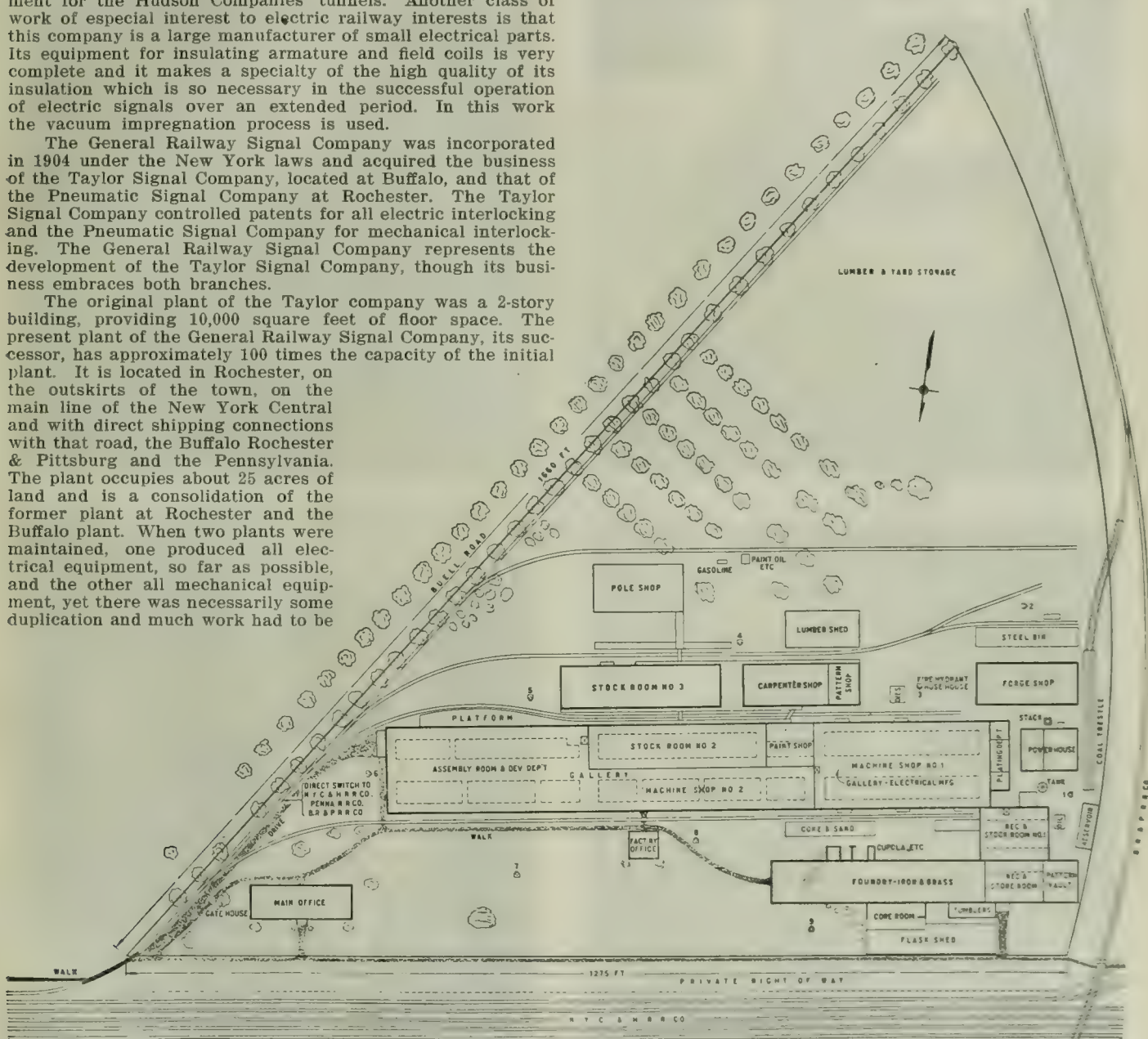
The General Railway Signal Company was incorporated in 1904 under the New York laws and acquired the business of the Taylor Signal Company, located at Buffalo, and that of the Pneumatic Signal Company at Rochester. The Taylor Signal Company controlled patents for all electric interlocking and the Pneumatic Signal Company for mechanical interlocking. The General Railway Signal Company represents the development of the Taylor Signal Company, though its business embraces both branches.

The original plant of the Taylor company was a 2-story building, providing 10,000 square feet of floor space. The present plant of the General Railway Signal Company, its successor, has approximately 100 times the capacity of the initial plant. It is located in Rochester, on the outskirts of the town, on the main line of the New York Central and with direct shipping connections with that road, the Buffalo Rochester & Pittsburg and the Pennsylvania. The plant occupies about 25 acres of land and is a consolidation of the former plant at Rochester and the Buffalo plant. When two plants were maintained, one produced all electrical equipment, so far as possible, and the other all mechanical equipment, yet there was necessarily some duplication and much work had to be

be said to have its origin largely in the foundry and forge shops, moves from those departments through the polishing and plating departments, as may be required, to the machine shop, where the heavier work is cared for first and the other details handled in logical sequence. From the machine shop the next step is to the assembly department, where the completed machine is assembled and tested. After assembly the parts are dismantled and go direct to the shipping department.

The Foundry.

The foundry is fitted for both iron and brass work and is sufficiently large to produce all casting required by the company, whether of iron, brass, aluminum, phosphor-bronze or other materials. The only castings not made here are malleables, and it may be well to say at this point that aside from malleable parts and such attachments as electric meters,



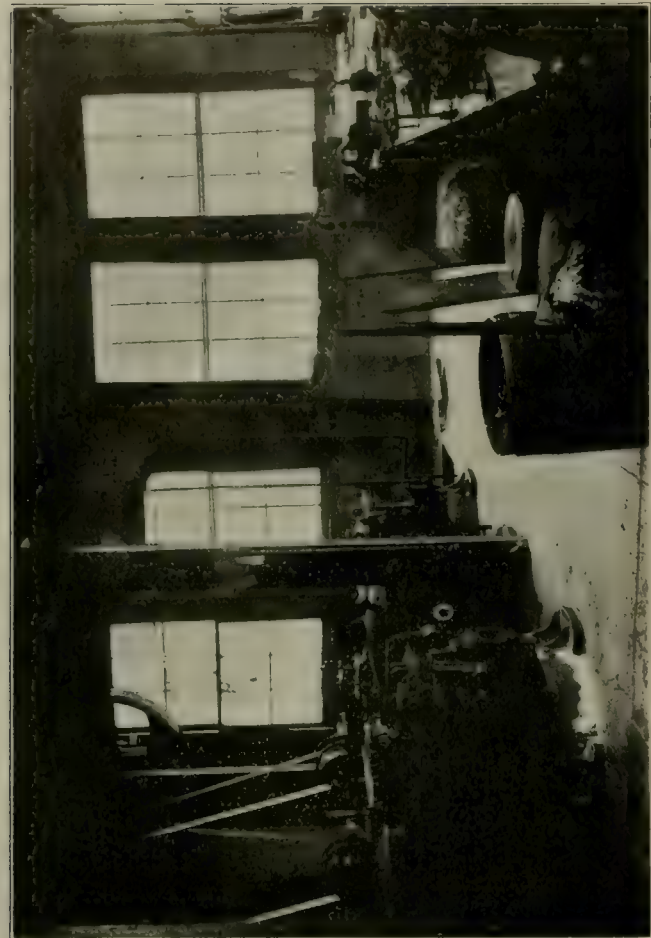
General Railway Signal Company's Plant.

transferred from one plant to the other, and more or less confusion arose from the shipment of orders in two parts from two factories.

The new plant, which is now in operation, was built under the direction of Westinghouse, Church, Kerr & Co., New York. The various buildings and departments are located with a view to making the process of manufacture a continuous one, so that from the time the raw material is received until the completed work is ready to ship all parts and supplies are moving through the works in one direction and the completed work may be shipped in its entirety. The work, which may

incandescent bulbs, sockets, etc., the company is entirely independent of outside production. Adjoining the foundry, and so situated as to be convenient of access from the forge shop also, is a receiving and stock room, where in general the rough stock is handled. The smaller stock room immediately adjoining the foundry provides storage for a certain portion of the foundry output and separates the foundry from the fireproof pattern vault.

The forge shop is well equipped with power hammers for use in producing drop as well as other forgings. In this building there is also an adequate equipment of bulldozers, punches,



Impregnating Section, Electrical Department.



Plating Department.



A Section of the Forge Shop.



Foundry.

General Railway Signal Company's Plant.

shapers, forges and furnaces for handling the required classes of work in a modern manner.

Machine Shop.

The machine shop is a large building, well equipped and well lighted. A gallery running entirely around the building and through the center affords location for machines working on smaller parts, and armature winding and other work of a similar nature. The machinery on the main floor is arranged in two aisles running the length of the building, the planers and milling machines for handling the heavier work being located on one aisle near the foundry, so as to do the heavy work before the castings go to the other machines. Similarly, on the other aisle the heavy lathe work is done first and the arrangement of the machinery is such as to facilitate the orderly progress of the lighter work which follows the rough and heavy machining. Automatic machines are used wherever practicable.

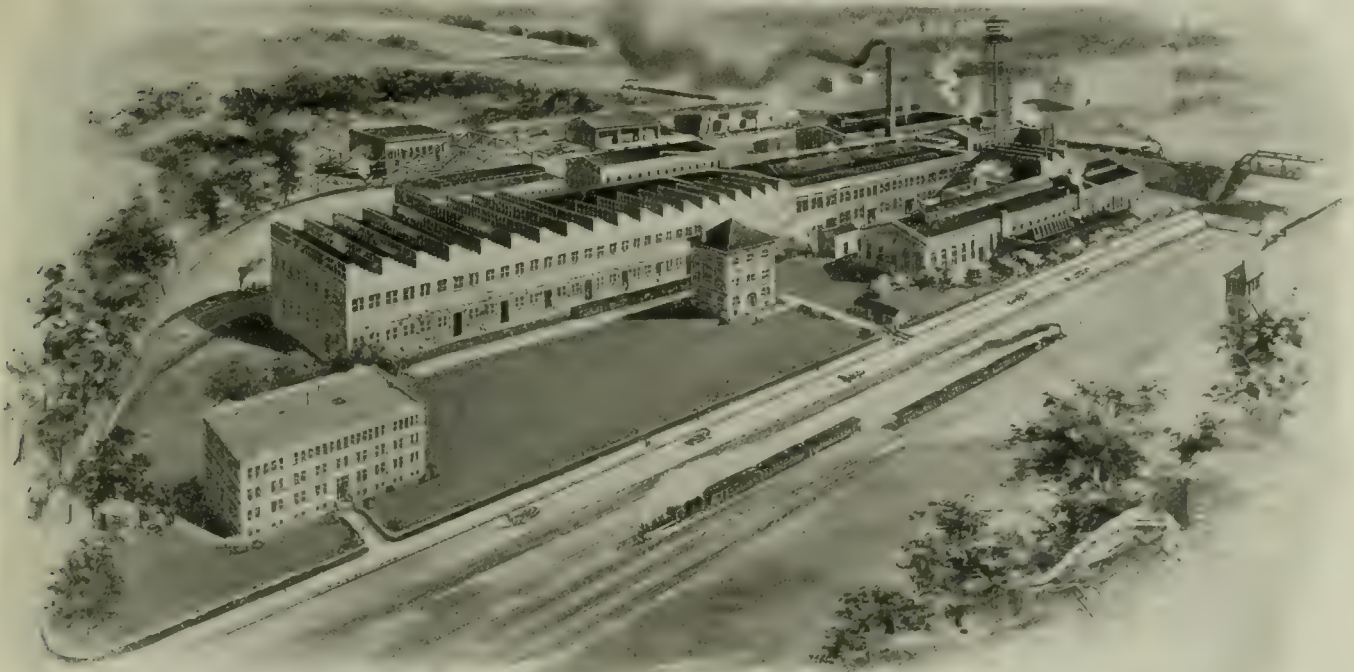
In this shop an inspection department is also provided, located so that the work moves past the inspection room in its course toward the assembling department. Where parts

not required immediately for assembling to fill an order and which have been through the machine shop and are finished stock. Another stock room provides storage for a large stock of commercial parts, of which about 25,000 are carried, and supplies which must be constantly kept on hand to meet the demand for repairs and replacements.

Other Buildings.

The buildings of the plant also include a pole shop with ample yard storage room adjoining and with equipment for a large amount of pole work, and a carpenter shop in which not only the work necessary and incident to a large industrial plant is done, but also all fine cabinet work for interlocking plants. There is also a pattern shop, which corresponds in ample high-grade equipment to the rest of the plant.

The entire plant is served by a Koppel industrial railway and most of the material is transported by it. There are extensive facilities for laying out and loading shipments and the tracks of the steam lines run to all parts of the company's property, so that carload shipments of supplies can be handled conveniently. The power house is located with a coal trestle



General Railway Signal Company's Plant.

are so heavy as to prevent their convenient handling, inspectors are sent to the work.

After passing through the machine shop most of the castings go through the paint shop and here the practice is similar to that in the inspection department. Finishing in the nature of reaming, tapping or boring of holes for the attachment of the smaller parts is done in the second machine shop, which has a large equipment of machinery for doing the finer work. Above the main floor of this shop there is a gallery where the smaller parts and electric work are assembled. This gallery extends over the main floor of the assembling department and provides room for the development department and the assembling of lighter work.

On the ground floor of the assembling department the heavier appliances, such as interlocking machines, signal machines, switching machines, etc., are assembled. In the assembling department the work is done in the same thorough manner as elsewhere in the plant and the entire equipment is not only assembled, but carefully adjusted and tested, to make certain that when the final installation is made the assembling and operation of the plant will be thorough and effective in every way.

Adjoining the assembling department are two stock rooms. One of these provides storage facilities for parts which are

of approximately 1,000 tons capacity immediately adjoining. The power house equipment includes four water-tube boilers with a feedwater heater and three electrical generating units. The machinery throughout the plant is for the most part electrically driven, the heavier machines by individual motors and the smaller arranged under the group system. The power system, however, also includes a 2-stage air compressor made by the Chicago Pneumatic Tool Company; this has a capacity of 980 feet of free air per minute and supplies all air-driven tools and machinery.

The offices of the company are located in a modern 3-story building. On the first floor the executive, accounting and sales departments have their headquarters and on the second floor are the offices of the consulting, factory and development engineers. The third floor is given over to the drafting and clerical force. In the basement the company has furnished and equipped a cafe for the office force and the heads of the departments throughout the plant.

Organization.

The organization of the company's forces is such as to aid in businesslike handling of contracts and to facilitate work in the manufacturing department. Such features as a perpetual inventory of supplies on hand, with a corresponding

system of placing orders for supplies so as to anticipate future demands, the completion of all details, factory orders, etc., before work enters the manufacturing department are indications of the company's progressive methods. Modern systems of recording, filing, etc., are in vogue not only in the office department, but throughout the plant. The company avoids trouble with labor unions by the use of the piecework system wherever possible. A thorough system of inspection and testing and the adjustment of piecework prices from time to time to correspond with the results of employees' work has done much to produce high-grade work in every respect and to increase the output.

The company has as a result been very successful in securing large contracts for signaling installations, and at this time the entire organization is working overtime and in spite of the recent financial depression additions have been made to the forces in the manufacturing department to care for contracts on hand. Among the work in process of manufacture is that for the complete equipment of the electric zone of the New York Central with apparatus manufactured under the Young patents for high-tension electric lines.

Personnel.

Much of the company's success has been due to the personnel of its directorate. The president of the company is W. W. Salmon, who was for a number of years vice-president of the Hall Signal Company and before that had an extended experience in railway service. George D. Morgan, vice-president and treasurer, was secretary and treasurer of the Taylor Signal Company. W. G. Hovey, signal engineer, was also connected with the Taylor Signal Company when the plant of the company was located at Buffalo. M. Wuerpel, Jr., assistant general manager, is well known among railway men through his connection with the Terminal Railroad Association of St. Louis as signal engineer. W. K. Howe, chief engineer, was for a number of years designing engineer of the Western Electric Company. The general superintendent is C. O. Poor, who was for a number of years connected with the Hall Signal Company. F. L. Dodson is consulting engineer.

A BUSINESS MAN'S LETTER ON CONFIDENCE.

The president of the Heath & Milligan Manufacturing Company of Chicago, Ernest W. Heath, addressed a letter to the salesmen of the company, which is a first-class expression of optimism. The letter, which was dated November 27, 1907, contained the following:

"We can no longer sit idly by without raising our hand to, in a measure, check the senseless wave of fear which, like a plague, seems to have swept over this country from one end to the other. To remain silent longer would question our loyalty to our country, our industries and our citizenship.

"What has brought about this seeming condition? Fear and nothing else. The whole situation is only the result of an accumulation and circulation of fear, which had its beginning in the east and which has gradually extended itself until it has reached every part of this country.

"While many merchants have views on the financial question which differ from those expressed by the bankers themselves in their adopted policies, we must all agree that the financial affairs must be handled through these channels; and we must conclude that wisdom directs the course which is being pursued by representative men in handling this complex proposition as it appears to exist.

"Lack of confidence is using every available means to close the commercial avenues which have heretofore been open to manufacturers and merchants, and the largest concerns in this country are deprived in a great measure of their usual banking accommodations.

"A great many small dealers, acting upon the advice of their banks, are holding back collections—under the impression that such a course will bring pressure upon their creditors in large cities—which pressure will be extended to their banks and will be the means of releasing currency to the interior banks. This course is not only ill-advised, but absolutely ineffective, and only tends to increase the burden of merchants in large financial centers.

"There is no less currency in the country than there has been at any time; on the contrary, the importation of an immense amount of gold, and the circulation of additional currency under direction of the government, have increased the medium of exchange which we have all learned to believe is the necessary adjunct of business—that is, money. There is no real difference in the actual resources of the country, except as a betterment.

"Fear, which begets lack of confidence, has retired and hidden, by the hoarding process, millions of currency which, without this fear, would still be in active circulation.

"What is needed at this time is a good strong hypodermic

of nerve which, if generally applied, would relieve the situation and immediately put conditions back onto a normal basis.

"Every right-minded man should do his share toward the restoration of confidence, and an earnest effort in this direction will be fruitful of results—will assist the bankers in the solution of the problem which they have in charge—and will tend toward the restoration of business conditions to a normal plane at once.

"Summarized, then, we have on the one hand fear, lack of confidence, hysterical pessimism; on the other hand, abundant crops, abundant supply, abundant demand, abundant prosperity. We need confidence and optimism.

"Please make the question of soliciting orders secondary entirely to an effort on your part to restore confidence, wherever it seems to have been lost. Do some talking along the right lines and along the lines of this letter—for those are the views of the house you represent, and, if your personal views differ, we must ask you to subserve them to our own and in your talk state that they are the views of Heath & Milligan.

"We would earnestly urge that you leave no town on your route without planting some seed of confidence and optimism. Plant these seeds in the hotels—on the cars—among your fellows everywhere.

"Let us get together and start a wave of truth, confidence and harmony which will grow and sweep back and bury in oblivion the false wave which would seek to plunge the business conditions of this great and prosperous country into senseless chaos."

DIRECTORY OF ELECTRIC RAILWAY ASSOCIATIONS.

American Street and Interurban Railway Association. Secretary, Bernard V. Swenson, 29 West Thirty-ninth street, New York.

American Street and Interurban Railway Accountants' Association. Secretary, Elmer M. White, 29 West Thirty-ninth street, New York.

American Street and Interurban Railway Claim Agents' Association. Secretary, B. B. Davis, claim adjuster Columbus Railway & Light Company, Columbus, O.

American Street and Interurban Railway Engineering Association. Secretary, J. W. Corning, electrical engineer Boston Elevated Railway, Boston, Mass.

American Street and Interurban Railway Manufacturers' Association. Secretary, George Keegan, 2321 Park Row building, New York, N. Y.

California Electric Railway Association. Secretary, L. E. W. Pioda, Oak and Broderick streets, San Francisco, Cal. Canadian Street Railway Association. Secretary, Acton Burrows, 33 Melinda street, Toronto, Ont.

Central Electric Railway Association. Secretary, W. F. Milholland, secretary and treasurer Indianapolis Traction & Terminal Company, Indianapolis, Ind. Next meeting, Dayton, O., January 24, 1908.

Colorado Electric Light Power and Railway Association. Secretary, John F. Dostal, Denver Gas & Electric Company, Denver, Colo.

Electric Railway Shop Foremen's Association. Secretary, J. R. Case, Public Service Corporation of New Jersey, Newark, N. J.

Iowa Street and Interurban Railway Association. Secretary, L. D. Mathes, general manager Union Electric Company, Dubuque, Ia.

Massachusetts Street Railway Association. Secretary, Charles S. Clark, 70 Kilby street, Boston, Mass. Meetings held in Boston on second Wednesday of each month, except July and August.

Michigan Electrical Association. Secretary, A. C. Marshall, Port Huron, Mich.

National Amusement Park Association. Secretary, C. H. Oberheide, Trenton, N. J. Annual meetings, third Tuesday of each November.

New England Street Railway Club. Secretary, John J. Lane, 12 Pearl street, Boston, Mass. Meetings held on fourth Thursday of every month.

Northwestern Electrical Association. Secretary, R. N. Kimball, Kenosha, Wis. Annual meeting, Milwaukee, Wis., January, 1908.

Oklahoma Electric Light, Railway and Gas Association. Secretary, Charles W. Ford, Oklahoma City, Okla.

Southwestern Electrical and Gas Association. Secretary, E. B. Meginnis, Dallas, Tex.

Street Railway Association of the State of New York. Secretary, J. H. Pardee, 611 West One Hundred and Thirty-seventh street, New York, N. Y.

Wisconsin Electric and Interurban Railway Association. Secretary, Clement C. Smith, president Columbia Construction Company, Milwaukee, Wis.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 24

CHICAGO, DECEMBER 14, 1907

WHOLE No. 242

TABLE OF CONTENTS.

Editorial:		
—Promoting the Purchase of Tickets.....	915	
—Signs at Danger Points.....	915	
—Earnings of New England Roads.....	915	
—The Promotion of Traffic.....	916	
—Why is Improvement Needed?.....	916	
Communications	917	
Conference on Electric Railway Accounting System Will be Held on December 17.....	918	
The Harmon Shops for the New York Central Electric Zone (Illustrated).....	919	
Newspaper Tickets at Los Angeles (Illustrated).....	921	
Meriden-Middletown Line of the Connecticut Company (Illustrated).....	921	
Refrigerator Cars for the Illinois Traction System (Illustrated).....	922	
Record Blanks for Rolling Stock (Illustrated).....	923	
Paris Extension of Terre Haute Lines (Illustrated).....	924	
Traffic Association.....	925	
New Cambridge Bridge (Illustrated).....	926	
Tests of Electro-Mechanical Track Brake (Illustrated).....	927	
The Desirability of Changing the Unit of Fares on Street Railways.....	928	
The Relation of the Interurban to the Steam Road. By J. Fay Tomlinson.....	929	
Operation of the Chicago & Milwaukee Line Not Expected Until Spring.....	929	
Instruction Blank for Placing Signs on Cars (Illustrated).....	930	
Subjects for Discussion at the International Congress.....	930	
The Flangeless Railway System (Illustrated).....	930	
Piping and Power Station Systems—LXVI. By W. L. Morris, M. E. (Illustrated).....	931	
Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	933	
News of the Week:		
—Recent Accidents.....	934	
—Chicago Union Traction Reorganization.....	934	
—Negotiations for Settlement of the Cleveland Controversy.....	934	
—New York Public Service Commission.....	935	
Construction News:		
—Franchises.....	937	
—Recent Incorporations.....	937	
—Track and Roadway.....	937	
—Power Houses and Substations.....	939	
Personal Mention.....	939	
Financial News.....	940	
Directory of Electric Railway Associations.....	940	
Manufacturers and Supplies:		
—Rolling Stock.....	941	
—Shops and Buildings.....	941	
—Trade Notes.....	941	
—Advertising Literature.....	942	
The Golden Automatic Water Gauge (Illustrated).....	942	

A road which would sell tickets rather than collect cash on its cars can do well by studying the ticket methods of the Milwaukee Northern Railway. On this new road, as described in our issue of last week, every inducement is offered for the purchase of tickets by intending passengers.

Agents are stationed at each important stopping point along the route and the rates of fare are clearly stated in an attractive timetable folder. The maximum rate per mile legally chargeable in Wisconsin is two cents. Conductors collecting fares on the electric cars charge at this rate. In accepting cash fares the conductors issue receipt slips which are redeemable at the ticket offices for 10 per cent of their face value; but enough mileage must have been paid for in cash to make the refund to the passenger amount to more than five cents, otherwise, as the receipts state, he is not entitled to this reduction from the 2-cents-per-mile rate. The next lower rate of fare, $1\frac{3}{4}$ cents per mile, is that for 1-way tickets sold at stations, and the lowest rate, with the exception of mileage books, is $1\frac{1}{2}$ cents per mile for round-trip tickets sold by agents. During the few weeks that the Milwaukee Northern has been in operation the passengers have quickly learned to patronize the station agents, with the result that the conductors have few or no cash fares to collect from passengers boarding cars at station stops.

Many of the electric railways have adopted steam railroad practice in the matter of fixed signals, such as whistling posts, highway crossing signs, slow-down signs for bad curves and signals to indicate grade crossings of intersecting lines. The practice, however, is far from general. In some states the use of a derail is required at grade crossings of steam and electric roads, usually accompanied by an illuminated sign. But in most localities the conductor simply runs ahead to the middle of the crossing and signals to the motorman to proceed. This method works well enough under ordinary conditions, but in case of a fog the car is liable to rapidly approach too near the crossing to permit of its being stopped if required. Moreover, a new man not yet thoroughly familiar with the line

**Signs at
Danger
Points.**

may allow his car to approach an unexpected dangerous crossing at speed. The same arguments apply at curves or other points of danger. A crew that has long been in the service of the road knows where to proceed with caution, but such men are frequently assigned to new runs, and the personnel of the trainmen changes so often that the opportunities for an accident caused by a slight relaxation of vigilance are greatly increased. The men should have something more definite than being compelled to remember that the first crossing is half a block beyond the cigar store with the wooden Indian, or that there is a sharp curve beyond the white barn with the gilded weathervane. The old men learn the combinations, but it is the newcomers that are most liable to have accidents. Safe operation, even of city lines, would seem to require a more conspicuous indication of a danger spot than is furnished by the crossing of the overhead wires. In steam railroad crossings even this warning is lacking. It would be a simple matter to protect the crossings by inexpensive illuminated signs attached to the span wires, using lamps of low candlepower. In cities a white board hung from a span wire near a street lamp would suffice and might be the means of preventing a serious accident.

In his comment to stockholders in the annual report of the Boston & Worcester Electric Companies, James F. Shaw, the president, stated that last year was a poor one for New England street railways. The earnings of the Boston & Worcester Street Railway, the operating road which is controlled by the Boston & Worcester Electric

**Earnings
of New
England Roads.**

Companies, did not show a normal improvement. The gross earnings of this railway, in the year ended June 30, 1907, increased 3.3 per cent over the previous year, but in the year ended September 30, 1906, gross earnings increased 14.7 per cent over the previous year. Net earnings last year were 5.4 per cent greater than in the preceding year, but net earnings in the fiscal year 1905-06 were 12.1 per cent above those during the 12 months ended September 30, 1905. Similar results are shown by the combined income accounts of the companies controlled by the Massachusetts Electric Companies, which include the Old Colony Street Railway and the

Boston & Northern Street Railway. Gross earnings of these companies in the last fiscal year increased 3.2 per cent over the previous year, but in the latter year gross earnings gained 11.6 per cent over the fiscal year 1904-05. Net earnings last year were 4.7 per cent greater than in the previous year. In the fiscal year 1905-06 net earnings gained 15.7 per cent over the preceding year. Gross earnings of the Springfield (Mass.) Street Railway increased \$77,836 last year over the preceding year and net earnings gained \$41,908. Gross earnings of the Worcester (Mass.) Consolidated Street Railway increased \$117,300, but net earnings decreased \$56,103, resulting in a surplus of \$783 last year after provision for the dividends. The Berkshire (Mass.) Street Railway increased its gross earnings \$144,702 and its net earnings \$34,057. The gross earnings of the Holyoke (Mass.) Street Railway increased \$22,657, but the net earnings gained only \$14,780. Evidence of the unprofitableness of some of the small roads is presented in the abstract of an address by J. L. Richards, published in this issue.

THE PROMOTION OF TRAFFIC.

The traffic manager is of recognized value on interurban electric railways. While large city railways do not ordinarily operate under conditions of competition which necessitate the constant protection and development of passenger traffic sources, a skilled manager can formulate methods of soliciting travel which will result in larger gross and net earnings. On roads in cities where the duties of the traffic manager would be so light as to render it inadvisable to go to the expense of employing a separate official for this purpose, one of the officers of the company with a grasp of the details of its affairs may be of constant aid in suggesting ways to promote traffic.

In cities where competition exists there are always opportunities for presenting some facts which will impress passengers with the accommodations offered and will attract business. On the Northwestern Elevated Railroad of Chicago advantage is taken of opportunities to draw attention to the service. An argument in favor of traveling by the elevated road instead of by the surface cars is printed in the elevated cars in the form of a poster carried in the advertisement rack. This poster says: "Time Saved—Money Earned. Wilson avenue via Northwestern Elevated, 18 minutes to Lake street. Wilson avenue via surface cars, 45 minutes to Lake street. Save 27 minutes each way, 54 minutes per day, 32 working days per year. Take Northwestern Elevated express trains, main line. Clean—Comfortable. No Dust. No Delay."

Small handbills have been placed in the Northwestern Elevated cars during the present week to call attention to a special holiday service taking effect on December 16 and lasting during the balance of the shopping season which precedes Christmas. Special express trains will be run on the Wilson avenue branch every six minutes from 10:30 a. m. to 3:06 p. m., supplementing the regular express trains and affording express service during the day. On the last three business evenings before Christmas—December 21, December 23 and December 24, express trains will be run until midnight each night.

Many other companies will run extra cars or trains to meet the necessity for additional facilities during this season, but the public will not appreciate that any unusual arrangement is made unless some steps are taken to circulate the information. The expense of preparing handbills of this character is slight compared with the effect of showing the public that extra provision would be made to care for the abnormal crowds of shoppers.

The value of taking steps to promote traffic is generally better appreciated on interurban roads than by the managers of city railways. The statements from traffic officials of interurban railways in the Central Electric territory which

have been published recently in the Electric Railway Review show a widespread sentiment in favor of the formation of a traffic association by roads located in Ohio, Indiana, Illinois, Kentucky and Michigan. Traffic and executive officials of different roads in these states have discussed the advisability of forming an association of this character on various occasions; but it was not until November 20 that a preliminary conference was held in Indianapolis for the purpose of discussing uniform plans for preparing, filing and publishing tariffs of passenger and freight rates. If this association should be formed most of those who are interested in the tentative measures already taken favor the consideration of the subject of promotion of traffic.

A traffic association in this territory could take up many questions and affect appreciably the importance of the service rendered to the communities reached. Even if such an association did not enlarge its scope so as to consider at frequent meetings the subject of the promotion of traffic, there would undoubtedly be an informal interchange of views at each gathering which would give valuable suggestions to all who might attend.

WHY IS IMPROVEMENT NEEDED?

The present widespread consideration of pay-as-you-enter cars for metropolitan use directs attention to the underlying motives which have prompted a general improvement in city transportation methods. During the last few years the size of cars has increased from 4-wheel units 30 feet long to large double-truck cars, approximately 45 feet in over-all length. In analyzing the reasons for the introduction of larger cars it is necessary to bear in mind the better character of the service now afforded, and the changes in the principal operating costs for that service.

Laying aside the question of the cost of power, there remains the large expense for platform labor. General averages show that nearly 50 per cent of the total operating expense is paid out for labor incident to conducting transportation. Approximately the figures may be given as 7 cents per car-mile for platform labor out of 15 cents for total car-mile operating expenses. It is unquestionably essential that the ratio of nearly 50 per cent thus indicated, if it is not reduced, must not become larger if street railways are to be successful financial undertakings.

In the last few years, while the size of cars has been so greatly increased, organized labor has demanded higher and higher wages for platform service. These demands are to be expected and there seems to be no reason why they will cease to be made. To operate a road economically, maintaining a fair ratio between the cost of platform labor and the total cost of operation per car-mile, the larger units are required; only by their use is it possible to hold down the platform labor cost per revenue passenger carried. The larger operating units also make it possible to improve the schedules and the service rendered; these units, therefore, perform the double function of encouraging an increase in traffic and providing a means for handling that larger traffic when higher platform wages are demanded, without any change in the ratio between the platform labor cost and the total operating expense.

Through the use of the larger car units, however, there has been introduced one condition which, until very recently, it has not been possible to avoid. We refer to the increase in the number of accidents at rear steps. With large cars, seating 40 passengers and providing standing room for as many more, it is a physical impossibility for conductors, on city lines, where the density of traffic is great, under the ordinary methods of operation, while walking back and forth through crowded cars collecting fares, to keep strict watch of the rear steps. Those who are familiar with the enlarging lists of damage claims chargeable to accidents on the rear

steps of city cars appreciate that since the advent of the larger cars the number of accidents has experienced a deplorable increase. At first thought it might seem that more careful instruction in the transportation department, tending to caution conductors against rear platform accidents, would reduce the number of such damage claims. Another factor, however, which must be taken into account is that conductors must exert every effort to collect the fares of all passengers.

As the two duties, collecting fares and attending to the safety of passengers on rear platforms, conflict more and more as the size of the cars increases, instances may occur where the managers will be required to direct their conductors to neglect one of two things—fares or the danger of accidents—neither of which can be neglected if the road is to be operated satisfactorily.

The following is an example of what might easily occur: The conductor of a large double-truck city passenger car may be collecting fares at the front end of his car at a time when the aisles are so crowded that it is quite impossible for him to observe the rear step. At a street crossing the car may stop to take on passengers and it may be impracticable for the conductor to work his way through the crowd to the rear platform before signaling the motorman to go ahead. The usual course in such a case is for the conductor to call back to the rear of the car asking if all is clear. Some one may reply in the affirmative and the conductor will give the motorman the "go ahead" signal. Meanwhile an intending passenger, attempting to mount the rear step, may be thrown to the pavement.

It can hardly be expected that a court would free a transportation company from liability in an accident of this character, and yet the management would be in no position to censure its conductor, who was doing his best to collect all the fares of evasive passengers and making every effort to see that the rear platform was clear before signaling for the car to go ahead.

Municipal officers who are hired to care for the safety of the traveling public will understand sooner or later that the increased number of rear-step accidents is not due to carelessness in management, but to the conditions which have been developed through the desire to improve transportation facilities without increases of fares. The tendency of all municipalities is to demand larger cars and faster schedules, meanwhile insisting that the companies furnish improved service without an increase in cost and with a lessening of the accident risk.

It is to be regretted that the number of accidents occurring with the larger cars cannot be reduced, but there are few representatives of municipalities who understand well enough the intricacies of electric railway management to realize that every effort is being made to care for the safety of passengers. In spite of the fact that such officers are not versed in street railway affairs, and because they are vested with municipal authority, it will undoubtedly develop that they will prescribe methods for operating cars; and it is altogether probable that their methods will be of an entirely impractical nature—such as, for instance, the requiring of two conductors on each car, one to watch the rear platform and the other to collect the fares.

It becomes a question of policy, therefore, for the officials of street railways to take steps in advance of the demands of municipal boards and introduce into their service practical methods or details of operation which will result in furnishing the character of service that will inevitably be demanded.

John I. Beggs, president of the United Railways of St. Louis, is quoted as saying that all employees of the construction and extension departments of this company, as well as of two affiliated light and power companies, have been laid off indefinitely. No new work is to be carried out until financial conditions change and confidence is restored.

Communications

INSTRUCTING EMPLOYEES HOW TO AVOID ACCIDENTS.

To the Editors:

In explanation of that part of our anti-accident campaign which consists of talks to the conductors and motormen, we have just finished the last of eight talks to the conductors and motormen of the various divisions of our system. At these meetings talks on "Accidents and Their Prevention" were made by the assistant general manager, the general claim agent, the superintendent of transportation and the assistant superintendent of transportation; the principal talk being made by the general claim agent, Arthur W. Gross, who, by reason of his position, is in most constant touch with the accident end of the business, and therefore able to make the most interesting talk upon the subject. In this connection it is also proper to state that we are fortunate in having a general claim agent who is a pleasing and effective talker.

Some of the matters touched upon in these talks were as follows:

That trainmen see and know but one side of an accident.

That they do not realize that accidents carry with them a world of sorrow, grief and hardship.

That the saving of life, limb and property should be uppermost in their minds.

That they would be staggered by the enormous outlay and expense made necessary in the settlement and handling of claims.

That it is the duty of a conductor or motorman to prevent, if possible, every accident, including those resulting from the carelessness of passengers and pedestrians.

Platform Accidents.

That conductors should give their undivided attention to passengers while leaving the car.

That passengers should be warned in a loud and distinct tone "to wait until the car stops."

That the conductor should prevent passengers from attempting to alight from a moving car when possible, even restraining them forcibly, if necessary, especially women, aged or infirm persons and children, who, under no circumstances, should be allowed to get down on to the step of a moving car.

That motormen must never start their car except upon the full signal of two bells.

That conductors should avoid giving the starting signal from the inside of the car whenever possible, and never give it from the inside of the car without first ascertaining from passengers on the rear platform that everything is clear by calling out, "All right back there?"

That it is a bad habit for conductors to grasp the bell cord before passengers are on or off the car.

Passing Standing or Slowly Moving Cars at Street Intersections.

That the motorman must never lose sight of the fact that someone may come from behind a standing or slowly moving car on to the track in front of him unaware of the approach of the car, oblivious to all surroundings, etc., and that it is up to him to avoid that accident.

That he must have his car under complete control at such times—no current, hand on brake, and giving ample warning with gong.

That he cannot take chances of waiting until he sees someone on, or about to come on to, the track ahead of him, but must always be prepared for such an emergency.

Collisions with Teams and Vehicles.

That motormen have no greater rights to the streets than the driver of a team; both must exercise care.

That motormen, though not mind readers, should, nevertheless, learn to anticipate drivers, especially at street intersections.

That they can better afford to hold their cars back for a second or two than to have a collision, which means the loss of so much time, to say nothing of the damage or injury resulting, possibly of the gravest nature.

That obstructions or standing vehicles near the curb occasion many accidents, as drivers in cutting around such obstructions or vehicles will get on to the track, and motormen must anticipate this.

Collision of Cars.

That collisions are always costly and serious.
 That there is no justification for taking chances on a bad rail, or following too closely behind the car ahead.
 That the lives of passengers are at their mercy.
 That when an accident has happened it is too late for afterthought.
 That motormen must know conditions and make allowances accordingly.

Derailment.

That derailments occur occasionally by hitting curves just a little too fast and by reckless running over new track, or down grade.

That what may be a safe rate of speed at one point may be an extremely dangerous rate of speed at another.

Handling of Accidents.

That conductors and motormen should work together.

How to care for an injured person.

Procuring of witnesses: that they cannot get too many from among the passengers on their car, or from persons on the street, as some witnesses may give wrong names and addresses.

Not to ask passengers whether they saw the accident, but to get their names and addresses, inasmuch as passengers inside or on the front end of a car make very good witnesses on some material point, such as the number of stops made by the car, the speed, or whether the car jerked or not, even though they may not have actually witnessed the accident.

That accidents should not be discussed by employees in the presence or hearing of strangers, as their conversation is apt to be distorted.

That every accident happening on or near the car should be reported.

That trainmen should not be misled by the fact that an accident appears to be trifling nor by the request of the injured party not to report the same on account of its being his own fault, or claiming not to have sustained any injury.
 That reports should, above all things, be truthful.

In his talk Mr. Gross frequently cited cases which have actually happened and aptly illustrated his points.

A booklet on "The Prevention of Accidents," by F. W. Johnson of the Philadelphia Rapid Transit Company, is being distributed to the conductors and motormen.

In addition to the talks to our conductors and motormen we are also taking other steps looking toward the prevention of accidents, as, for instance, publishing in the newspapers a series of talks to the public cautioning them to be careful on and about street cars; placing in all of our cars a picture illustrating the right and wrong way of getting off a car, which we had made from photographs taken from life and on which we designated the right way as "safe and graceful" and the wrong way as "dangerous and awkward."

We have also enlisted the support of the probation officer and his staff in keeping boys from jumping on cars and children from playing in the streets on which there are car tracks, and also enlisted the aid of the physical director of the Young Women's Christian Association in educating the young women in the proper way to get on and off cars.

Careful investigation of each accident, aside from the usual investigation by the claim department, is also made by our superintendent of transportation, for the purpose of determining whether the accident was caused from the carelessness of the conductor or motorman, and if so, the delinquent one is given a heart-to-heart talk, and it is explained to him just where he was negligent and what the result of his negligence was, or what it might have been, and it is impressed upon his mind that hurting men and women, or children, is a very serious business.

We are glad to find that the majority of our men show a very fine spirit in this educational campaign, and are just as eager to prevent accidents, when the matter is put before them in the proper light, as we are ourselves.

R. A. LEUSSLER,

Assistant General Manager Omaha & Council Bluffs Street Railway.

Omaha, Neb., December 10, 1907.

CONFERENCE ON ELECTRIC RAILWAY ACCOUNTING SYSTEM WILL BE HELD ON DECEMBER 17.

The report of the special committee on "Classification of Electric Railway Accounts," which was made to Prof. Henry C. Adams, in charge of statistics and accounts, interstate commerce commission, will be considered at a conference in Washington, D. C., on December 17.

Following is a list of those who have been invited to attend the conference on December 17:

H. A. Nicholl, general manager Indiana Union Traction Company, Anderson, Ind.

J. Ledlie Hees, president and general manager Fonda Johnstown & Gloversville Railroad, Gloversville, N. Y.

W. H. Forse, Jr., secretary and treasurer Indiana Union Traction Company, Anderson, Ind.

Thomas N. McCarter, president Public Service Corporation of New Jersey, Newark, N. J.

Alexander Rennick, third vice-president Philadelphia Rapid Transit Company.

T. W. Wilson, general manager International Railway Company, Buffalo, N. Y.

Calvin G. Goodrich, vice-president and managing director Twin City Rapid Transit Company, Minneapolis, Minn.

W. Caryl Ely, president Ohio Valley Finance Company, Buffalo, N. Y.

Charles O. Kruger, second vice-president and general manager Philadelphia Rapid Transit Company.

W. F. Ham, comptroller Washington (D. C.) Railway & Electric Company.

John I. Beggs, president Milwaukee (Wis.) Electric Railway & Light Company.

B. V. Swenson, secretary American Street and Interurban Railway Association, New York, N. Y.

C. Loomis Allen, vice-president Utica & Mohawk Valley Railway, Utica, N. Y.

Henry J. Davies, secretary Cleveland (O.) Electric Railway.

C. S. Sargeant, vice-president Boston (Mass.) Elevated Railway.

James F. Shaw, president Boston & Worcester Electric Company, Boston, Mass.

J. F. Calderwood, third vice-president and general manager Brooklyn Rapid Transit Company.

J. D. Callery, vice-president Philadelphia Company, Pittsburgh, Pa.

T. E. Mitten, president Chicago City Railway.

Hugh J. McGowan, president Indianapolis (Ind.) Traction & Terminal Company.

Arthur W. Brady, president Indiana Union Traction Company, Anderson, Ind.

W. Kesley Schoepf, president Cincinnati (O.) Traction Company.

Horace E. Andrews, president Cleveland (O.) Electric Railway.

Calvert Townley, first vice-president Consolidated Railway Company, New Haven, Conn.

J. C. Hutchins, president Detroit (Mich.) United Railway.

George H. Harries, vice-president Washington (D. C.) Railway & Electric Company.

Frank R. Henry, auditor United Railways of St. Louis.

P. F. Sullivan, president Massachusetts Electric Companies, Boston, Mass.

W. A. House, president United Railways & Electric Company, Baltimore, Md.

E. C. Foster, president New Orleans (La.) Railway & Light Company.

Chauncey Eldridge, Tucker, Anthony & Co., Boston, Mass.

G. W. Bacon, Ford, Bacon & Davis, New York, N. Y.

Joseph A. Pardee, J. G. White & Co., New York, N. Y.

William A. Pratt, Stone & Webster, Boston, Mass.

H. L. Wilson, comptroller Boston (Mass.) Elevated Railway.

W. B. Brockway, auditor Ford, Bacon & Davis, New York, N. Y.

P. S. Young, comptroller Public Service Railways Company, Newark, N. J.

C. L. S. Tingley, vice-president American Railways Company, Philadelphia, Pa.

William G. McDole, auditor Cleveland (O.) Electric Railway.

F. E. Smith, auditor Chicago Union Traction Company.

C. N. Duffy, comptroller Milwaukee (Wis.) Electric Railway & Light Company.

C. N. Black, vice-president and general manager United Railroads of San Francisco.

THE HARMON SHOPS FOR THE NEW YORK CENTRAL ELECTRIC ZONE.

Extended accounts have previously been published of the work which the New York Central & Hudson River Railroad now has under way in the so-called "electric zone." The northern limits of this zone upon the main line are at Croton on the Hudson, 34 miles from the Grand Central terminal in New York City, and North White Plains, 24 miles from New York City, on the Harlem division. At these points, when the work within the zone is fully completed, the change from steam to electric locomotives will be made on incoming trains and from electric to steam locomotives on outgoing trains. All trains within these limits will be operated by electric power and these points will also constitute the termini of the multiple-unit suburban service for the respective divisions. These facts determined the location at these two points of the shops for the maintenance of the electrical equipment employed in the service.

The site selected for the shops of the main line division, which will henceforth be known as Harmon, is about one mile south of Croton. A large tract of land to the west of the railroad tracks is owned by the company, and this is sufficient not only for the shops, with ample provision for future extension, but for the establishment of a large yard for interchange purposes. The plans provide for possible additions to the buildings to an extent equivalent to their present capacity. As shown upon the accompanying plan, there is a large loop at the north end in addition to the tracks of the interchange yard mentioned, and as the site was originally at a considerably higher level than that of the adjacent tracks of the main line the preparation of the site involved a great amount of labor. However, as the soil was a good quality of fine sand, the material has proved useful throughout the electric zone and has been used in the making of fills and in concrete with very satisfactory results on the score of economy.

The buildings cover about 98,000 square feet. This space is covered by a building under a common roof, though the space is so subdivided as to constitute actually a group of adjoining buildings, which are designed to serve various purposes. The eastern section is devoted to the car inspection shed, with its adjuncts, including a coil and fan room, while the western end is devoted to machine shop, car repair shop, with its coil room and fan room, blacksmith shop, power plant and offices with suitable facilities for each. It is the intention ultimately to erect a 30-stall roundhouse for steam locomotives and to convert what is now the temporary power plant into a shop for locomotive repairs and to add sheds for the inspection of electric locomotives.

In the matter of architecture the construction is plain, but presents a pleasing appearance. The materials are hard brick laid in Portland cement mortar, and the walls are broken into panels by pilasters which relieve the monotony of the exterior. The walls are capped with blue stone, the pilasters and corners are similarly finished and the walls are finished with a tile coping. The foundations are of concrete in a mixture of 1-4-7½ below subgrade and 1-3-6 above, and on account of the nature of the soil no piling was necessary. The piers are designed to support a load of 1.75 tons per square foot and the walls 1.25 tons.

Car Inspection Shed.

A space 448 by 56 feet at the east side is occupied by the car inspection shed. Its three tracks furnish a storage capacity for 21 cars, entrance being afforded from each end through openings 16 feet high and 12 feet 4 inches wide, protected by double-hinged wooden doors having the upper panels fitted with lights. The lighting in general is satisfactory. Of the 16 panels of the east elevation two have an opening of 5 feet 5½ inches by 17 feet 3 inches, with wooden doors and transom and two windows each 5 feet 5½ inches by

12 feet 6 inches. The other panels have each three windows of the size last mentioned, fitted also with pivoted transom sashes above. The windows are all fitted with double-hinged sashes, each carrying 12 panes of 14 by 16 inch ⅜-inch ribbed glass. The window-operating system is that supplied by G. Drouvé, Bridgeport, Conn.

Each track in the inspection shed has a pit 420 feet long and 4 feet 2 inches wide. At the middle and at each end the depth is 3 feet 8 inches and the floor is depressed midway between the middle and each end to a depth of 4 feet 2 inches for drainage, while in cross section each pit floor has a crown of 2 inches. Drainage openings are placed at intervals of 28 feet. The walls and floors of the pits are of concrete (1-3-6), the side walls being 18 inches thick and the floor 12 inches, reinforced with ¾-inch rods laid longitudinally and transversely 9 inches apart. The walls are capped by 10 by 10 inch stringers, held by anchor bolts embedded in the concrete. The walls are recessed at intervals for pit lights and connections with the compressed air system and there are concrete steps at each end. At each side of the pit are placed three yellow pine planks 4 by 8 inches, embedded in and flush with the concrete floor to serve as a support for jacks.

To the west of the car inspection tracks are a coil and fan room (30 by 84 feet and separated from the inspection shed by a brick wall having openings provided with glass in the upper panels) and three spaces, each 25 by 84 feet, used for storeroom and work bench space, toilet, lavatory and locker rooms, etc. In this section of the building there is a mezzanine floor, separated from the inspection shed by a wall with numerous windows. The mezzanine floor is of 4-inch reinforced concrete carried on I-beams and channels and covered by a wooden floor. The space on this floor at the northern end is occupied by offices and the south end is reserved for future office extension. The roof over these adjacent buildings is provided with large skylights, two over each section.

Car Repair Shop.

In the car repair shop, which is 176 by 182 feet, are 10 tracks, each provided with a pit of construction similar to that used in the inspection shed. The openings for entrance to the track are also similar to those in the inspection shed. In this section of the building the walls are carried to a greater height, affording room for a series of 20 windows, each 3 by 7 feet, placed above the cornice, and the building is provided with a roof of saw-tooth pattern, supported by steel trusses and columns. The latter carry the crane girders and trolley track for supplying current to move cars. Six of the 10 tracks are spanned by electric traveling cranes of 18 tons capacity each, built by the Alfred Box Company.

Adjoining this section of the building is one of construction similar to the building described as an adjunct to the car inspection shed. This is divided into a coil and fan room, 30 by 70 feet, a blacksmith shop, 30 by 28 feet, and a space for facilities, 30 by 56 feet, the latter containing toilets, lavatories and metal lockers and having above a mezzanine floor devoted to office purposes.

In addition to the traveling cranes mentioned, which are operated by General Electric motors of the inclosed type—hoisting motor of 25 horsepower, trolley travel motor of 5 horsepower and bridge travel motor of 10 horsepower, all controlled from the floor—there is an electric traveling hoist run on an overhead track. This runway is built of 15-inch I-beams suspended from the bottom chords of the roof trusses at an elevation of 21 feet above the floor. It runs from the inspection shed through a passageway and then on a curve of 20 feet radius to the middle of the machine shop, through which it passes. The total length of the runway is 536 feet. The trucks of the hoist consist of a frame of four wheels flanged on the outer edge and running on the lower flanges of the I-beams, the treads of the wheels being beveled to suit the pitch of the flanges. The hoisting drum is of cast

steel and is operated by an electric motor controlled by an electric brake.

Machine Shop.

The machine shop, like the repair shop, has a saw-tooth roof and the walls are carried to a height to afford ample window space. The dimensions are 182 by 55 feet, of which 48 feet is partitioned off at the south end for use as a store-room. A track runs through the length of the building and two turntables, 13 feet 8 inches in diameter, are provided to form connection with tracks leading through the repair shop.

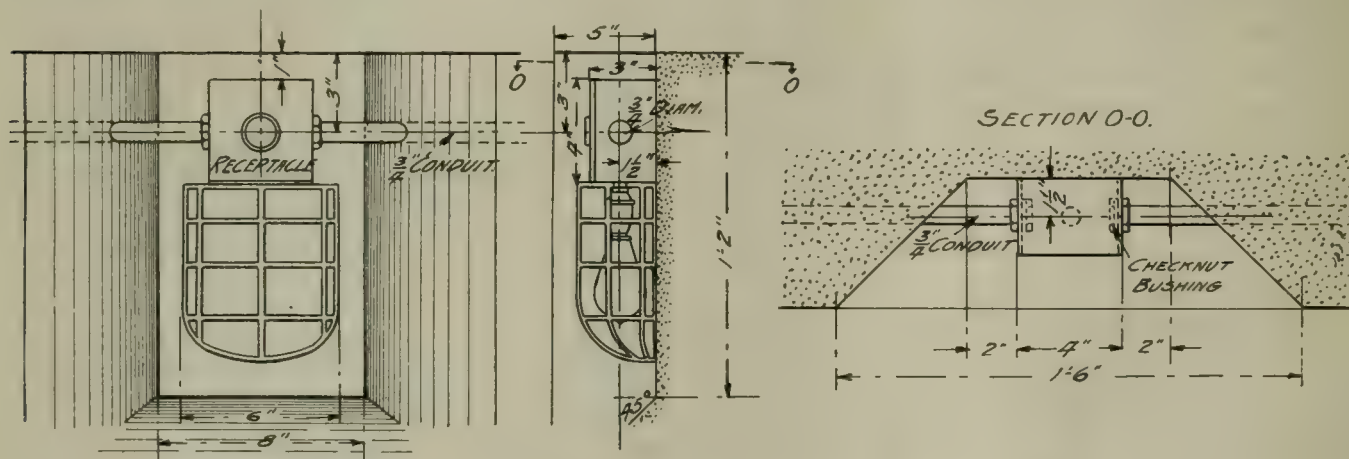
The machine shop equipment and the capacities of the motors are as follows:

- Driving wheel lathe, 24-horsepower motor.
- Forty-two-inch Pond tire lathe, 25-horsepower motor.
- Sixty-inch Bickford radial drill, 4-horsepower motor.
- Twenty-eight-inch Cincinnati upright drill, belted.
- Sellers drill-grinding machine, belted.
- No. 2 Cincinnati universal cutter and tool grinder, 1½-horsepower motor.
- No. 4 Cincinnati universal milling machine, belted.
- Schumacher & Boye engine lathe, 35 by 14 inches, 15-horsepower motor.
- Plate-straightening rolls, 7½-horsepower motor.
- Rip saw, 15-horsepower motor.
- Band saw, 5-horsepower motor.
- No. 2 Hilles & Jones 25-inch punch and shear, 7½-horsepower motor.
- Pratt & Whitney 2-spindle centering machine, belted.

plant. A space 60 feet in width is partitioned off with a light skeleton construction of steel angles covered with corrugated galvanized iron, and this space is about equally divided between boiler and engine room.

Five locomotive type boilers, each rated at 150 horsepower, are installed in the boiler room with firebox toward the engine room. Doors in the inclosure partition afford access for cleaning tubes and repairs. The steel stacks, one for each boiler, are 34 inches in diameter and 60 feet high. Feedwater is supplied by a duplex pump 6 by 4 by 6 inches, and for emergency each boiler is provided with an injector. Surplus exhaust steam is delivered to the heating apparatus in the fan and coil rooms.

In the engine room are two 150-kilowatt and one 100-kilowatt generator sets, one 8 by 12 by 12 inch vacuum pump, one 750-horsepower feedwater heater, one air compressor, fire pump and switchboard. The two large generator sets, which supply current for light and power purposes, are compound wound for 220 volts at 275 revolutions, and the other, which supplies power for trolleys to move cars in and out of the building, is compound wound for 440 volts at 225 revolutions. The engines are vertical, simple non-condensing, with automatic regulation, and have cylinders 17 by 16 inches and 14 by 14 inches for the larger and smaller generators, respectively. The vacuum pump is designed to handle 15,500 pounds



Harmon Shops for the New York Central Electric Zone—Detail of Pit Light.

- Pipe-threading machine, belted.
- Thirty-inch Pond planer, 7½-horsepower motor.
- Cutting-off machine, belted.
- Acme bolt cutter, belted.
- Eighteen-inch Dill slotter, 7½-horsepower motor.
- Northern Electric Company emery grinder, 10-horsepower motor.
- Pond grindstone, belted.
- Rochester-Davis 20-inch drill, belted.
- Gould & Eberhardt 24-inch shaping machine, 3-horsepower motor.
- Fenn 4-inch spindle Sadler sensitive drill, belted.
- Reed speed lathe, 11 inches by 5 feet, belted.
- No. 5 Greenard arbor press, hand-power.
- Hendey & Norton 14-inch lathe, belted.
- Lodge & Shipley 16-inch lathe, 5-horsepower motor.
- Lodge & Shipley 28-inch lathe, 7½-horsepower motor.
- Niles No. 3 double-head axle lathe, 25-horsepower motor.
- Lodge & Shipley 30-inch engine lathe, 10-horsepower motor.
- Bullard 62-inch boring mill, 15-horsepower motor.
- Putnam No. 2 car wheel boring machine, 10-horsepower motor.
- Niles 48-inch 500-ton hydraulic wheel press, 7½-horsepower motor.
- Fan blower, 15-horsepower motor.
- Two forges.
- Chambersburg 1,000-pound hammer.
- Line shaft, 35-horsepower motor.

To the west of the inspection shed is the section of the building which will eventually become the locomotive shop, but which is now partially utilized as a temporary power

of condensation per hour. It is connected with a vacuum return system and is provided with automatic governor. The feedwater heater is of the open type and has a water capacity of 40 cubic feet. It is equipped with an oil separator and is capable of working under a back pressure of 8 pounds per square inch. An air compressor of a capacity of 500 cubic feet of free air per minute is used for blowing out motors and testing brakes; this was supplied by the Chicago Pneumatic Tool Company. The fire pump has a capacity of 1,500 gallons per minute. A 14-inch suction line runs from two storage tanks having each a capacity of 50,000 gallons. Water is procured from Croton and comes to the tanks through an 8-inch main. Branches from the main leading to the pump supply water for the lavatories, boiler room, facilities rooms and hydrants in the yard.

From the compressor the air is forced to a storage reservoir, 42 inches by 10 feet, located outside the building. From this tank it is taken by lines of pipe leading to the car repair shop, machine shop, blacksmith shop, etc.

Heating.

Two coil and fan rooms have been referred to, one belonging to the inspection shed and the other to the machine and repair shops. The fan blowers are of the Buffalo Forge Company's manufacture and are 10 feet in diameter by 5 feet in width. They are three in number, operated at about 160



View Looking North



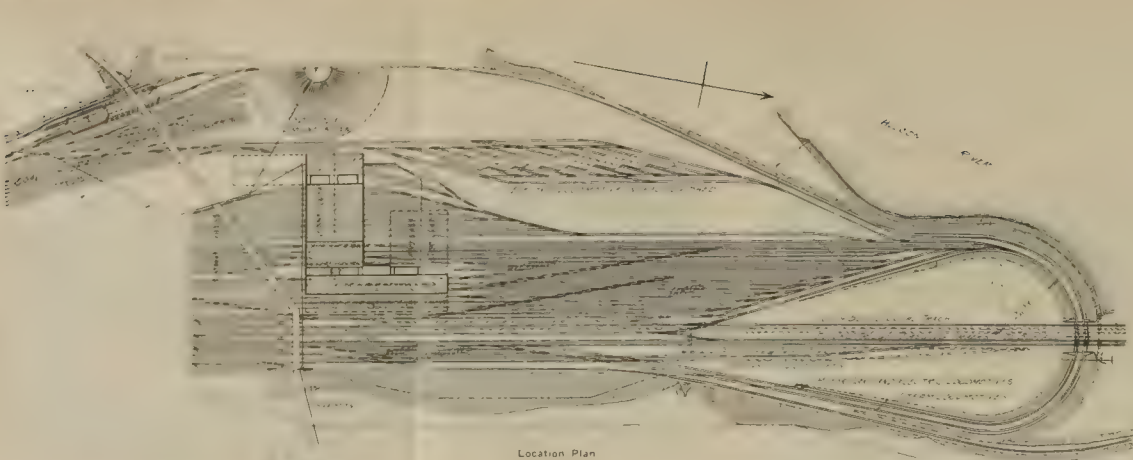
East Elevation



View from Southeast



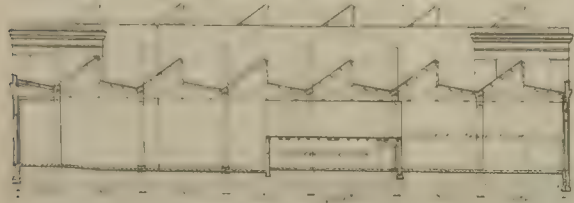
Interior of Repair Shop



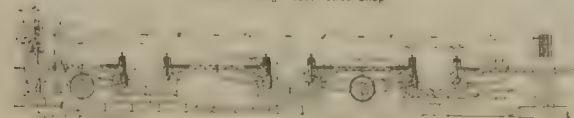
Location Plan



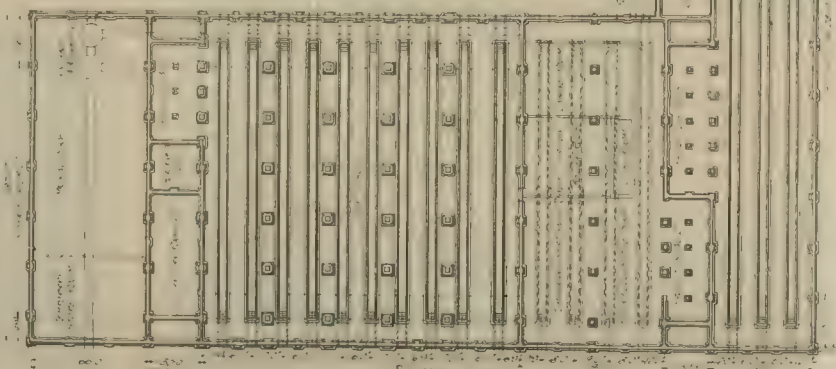
Section Through Facilities



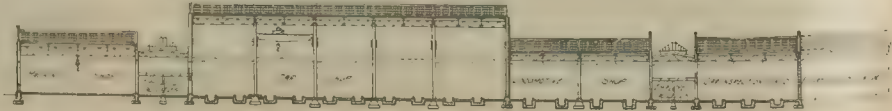
Section Through Locomotive Shop



Section Through Inspection Pits



Foundation Plan of Shops.



Cross Section of Shops.

THE HARMON SHOPS FOR THE NEW YORK CENTRAL ELECTRIC ZONE

revolutions per minute and their maximum capacity is 72,000 cubic feet of free air per minute. The volume of space to be heated is about 3,000,000 cubic feet. The fan and coil arrangements, as well as the hot air duct system, have been constructed and placed with a view to future extensions. The fans are driven by Westinghouse No. 8 type S 35-horsepower motors. The heating ducts are of concrete and vitrified tile.

Lighting of the yards is by 11 arc lamps, with reflectors, mounted on wooden poles at a height of about 30 feet. Incandescent arc lamps with inverted concentric diffusers and opal inner and clear closed base outer globes are distributed around the interior of the several buildings, 28 in the car repair shops, 12 in the power plant, 18 in the car inspection shed and 12 in the machine shop. There are also 800 incandescent lamps distributed about the buildings. Pockets in the side walls of the pits afford protection for the lamps used therein, a wire guard being used as a cover for the pocket.

Organization.

The design and construction of the plant were under the general supervision of W. J. Wilgus. The work was carried out in detail by Edwin B. Katté, chief engineer of electric traction; G. A. Harwood, chief engineer of electric zone improvements; C. H. Quereau, superintendent of electric equipment; L. H. Byam, engineer of company forces; and Carl Schwartz, engineer of power stations.

NEWSPAPER TICKETS AT LOS ANGELES.

To facilitate the work of the conductor in making his collections for newspapers carried on the cars of the Pacific Electric and the Los Angeles Interurban railways, the company supplies books of newspaper tickets. A page from one of these books is reproduced herewith. The books are made up of tickets of denominations ranging from 5 to 100 and each ticket is accepted for the transportation of a single bundle

PACIFIC ELECTRIC RAILWAY COMPANY LOS ANGELES INTER-URBAN RAILWAY CO.		P. E. RY. CO. L. A. I. RY. CO. Conductor's Check 127
One Bundle	100	One Bundle 100 Newspapers
127	<i>McMillan Traffic Mgr.</i>	
Form N P-1 Void when Conductor's Check is detached.		
PACIFIC ELECTRIC RAILWAY COMPANY LOS ANGELES INTER-URBAN RAILWAY CO.		P. E. RY. CO. L. A. I. RY. CO. Conductor's Check 127
One Bundle	100	One Bundle 100 Newspapers
127	<i>McMillan Traffic Mgr.</i>	
Form N P-1 Void when Conductor's Check is detached.		

Page from Book of Newspaper Tickets (Original 5 by 5 Inches).

containing newspapers not greater in number than that called for on the face of the ticket. The tickets are purchased in book form by the newspaper companies and are pasted on the bundles so that the conductor may remove the conductor's check forming the right-hand portion of each ticket.

By the use of this form of ticket the conductor on a passenger car also carrying newspapers is able, with but little additional effort, to turn into the general offices a complete check on all newspapers handled.

MERIDEN-MIDDLETOWN LINE OF THE CONNECTICUT COMPANY.

Included in the work completed by the Connecticut Company within the past few months is the electrification of the line from Middletown to Meriden, Conn., through the towns of Berlin and Westfield, which was originally operated as a steam line. At the present time on this line there are only a few freight trains operated at night which employ steam locomotives.

The work of electrification provided for no changes in



Berlin Power Station, New York New Haven & Hartford Railroad.

the track aside from a few minor ones in turnouts and to arrange a connection in Meriden with the steam line. The overhead is No. 0000 grooved trolley wire on chestnut poles, the bulk of the work being bracket construction. Poles are spaced 110 feet apart on tangents and as necessary on curves and at special points. The trolley wire is anchored every 1,000 feet on tangents and at the ends of all curves a double hub anchor ear with strain plates is used. This construction does away with the acute angle formed between the head guys and the old type of anchor ear, in which the trolley pole which had jumped its line was liable to catch and bring down all the overhead. In addition to the mechanical grip all anchor ears are soldered to the line. The track is bonded with two No. 0000 bonds at each joint and an equalizing cross bond is placed every 1,500 feet.

Power is obtained from the Berlin power station of the New York New Haven & Hartford Railroad, an 11,000-volt three-phase transmission line extending to substations at Middletown and at Meriden, where rotaries convert the current to the trolley voltage of 600.

The work is of interest because it is an example of the electrification of an existing steam line and because the overhead is somewhat heavier than ordinary. The construction was carried on almost entirely by work trains and was badly interfered with, particularly on the Berlin-Middletown section, by reason of the passenger service which had to be avoided.

On this line the Connecticut Company uses a special combination closed suburban car, having a small baggage compartment. The other lines are operated with the usual type of large-sized open and closed cars.

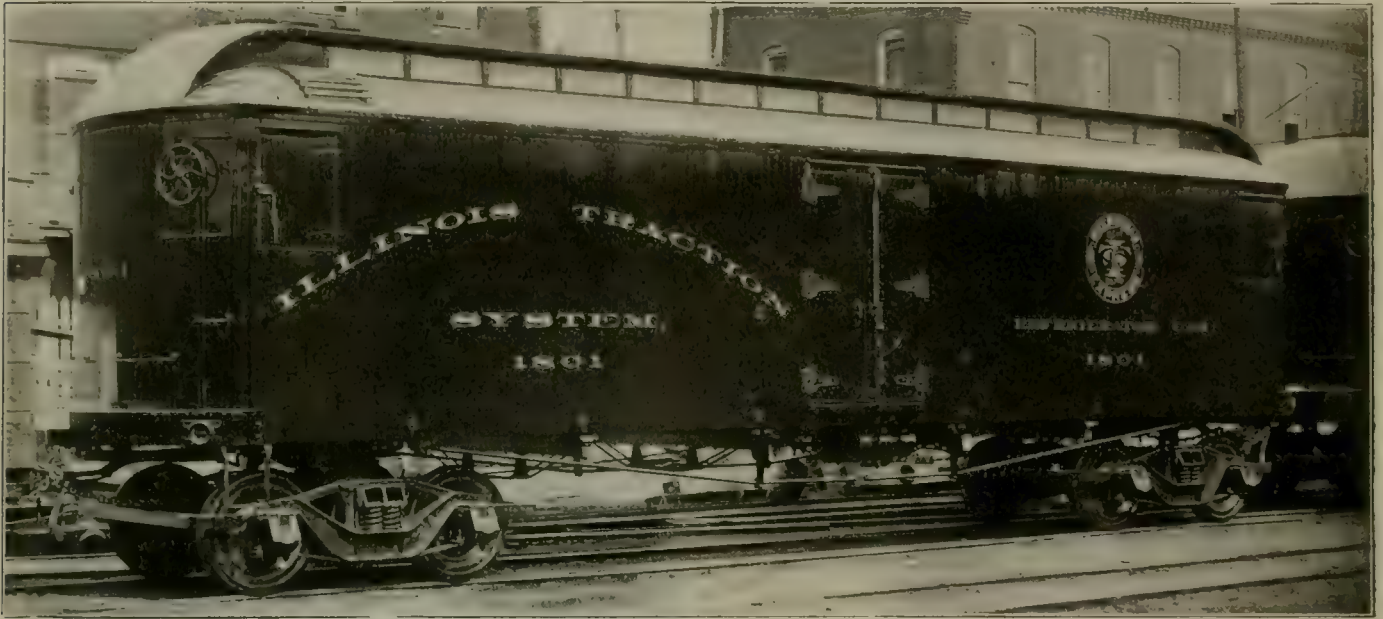
It is announced that the directors of the New Orleans Railway & Light Company have decided to discontinue paying dividends on the preferred stock in order to make a large number of needed improvements to the system, including new tracks, improved roadbed and new cars.

REFRIGERATOR CARS FOR THE ILLINOIS TRACTION SYSTEM.

The Illinois Traction System has recently received from the American Car & Foundry Company four express refrigerator cars to be used in the distribution of fresh meat from

each on Tuesday, Thursday and Friday nights. One car on each of these nights is routed from East St. Louis to Hillsboro, Ill., a distance of 60 miles, and the other contains shipments to points between Staunton and Springfield, covering a distance of 60 miles.

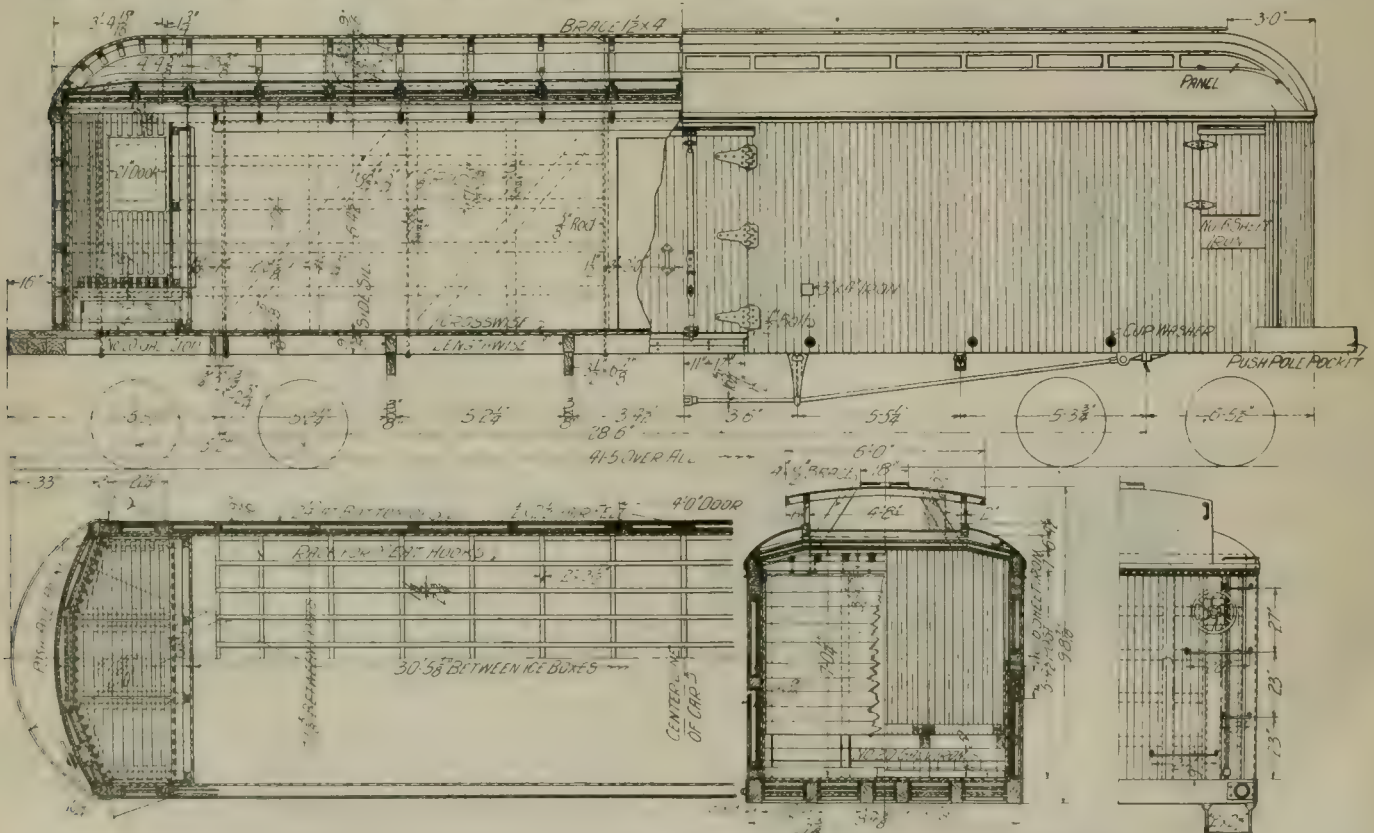
The cars are built for operation as trailers and in general



Refrigerator Car for the Illinois Traction System—Exterior View.

packing houses at East St. Louis, Ill. One of the new cars is illustrated by an engraving from a photograph presented

arrangement differ but little from the standard steam railroad refrigerator car, although their appearance is like that of the



Refrigerator Car for the Illinois Traction System—Plan, Section and Elevation.

herewith. These cars have now been in operation about two months and we are advised by B. R. Stephens, traffic manager, Springfield, Ill., that they have proved very remunerative.

Six cars are routed out of East St. Louis each week, two

ordinary interurban express car. They have double folding center side doors on each side and are of 60,000 pounds capacity.

The ice boxes are located in the ends and have an

entrance on each side, as shown in the illustration, instead of on top of the car as in steam railroad practice. Each box has a capacity of two tons of cake ice and has a false floor made of slats to facilitate the circulation of cold air. The cars are fitted with oak beef racks and 95 galvanized iron beef hooks. The box meat is placed on the floor.

The principal dimensions of the cars are as follows: Length, over all, 41 feet 5 inches, over end posts, 38 feet 7 $\frac{3}{8}$ inches; width, over sills, 8 feet 4 $\frac{3}{8}$ inches, over all at eaves, 8 feet 8 $\frac{1}{4}$ inches, inside between sheathing, 7 feet 6 $\frac{7}{8}$ inches; height between end sill and plate, 6 feet 4 $\frac{1}{2}$ inches, from top of rail over roof boards, 13 feet 1 $\frac{7}{8}$ inches, from floor to ceiling, 7 feet $\frac{1}{4}$ inch.

The framing is the American Car & Foundry Company's standard. There are two 5 by 9 inch side sills, two 4 $\frac{1}{2}$ by 7 $\frac{3}{8}$ inch center sills and two 4 by 7 $\frac{3}{8}$ inch intermediate sills of longleaf yellow pine. The flooring consists of two courses of dressed and matched yellow pine $\frac{11}{16}$ inch thick, laid so that the joints of the lower course are covered by the boards of the upper course. One layer of insulating paper is placed between the courses.

The floor insulation, commencing at the bottom, consists of $\frac{7}{8}$ by 1 $\frac{1}{2}$ inch nailing strip, one layer of $\frac{11}{16}$ -inch dressed and matched blind flooring, one layer of $\frac{1}{2}$ -inch Kelly insulation, $\frac{7}{8}$ by 1 $\frac{1}{2}$ inch nailing strip, one layer of $\frac{3}{8}$ -inch pine blind flooring, one layer of $\frac{1}{2}$ -inch Kelly insulation, $\frac{7}{8}$ by 1 $\frac{1}{2}$ inch strip nailed to the sill.

The body bolsters are of the Commonwealth Cast Steel Company's single steel type.

The roof is covered with yellow pine, $\frac{9}{16}$ inch thick, and No. 8 duck canvas well painted with lead and oil.

The side and end insulation is as follows: On the inside against the frame is placed a layer of $\frac{3}{8}$ -inch shiplapped boards, running lengthwise of the car and securely nailed. On this is placed one layer of $\frac{1}{2}$ -inch Kelly insulation, held in place by a $\frac{7}{8}$ -inch inside false frame and on this is placed a layer of insulating paper. The inside lining is of $\frac{11}{16}$ -inch yellow pine, tongued and grooved, securely nailed to the false frame. Against the main frame on the outside is placed one layer of $\frac{1}{2}$ -inch Kelly insulation and a layer of insulating paper, an air space being formed between them by nailing strips.

The cars are equipped with Wolff cast-steel truck side frames with brake hanger brackets cast integral. The wheel base is 5 feet 2 inches. The wheels are of cast iron, 33 inches in diameter, weighing 650 pounds each, and are mounted on M. C. B. axles with 4 $\frac{1}{4}$ by 8 inch journals. The cars are also equipped with Westinghouse automatic air brakes with 10 by 12 inch brake cylinders, and with hand brakes connected to both trucks.

Consul James E. Dunning of Milan, Italy, reports that the official publication on electrical developments in Italy, issued by the factory inspectors, shows a rapid development in the use of electricity as a motive power in that country, particularly in the northern provinces, where the manufacturing interests center. The report for 1906 shows that at Milan alone about one-quarter of the total new work was put into operation, while development through the peninsula was general. There were 125 new plants built, and 114 existing plants made extensions. The new installations and extensions were divided as follows: Milan, 11 new plants and 43 extensions; Turin, 26 and 15; Genoa, 5 and 5; Venice, 13 and 8; Rome, 8 and 3; Florence, 12 and 6; Naples, 16 and 7; Marche, 6 and 8; Umbria, 2 and 2; Lazio, 4 and 2; Abruzzi, 8 and 2; Basilicata, 2; Puglia, 2; Calabria, 2 and 1; Palermo, 2 and 1; Sardegna, 1; and government plants, 1 and 11.

President T. N. McCarter of the Public Service Corporation of New Jersey, Newark, N. J., is quoted as saying that the company has decided for the present to stop new construction on all work that will bear postponement.

RECORD BLANKS FOR ROLLING STOCK.

The Northern Electric Railway Company operates a high-speed third-rail line from Sacramento to Chico, Cal. Local street car lines are operated in Chico and Marysville. The various classes of rolling stock include 56-foot passenger coaches, steel frame express locomotives, 32-ton electric

NORTHERN ELECTRIC RY.—PASSENGER		
Car No.	Truck No.	Type
Built by	Contract No.	Date delivered
Drawing No.	Height of center plate	Height of side bearing
Wheel base	Weight without motors	On-goad to carry on center plate
Side frame	End frames	Padelais
Bolsters	Center transverse	Center plates
Equalizer bars	Spring plank	Boring timbs
Brakes	Bolster springs	
Equalizer springs	Diam. gear seat	Wheels diam.
Axles diam. at center	Journal boxes	Diam. at wheel seat
Journals	Weight of motors	Motors
Suspension	Width over all	Transverse centers of frame
Length over all		
Remarks		

Northern Electric Railway—Data Blank for Passenger Car Trucks and Motors.

freight locomotives and single and double truck city cars. A complete description of this road was presented in the Electric Railway Review for June 8, 1907, page 738.

To maintain a complete record of each car owned by the

NORTHERN ELECTRIC RY.—FREIGHT		
Car No.	Class	Built by
Date received	Contract No.	Specification No.
Drawing No.	Cost	Total weight
Length over all	Length over and sills	Truck centers
Wheel base	Dist. from face of sill to c. of bolster	Length inside in clear
Width over all	Width inside in clear	Height from rail to roof
From rail to floor	Height inside in clear	Under frame
Sills		Trusses
Bolsters	Draft gear	Drawbar springs
Couplers	Brakes	Brake staff
King bolts		
Trucks	Type	Arch bars
Bolsters	Bolster springs	Spring plank
Tie bars	Axles	Journals
Journal boxes	Wheels	Brakes
Brake beams		
Remarks		

Northern Electric Railway—Data Blank for Freight Car.

company the engineering department utilizes blanks similar to those reproduced herewith. These blanks are of a size 8 by 5 inches, which lends to their being readily filed and indexed. The records bear blank spaces and guide lines for

NORTHERN ELECTRIC RY.—PASSENGER		
Car No.	Class	Built by
Date delivered	Contract No.	Specification No.
Drawing No.	Cost	Total weight
Length over all	Length over bumpers	Length over vestibules
Truck centers	Truck base	Wheel base
Width over all	Width over sheathing	Width inside panels
Width of body at ball rail	Width over step	Sweep of posts
Height of body	Rail to roof	Rail to floor
Floor to plate	Rail to top of trolley board	
Compartments	Length inside	
Seating capacity	Reversible	Stationary
Style of seat	Lower framing	Width of side
Length of seat	Base	Sills
Uphestering	Roof	Body bolster
No. trusses	Window	Interior finish
Body framing		
Ceiling		Deck seat
Vestibule	Doors	
Curtains	Balcon	Stairs
Buffers and draft-rigging	Heaters	Lights
Pipes	Brakes	Sanders
Headlight	Control	Trucks. See card
Equipment		

Northern Electric Railway—Data Blank for Passenger Car Body.

a very complete listing of the controlling dimensions and special details of each class of equipment. Three types of cards are reproduced herewith: one for describing passenger car bodies, one for passenger car trucks and electrical equipment and one for describing freight cars.

PARIS EXTENSION OF TERRE HAUTE LINES.

In 1905 the Terre Haute Traction & Light Company, Terre Haute, Ind., built an extension from Terre Haute to St. Mary's, Ind. This line, 4.5 miles long, has since been profitably operated and this year has seen the completion of



Paris Extension from Terre Haute—Exterior View of Vermilion Substation, Showing Attractive Arrangement of Adjoining Waiting and Baggage Rooms.

a further extension from St. Mary's to Paris, Ill., located 20 miles west of Terre Haute. The Paris extension is interesting on account of the high construction standards used and the thoroughness with which the work has been executed.



Paris Extension from Terre Haute—Interior View of Vermilion Substation, Showing Motor-Generator Set.

The line is built entirely on private right of way, and, except for a short grade of 2.5 per cent, the maximum grade is one-half of 1 per cent. Illustrations are presented showing the character of the roadbed and overhead construction.

To maintain the low grade several large fills and cuts

were necessary, the excavation approximating 500,000 cubic yards in the 15.5 miles. The roadbed varies in section from that ordinarily used, in that the center line of the roadbed is not the track center. To provide for the easy maintenance of a sufficient amount of earth around the butts of the poles to hold them permanently in their set position, the roadbed is 16 feet wide, but the track is placed two feet off center, making available an extra 2-foot width of roadbed on the pole side.

The new roadbed work required the construction of 20 bridges, 19 of which are reinforced concrete flat-top boxes. The single bridge not of this design affords a crossing for the electric line over the Big Four Railroad and comprises a 112-foot through truss designed for 100-ton loading.

The track rails are of standard 70-pound section joined with 6-bolt extra heavy angle bars. No. 1 ties are used and the track structure is ballasted with eight inches of clean gravel. The electrical track circuit is made complete with No. 0000 9-inch Chase-Shawmut soldered bonds placed under the fishplates. The switches at sidings are marked by Pennsylvania Steel Company's "New Century" switchstands having disappearing semaphore blades and targets.

Overhead Construction.

The overhead construction is very thoroughly built. The pole line comprises 40-foot Idaho cedar poles with 8-inch tops, carrying a high-tension transmission crossarm, a telephone and feeder crossarm and a Richmond 9-foot bracket, with an extra heavy stay rod.

A single No. 00 round trolley wire distributes the current to the cars. The wire is supported throughout with Ohio Brass Company overhead fittings. At intervals of 2,000 feet along the tangents and at the ends of curves the trolley wire is anchored with "Metropolitan" strain plates. To provide

against any possibility of these plates being pulled out of line by the guys, two extra 30-foot poles are set in the grade, so that the strain plates may be thoroughly anchored from the four diagonally opposite corners. A 6-foot crossarm placed just above the trolley bracket carries a pair of copper

telephone wires and one 500,000-circular mil bare copper cable, which serves the entire line. The overhead construc-

The trolley wire and feeder receive current from the Water street plant of the Terre Haute Traction & Light Com-



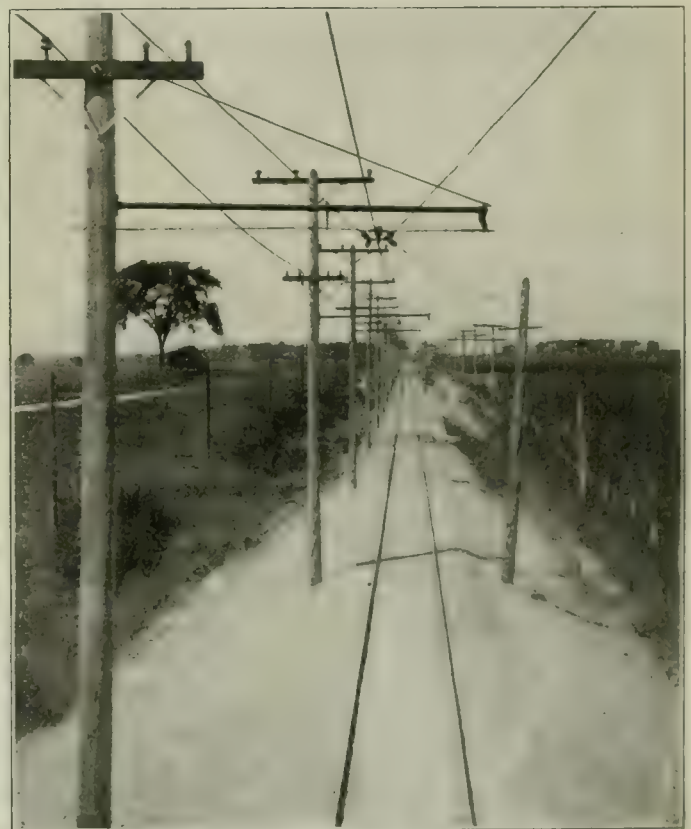
Paris Extension from Terre Haute—Overhead Construction on Curves.



Paris Extension from Terre Haute—Construction of Concrete Bridge and Large Fill over Sugar Creek.



Paris Extension from Terre Haute—Method of Supporting High-Tension Wires and Lightning Arresters in Vermilion Substation.



Paris Extension from Terre Haute—Overhead Construction on Tangents, Showing Method of Guying Strain Plate.

tion and the feeder are protected from lightning by Garton-Daniels arresters spaced at a distance of 7,300 feet apart.

pany, which was described in the Electric Railway Review for November 9, page 755, and from a substation located at

Vermilion. The transmission line between the generating station and the substation comprises three No. 4 copper wires carrying current at 23,000 volts pressure and supported by Lima insulators tested for 70,000 volts. The three high-tension wires are carried on a single crossarm at the tops of the poles. Wherever the poles carrying the high-tension line are guyed a wood-break insulator about 20 inches long is placed in the guy wire 10 feet from the connection between the pole and the guy wire.

The substation at Vermilion is about 15 miles distant from the generating station at Terre Haute. This building comprises a combined machine room and depot presenting a pleasing appearance, as shown in one of the accompanying engravings. The front or depot portion of the building is divided into three rooms, one of which is used for passengers, one for the station agent and the other for baggage and express. The rear or larger portion of the building is devoted to the substation equipment.

As the generating station at Terre Haute supplies lighting current, motor-generator sets are used for converting the current in the Terre Haute Traction & Light Company's substations. The Vermilion substation is equipped with two 300-kilowatt Westinghouse motor-generator sets; four 175-kilowatt Westinghouse self-cooling transformers; a General Electric switchboard, and an installation of Westinghouse lightning protection apparatus.

Interior views are presented showing the methods of supporting the high-potential wires on iron pipe racks and standard line insulators within the building. No large oil switches are installed except at the power house.

In front of the substation the trolley wire and direct-current feeder are sectionalized, and during normal operation one motor-generator set feeds east from the substation, while the other set feeds west. In this way it has been found that the continuity of service can be better maintained and the voltage be kept nearer normal.

The engineering and construction work of the Paris extension was carried out by the Stone & Webster Engineering Corporation, Boston, Mass., W. L. Locke, superintendent of construction. The operation of the new Paris line and the Terre Haute Traction & Light Company is under the management of T. F. Grover.

VIEWS OF J. B. CRAWFORD ON TRAFFIC ASSOCIATION.

J. B. Crawford, who has recently resigned as superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., to become general manager of the Lexington & Interurban Railways, Lexington, Ky., writes the following in reference to the proposed traffic association in Central Electric territory: "There certainly is a field for an organization of this kind in the Central Electric territory, and while I am leaving the Ft. Wayne & Wabash Valley Traction Company to go to Lexington, Ky., I am very anxious that Lexington should be included in this territory. This association would be of great help to the interurban roads in getting business away from the steam roads, in my opinion, especially in the matter of through travel. Our local traffic comes to us without a great deal of solicitation on our part, but, by having traffic association meetings say once a month in the different cities, it is very clear to me that great benefit would result, not only in the matter of proper compiling of tariffs for all interurban roads, thereby reducing the expense of printing, etc., but also in enabling us to get together, which is what the interurban roads need more than anything else. I, therefore, would say that the subject of promotion of traffic would most decidedly come within the scope of this association, and I feel very sure that the interchange of ideas which would take place at regular meetings would be of inestimable value to our systems. I am heartily in favor of this organization being perfected and have been from the first, and I do not think it can be done too soon."

NEW CAMBRIDGE BRIDGE.

A new bridge over the Charles river between Boston and Cambridge has recently been opened to street car and vehicular traffic. This bridge is also designed to carry trains from the elevated division of the Boston Elevated Railway. Construction work on this structure began in 1901. Reference to the illustration will indicate that provision has been made at the center of the structure for two tracks to accommodate elevated trains. These tracks are fenced in from the rest of the bridge. On either side of the elevated tracks are the tracks accommodating the surface cars of the Boston Elevated Railway. On the new bridge the elevated trains will leave the elevated structure and reach the bridge floor level over abutments on the Boston side, passing across the bridge at the same grade as the roadway. On the Cambridge side the elevated trains will pass into the new Cambridge subway.

The length of the new bridge between abutments is 1,767.5 feet. It contains 11 spans varying in length from 101.5 to 188.5 feet. The total width of the bridge between



New Cambridge Bridge—Boston Approach, Showing Incline to Connect with Elevated Structure.

sidewalk railings is 105 feet. It is essentially a high level bridge, with 26 feet in the clear above high water.

Piles for this bridge were driven, in some cases, to a depth of 60 feet below low water, being cut off at two elevations—one about two feet, the other about three feet, above the bottom of the concrete; 1-2-4 concrete was placed on top of the piles through the tube to five feet below low water. Above this concrete was built the regular granite piers.

Some of the quantities involved in the construction of this bridge may be of interest. There are 80,000 yards of dredging, 85,000 yards of concrete, 20,000 yards of granite, 25,000 piles, 150,000 barrels of cement and 8,000 tons of steel used in the construction. The approximate cost of the bridge is \$3,500,000, divided between the city of Boston and the city of Cambridge, the Boston Elevated Railway Company paying for the extra construction necessary to carry the weight of the elevated trains.

It is reported that the traffic commission of the municipality of Berlin has decided to build an underground railroad running northwest and southeast through the heart of the city.

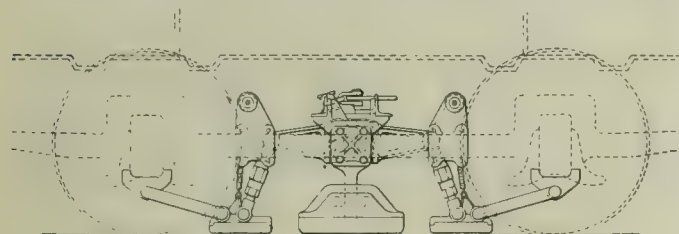
TESTS OF ELECTRO-MECHANICAL TRACK BRAKE.

A new type of tramcar track brake has been developed by the staff of the Leeds City Tramways of England. The leading feature of the brake is the use of both magnetized and non-magnetized blocks, which may be applied either by hand or electrically. Each magnetized shoe is mechanically connected through a series of linkages to a pair of what may be termed auxiliary mechanical blocks in such a way that the drag of the magnetized shoe on the rail applies the auxiliary brake blocks to the track with a pressure corresponding to the drag of the magnetic blocks. The arrangement of these linkages is clearly shown in the general arrangement drawing.

The principal difference between this action and that of the widely used Westinghouse magnetic track brake is that, whereas in the latter case the drag of the magnetized block applies the wheel brakes, in the Leeds brake the drag applies other track brake blocks.

The mechanism of the new brake is so arranged that in the event of current for the excitation being for some reason not available at any time, the auxiliary blocks can be mechanically applied by hand by means of the ordinary brake staff. It is intended in normal working to apply the brake by the usual brake notches on the controller, but the equipment also includes a switch, by means of which the brake magnets may be excited by current from the trolley if required.

It will be seen that, by this arrangement, wheel brakes can be entirely dispensed with, and when it is considered how many serious accidents have been caused by the skidding of wheels, which, in addition to lessening the effect of the wheel brakes themselves, paralyzes the working of the ordinary magnetic brakes, there can be no doubt that this is a great step in the direction of safety. In the new appliance the driver cannot possibly skid the wheels, and has normally three ways of applying the brakes: one depending on the current from the motors acting as dynamos independent of the trolley;



Electro-Mechanical Track Brake.

another depending on the trolley and independent of the motor; and the third, by hand, of less power than the preceding but independent of either motor or trolley.

The profile of the hill in the outskirts of Leeds, on which a demonstration was recently held, has a ruling gradient of 1 in 8½. Two cars took part in the tests. One of these was car No. 87, which was fitted with the latest form of Westinghouse magnets. For the first part of the tests the wheel attachment was removed. The other car, No. 270, which is fitted with two Dick Kerr standard 35-horsepower motors, carried the new experimental electro-mechanical "non-skidding" brake, with auxiliary track blocks. The magnets on the car were of exactly the same design as those on car No. 87. This car was also equipped with a number of measuring instruments, including a tachometer, a Weston ammeter for measuring the current when the brake magnets were energized from the trolley wire, a testing set for the measuring of the output of the motors when acting as generators and supplying the track brake or the rheostatic brake, and a Weston voltmeter showing the voltage generated.

The tests commenced by car No. 87, fitted with the Westinghouse magnetic brake, with the wheel gear removed, being sent down the hill to demonstrate how much of the braking was due to the magnets only. The car could be kept at a moderate speed, but even with 42.5 amperes in each of the shoes, which were connected in parallel, could not be stopped. In this case the magnets were excited from the trolley. The same car then coasted down the hill, and the current was noted when using the magnets only excited from the motors. When coasting down at about three to four miles per hour the current was 28 amperes at 166 volts. The connections were then altered, and the car was allowed to coast down the hill on the rheostat brake only, when 40 amperes were required at 204 volts.

Car No. 270, with the new brake gear, was then sent down the hill, and stops were made which showed the ease of control of the brake actuated by hand power alone; but in this very high speeds were, of course, not attempted. Stops were then made with the brake energized from the trolley, in-

dicating the work done by the brake apart from the motors. The first of these stops was made in 104 feet down the steep part of the hill when going at 11.4 miles per hour, with 79 amperes (39½ amperes per magnet). When traveling 15 miles per hour the distance required to pull up was 229 feet, with about the same current.

The way to brake when operated in the normal way by the motors was next demonstrated, and stops were made from high speeds. Some of the results were as follows:

Speed.	Distance.	Current per motor.	Voltage generated.
19.3 miles per hour	109 feet	84 amperes	700 volts
17.8 miles per hour	64 feet	90 amperes	663 volts
21.6 miles per hour	115 feet	102 amperes	803 volts
25.4 miles per hour	198 feet	110 amperes	663 volts

In these tests skidding of the wheels was entirely absent. The car was carrying 18 passengers. Some stops were also made at speeds up to about 27 miles per hour. The car was then allowed to coast down the hill with the brake operated by the motors, and the current was found not to exceed an average of about six amperes per motor when coasting at speeds varying from 9 to 10 miles per hour.

As an instructive comparison stops were afterwards made with the motors only as a rheostatic brake, when excessive skidding was produced, and a good deal of flashing at the commutators. Subsequently the car was allowed to coast down the hill on the motors alone without moving the controller from the last braking notch to show how the brake would hold the car for a few seconds, and then allow it to descend a few feet, and grip again, and so on.

In normal working with this type of brake it is intended that the hand brake should be applied at the beginning of the hill, and the car allowed to coast on it at a low speed down the hill, while the powerful electrical application is reserved for stops if required.

The rails were not sanded during the tests, and may be described as just moist, but not really greasy. In every way the tests were most successful in showing the capabilities of the new brake, and the way in which the car, which was of the single-truck top-cover type, plunged down the 1 in 8 hill at nearly 30 miles an hour, and was quickly stopped on the steepest part, was very striking.

The following are the specifications and descriptions of the equipments of the two cars used in the tests:

Car No. 87.—Dick Kerr 35-A motors, British Thomson-Houston B-13 controllers, Westinghouse latest type of brake. Car has top deck cover, is mounted on 6-foot wheel base, standard Brill truck, and weight unloaded is 23,200 pounds.

Car No. 270.—Exactly the same equipment and weight as above, but fitted with patent electro-mechanical track brake. The auxiliary track blocks are of cast iron, but any other material may be used if preferable. The action of the mechanism is as follows: The main track block travels along the rail backward relatively to the car when pressure is applied, either by exciting the magnet or mechanically. This action takes with it the vertical lever, which is in cam form. The cams force the triangular shaped thrust pieces outward, and these thrust pieces tend to force the connecting link, between the bracket on the car frame and the auxiliary blocks, into a straight line, thus applying pressure to the auxiliary blocks. The drag or pull of the auxiliary blocks is taken by the separate links secured to the car frame below the axle boxes.

The magnets on both cars are the Westinghouse type, with poles longitudinally along the rail, and giving a vertical pull of about 4,000 pounds on 100-pound standard rail when magnets are saturated. The retardation of these magnets when so energized is from 1,600 to 1,800 pounds for the two on clean rail at a speed of three to four miles per hour.

The brake automatically limits the current in the motors in the following way: The weight on the auxiliary track blocks is taken off the wheels. The greatest amount of weight which can be so taken is the weight of the car body above the axle boxes; that is, the weight of the motors, wheels, etc. (about 9,900 pounds), is always left on the wheels, but this is insufficient to drive the wheels to generate the high currents obtained on other forms of magnetic brakes. The answer to the argument which may be advanced, that this tends to derailment, is that the same principle is common to all track brakes, but with this brake speed sufficient to derail a car by centrifugal force in rounding a curve could never obtain, as any one of the three systems of operating would check the car before such a speed was reached.—Electrical Engineering, London.

Chief Engineer H. L. Weber of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., is preparing plans for improvements to be made at Robinson park next spring which will cost about \$50,000. The plans include a new concrete dam which will increase the facilities for boating and bathing, and three aqueducts for feeders to the lagoon.

THE DESIRABILITY OF CHANGING THE UNIT OF FARES ON STREET RAILWAYS.*

I sincerely believe that the interest of public service corporations and the communities served by them are absolutely identical and think the sooner that fact is recognized by both the corporations and the public, the better it will be for all concerned.

It is of the utmost importance to any community that it should receive from the public service corporation serving it the very best accommodations, and the more successful a corporation is, the better service it will be in a position to render; and if good service is not rendered by a corporation that is successful, then the public not only can demand, but obtain, the service that the community served is entitled to.

On the other hand, an unsuccessful corporation, no matter what its desires may be, is not in a financial position to render the accommodation that it would like to, or that the public has a right to expect.

Therefore, it seems to me that, when public convenience and necessity require the services of a corporation, whether it be lighting, transportation, or anything else, it is poor economy for any community to restrict, or embarrass, the corporation with unnecessary burdens and thereby make it difficult for the corporation to be successful, for by so doing the very objects for which the franchise was granted will be defeated.

I think we will all agree that lighting and traction companies, especially the latter, have done more to develop suburban districts and add to the comforts of the communities than any other enterprises, and I believe that those who put their money into public enterprises of this nature are entitled to a liberal return on the capital invested, for the persons investing in property of this kind are not only taking a risk, for which they are entitled to something, but are also investing money which would earn them a reasonable return if invested in some other enterprise.

I believe the people, as a whole, are fair and willing that capital invested in public service corporations should receive a reasonable return, but the trouble is that the people, as a rule, do not understand the facts relating to the companies, for which, in my opinion, the companies themselves are at fault for not having, in the past, taken the people into their confidence and acquainted them with the facts.

Personally I am a believer in publicity. The more the people know about the corporations serving them, the better it will be for both the people and the companies; and I want to say that the people are welcome to, and I will be glad to give them, any information about the 15 (more or less) public service corporations with which I am connected. As perhaps some of you know, it is on that basis that I have met the public the past few years in matters relating to the gas companies of Boston and I think the results have been, by comparison, reasonably satisfactory to all concerned; the results, summed up, mean a saving to Boston people in their gas bills of over \$800,000 this year, as compared with their bills two years ago, and to the companies a prosperous business and the confidence of the people, which is the most valuable asset a public service corporation can have.

Unprofitable Street Railways.

Now let us look at the street railway situation that you are particularly interested in. I believe few realize how unprofitable the street railway companies in Massachusetts are outside of the large cities, especially those serving this community. I therefore want to give you a few figures showing the results for the year ending September 30, 1907, of the Lexington & Boston Street Railway Company, the Newton Street Railway Company and the Waltham Street Railway Company, these being the companies that served this community during the period mentioned. The gross earnings of the Newton Street Railway Company for the year ending September 30, 1907, were \$357,588.62; the operating expenses, not including taxes or interest, were \$268,531.31, leaving \$89,057.31, from which taxes amounting to \$14,046.09 and interest on bonds and floating indebtedness amounting to \$54,597.44 had to be deducted, leaving \$20,413.78 applicable to dividends on \$722,000, the amount of the capital stock. A dividend of 2½ per cent was paid on this stock for the period mentioned, amounting to \$18,050. A dividend of 5 per cent was declared in the preceding year.

The gross earnings of the Lexington & Boston Street

Railway Company for the year ending September 30, 1907, were \$151,134.78; the operating expenses, not including taxes or interest, were \$110,657.95, leaving \$40,476.83, from which taxes amounting to \$5,753.27 and interest on bonds and floating indebtedness amounting to \$34,455.61 had to be deducted, leaving \$267.95 applicable to dividends on \$525,000, the amount of the capital stock. No dividend was declared in the preceding year.

The gross earnings of the Waltham Street Railway Company for the financial year ending September 30, 1907, were \$5,460; the operating expenses, not including taxes or interest, were \$150, leaving \$5,310, from which taxes amounting to \$8.25 and interest on bonds and floating indebtedness amounting to \$5,120 had to be deducted, leaving \$181.75 applicable to dividends on \$100,000, the amount of the capital stock. No dividend was declared in the preceding year.

In this connection I would state that the other street railway companies—the Newton & Boston Street Railway Company, the Natick & Cochituate Street Railway Company, the Middlesex & Boston Street Railway Company and the Westboro & Hopkinton Street Railway Company—controlled by the same interests that control the three just referred to, make no better, if as good showing as the companies the figures of which I have just given you. Is it to be wondered at that corporations, in financial conditions such as those referred to, are unable to do as much for the public as the public oftentimes thinks that they should?

Why Have People Built Street Railways?

In view of these facts, one of the most natural questions for one to ask who is not thoroughly familiar with the street railway situation is, "Why have people invested their money in the past, as they have, in building street railways?" The reason is, investors a few years ago (8 or 10 years perhaps) were of the opinion that street railway properties would be very much more successful than they have been. The result was that street railways were built, and during the first two or three years of their operation, when operating expenses were very much less than they are today, did make a fairly good showing, but, as time went on and the properties became older and substantial repairs had to be made upon the tracks, overhead equipment and cars and the equipment of same, the apparent profits vanished. Then, too, as you all know, the last few years prices of both labor and materials have shown a very great increase (materials showing increases of from 20 to 100 per cent). During this time the gross income has not increased anywhere near enough to take care of the increased charges. Another thing that must not be lost sight of is that the public during these past years has demanded more and more from the transportation companies in the way of free transfers and a longer ride for five cents, all of which has had a detrimental effect on the income of the companies.

Recently the management of the Newton & Boston Street Railway Company (a property that has been losing money every year for a number of years) deemed it necessary to advance the charge for transportation. At the time some of the citizens of Needham thought the company was not justified in its action and had much to say about the valuable franchise that it had, etc. Now we would be very glad to turn the Newton & Boston Street Railway property over to any of the citizens that think the franchise has so much value for a term of five years and will not charge them anything for the investment of the railroad, overhead line and equipment, providing that they will operate the road and keep it in as good repair as it now is. We decided recently to stop operating some six miles of track between Lexington and Woburn because the line lost several thousand dollars per year, and I told the mayor of Woburn, who was acting in an official capacity to try and get us to continue operating the road, that we would turn that property over to anyone free of charge, for a period of years, who would continue to operate it. Then, too, we should not lose sight of the fact that when franchises were granted to some of the street railways that are now struggling for an existence, the city authorities compelled the companies to widen streets, etc., at a large expense to the corporation. The interest charges which companies now have to pay on these city improvements are additional burdens which few of them are in a position to bear. In my opinion, one of two things will happen: either many street railways companies in the comparatively near future will go into the hands of receivers, or they will change the unit of fare, unpleasant as that may be to both the management of the railroads and to the communities served.

Gentlemen, few of you realize the difficulties that managers of street railway companies have to contend with at the present time, and not only the best brains, but the hearty assistance of the representatives of communities are needed to help solve the problems in a satisfactory manner to all concerned.

*Abstract of remarks made before the Fales Club, Waltham, Mass., November 26, 1907, by J. L. Richards, president Newton (Mass.) Street Railway, Lexington & Boston Street Railway, Newton & Boston Street Railway, Natick & Cochituate Street Railway and Westboro & Hopkinton Street Railway.

THE RELATION OF THE INTERURBAN TO THE STEAM ROAD.*

BY T. JAY TOMLINSON, PENNSYLVANIA RAILROAD.

Advance statistics of the interstate commerce commission for the year ending June 30, 1906, show that the steam railroads of the United States had a total of 222,340.3 miles of first track, with a total trackage of 317,083.19 miles. The gross earnings for the year were \$2,325,765,167, of which \$619,729,203, or 26.6 per cent, were earned by the passenger service, and \$1,646,031,877, or 70.8 per cent, by the freight service. The other earnings from operation amounted to \$60,004,087, or 2.6 per cent. A traffic which amounts to \$619,000,000 per annum is earned by passenger trains, more than one-fourth of the entire traffic, and in a number of the larger eastern roads the proportion of passenger traffic earnings ranges up to 35 and 40 per cent of the gross. It is this traffic which the interurban roads are attacking.

The electric railway had its practical birth in the period between 1880 and 1890, and the electrification of the city or urban lines proceeded rapidly in the period between 1890 and 1895. These urban lines soon found that with the quicker schedule, as compared with horse or cable lines, it was advisable to extend such lines into the outlying territory, and this in turn gave rise to the earlier interurban lines, that is, lines intended to link two cities as distinct from those confined to city and suburban operation.

The number of electric roads in the United States, December 30, 1906, was 1,164, with 36,212 miles of track (measured as single track), with 66,206 motor cars and 15,442 trail and service cars. The capital liabilities of these companies are \$2,039,948,875 of stock and \$1,725,369,000 of bonds.

Of the total track, approximately 20,000 miles are interurban, of which the major portion and the more important are found in Illinois, Ohio, Indiana, Michigan, New York, New Jersey, Pennsylvania and New England, with some very high-class electric railways in the Pacific coast states, one of which, the Inland Empire Railway system, of Washington and Idaho, comprising 190 miles, is quite the equal of most of the steam operation of the United States, carrying not only passengers, but freight, the latter in trains, and exchanging freight with steam lines.

The usual location of the interurban line is to parallel and be competitive with steam railroad service, and a modern interurban line with "limited" trains maintains a schedule the time of which between competitive points compares very favorably with that of steam lines.

Strength of the Interurban Roads.

The strength of the interurban lines lies in the low cost per mile of the moving unit, thus allowing frequent service and a low unit load as a paying proposition. The general system of electric transmission and electric traction provides for evenly distributed service and the power house being continuously in operation, the cost of such traction is relatively uniform during high or low period of traffic. Further, the power house being of necessity operated as continuous service, additional service during periods which are not originally patronized by passengers is performed at a minimum cost. This continuous and frequent service rapidly stimulates traffic. It is currently accepted in the promotion of interurban lines that the travel between two given points will by frequent service be expanded four or five times within a year.

The unit of cost is the car-mile, rather than the train-mile, and while the electric car will average in seating capacity about 50, yet, by the continuous and frequent service, the load hauled during the day is fairly well divided in successive cars, thus making the average dead weight per passenger less than by steam service, where the usual schedule is two or three round trips per day. It might be questioned as to whether the interurban road was a strong competitor, but it should be remembered that the average distance traveled by all passengers in the United States for the year ending June 30, 1907, was 31.5 miles. The average for one of the largest steam roads in the United States for all passengers is 24 miles; and a special examination was made with a view of separating the long-distance travel from the short-distance travel.

Three railroads, two of which extend from a large city to a smaller city and a third extending between two large cities, with a dense intermediate population, were examined; the period of examination embracing one midyear month and comprising a total of 3,600,000 passengers. The average number of passengers traveling the whole distance on each road (about 100

miles) was equal to 12.7 per cent, and these through passengers made 58 per cent of the passengers one mile. The number of passengers traveling less than the whole distance was 87.3 per cent of the total number of passengers, but only 42 per cent of the passengers one mile. The average distance traveled by such local passengers was 12.8 miles. The average distance traveled by local passengers upon the first two railroads examined, each of which represents a dense travel centering into a large city, gradually diminishing as the country was reached, and then with a gradual increase approaching the smaller city at the other terminal, was in one case 10.7 miles, in the other case 11.5 miles, while the third railroad examined, lying between two very large cities and with a dense intermediate population, showed an average of 15 miles. This, however, was complicated by the first station on one end being eight and on the other six miles from the terminal, and further, that a number of passengers on through trains which ran to points other than the terminals above mentioned, were included among the way passengers. Had this been eliminated the average distance traveled by way passengers would have corresponded with the other railroads named.

A further examination comprising a number of other railroads of about equal length, some being roads which do not terminate in large cities and some being roads which do have a large city as a terminal, induces the belief that the approximate distance traveled by the short-distance rider is about 11.5 miles. Further, 70 per cent of such short-distance riders ride to and from the terminals.

It has appeared that 42 per cent of the passengers one mile, or, in other words, about 35 per cent of the revenue, is derived from the short-distance rider, and if it were thought that the interurban roads would only attack the short-distance rider, it will be readily seen that the loss of the short-distance rider would at once take a large proportion of the pay load from many steam passenger trains.

Experience has demonstrated in competitive territory that the interurban roads are taking nearly all the short-distance riders, and, in their gradual development, are now attracting the long-distance riders, that is, that portion of the travel between the larger cities comprising continuous rides of 50 to 100 miles.

The interurban rates of fares in effect today (frequently concealed by the zone system) are, as a rule, barely under competitive steam rates, but this is apparently not so much an attraction as is the frequency of service. The question of city terminals is perhaps the one which in the end measures best the strength of competition. Where, as in the central states, adequate city terminals have been provided, there is little difficulty in the electric line securing the greater proportion of the competitive travel. If, however, interurban lines have terminals on the outer edge of the large cities, only reached by ordinary and slow street car service, the competition is not a very heavy factor. This handicap is not ignored by the interurban managements and adequate city terminals are being acquired.

The tendency and demand of the day are for frequent, rapid service—rapid at frequent intervals rather than one or two very fast trains and a sparse, slow service. The immediate problem of the steam roads is to provide such service at lowest cost as will retain their revenue or see it taken by aggressive competitors who also contemplate attracting the freight traffic. The apparent solution is electrification of existing steam lines for passenger service.

Operation of Chicago & Milwaukee Line Not Expected Until Spring.

A. C. Frost, president of the Chicago & Milwaukee Electric Railroad, has sent a communication to the Milwaukee common council asking consent to discontinue service on Grove street and First avenue, which is required by the franchise, until the Sixth street viaduct is completed. He states that the operation of these lines entails a loss to the company of approximately \$1,000 a month and is of no benefit to the public. In regard to the completion of the through line from Chicago to Milwaukee Mr. Frost says:

"This company finished all its construction work last month, the only unfinished work being the section immediately south of Milwaukee, which is under contract by MacArthur Brothers of Chicago, and on which they are working day and night. This section will be completed some time next month.

"If the weather conditions are such that we can properly ballast this uncompleted section at that time to place it in immediate operation we shall do so, but should the weather conditions be so severe that we cannot ballast and place the road in perfect condition for service, we shall probably delay opening the road until spring, when we can commence our through service under favorable conditions."

*Abstract of a paper presented before the Association of Transportation and Car Accounting Officers, Chicago, Ill., December 11, 1907.

INSTRUCTION BLANK FOR PLACING SIGNS ON CARS.

The Denver City Tramway Company carries advertising banners and signs on its cars within the city limits of Denver. In order that the instructions for placing these signs may be

Form 150

THE DENVER CITY TRAMWAY COMPANY.

FOREMAN AT CENTRAL LOOP:
Place banners or signs reading _____

on the number of cars and lines marked below, commencing at _____ o'clock _____ M., of _____ day of _____, 190____. Take the same off at _____ o'clock _____ M., of _____, 190____, and return this slip to superintendent.

NUMBER	LINES	NUMBERS OF CARS	CHECK OFF
	Arvada		
	Aurora		
	Argo		
	Berkeley		
	Broadway		
	Colfax Avenue		
	Golden		
	Goss Street		
	Eleventh Avenue		
	Fairmount		
	Herman		
	Larimer Street		
	Lawrence Street		
	Leyden		
	Nineteenth Avenue		
	Park Hill		
	Rocky Mountain Lake		
	South Eleventh Street		
	Stout Street		
	Seventeenth Avenue		
	Seventeenth Street		
	South Tremont		
	Twenty-second Avenue		
	Washington Park		
	Welton Street		
	West Thirty-eighth Avenue		
	West Twenty-ninth Avenue		
	West Twenty-third Avenue		

Superintendent.

Instruction Blank for Placing Signs on Cars.

carried out in a businesslike way the blank form illustrated herewith is used. The original of this form is printed on white paper, 6¾ by 8¾ inches in size. It will be noted that the form is in the nature of very definite instructions to the foreman at the central loop around which practically all the city cars pass.

SUBJECTS FOR DISCUSSION AT THE INTERNATIONAL CONGRESS.

The Union Internationale de Tramways et de Chemins de Fer d'Interet Local (International Street and Interurban Railway Association), of which Leon Janssen is president and P. t'Serstevens is secretary-general, both of Brussels, Belgium, has announced the programme of subjects selected by the executive committee for reports and discussion at the next annual congress of the association, which will be held at Munich in September, 1908. The question box for the various subjects will be issued shortly. The topics are as follows:

1. Rail corrugation.
2. Production of electrical energy. Comparative advantages and cost of reciprocating engines, steam turbines, gas engines, Diesel engines, etc., in power stations for electric traction.
3. Advantages and disadvantages of different types of cars for electric railway operation (motor cars, trail cars, single or double truck cars, cars with radial trucks, convertible, semi-convertible and center entrance cars).
4. New ideas, improvements and operating costs of brake parts in electric railway operation.
5. Results obtained by the use of ammeters and other meters on street cars. Economy in use of power.
6. Examples of and comparative results obtained by the use of electric traction on light railways.
7. Life of the various parts of rolling stock before replacement.
8. Advantages and disadvantages of the auto-bus.
9. Oiling of bearings and gears on motor cars.

10. Construction of light railway track. (a) Dimensions and weight of ties; (b) depth of ballast; (c) rail section; (d) use of metal ties and ties embedded in concrete; (e) maintenance and inspection of rail joints.

11. Types of steam locomotives for light railways, especially narrow-gauge roads. Results obtained with compound locomotives and with superheated steam. Locomotives for fuel other than coal.

12. The use of motor vehicles on railroads in general and interurban roads in particular.

13. Importance of large centers of population in the development of electric railways.

THE FLANGELESS RAILWAY SYSTEM.

The accompanying illustration shows the "center rail, flangeless wheel railway system," invented by Capt. Lina Beecher of Miami, Fla., which is being promoted by the Flangeless Railway Corporation of Miami.

As will be noted from the illustration the peculiar features of the system are that the wheels have no flanges and that the car is held firmly to the track by four wheels suspended from the car axles, which run against the web of a center rail of ordinary T-section, placed midway between the ordinary track rails. The principal object of the invention is to prevent derailments at high speeds, especially on curves. Other advantages claimed for the system are that it prevents breaking of wheels and rails, spreading of rails and lurching of cars, with consequent reduction of wear and tear on the equipment. It is also proposed to use the center rail as an electrical con-



Flangeless Railway Car.

ductor to operate cars on the third-rail system and the inventor has a plan for protecting the live rail by a covering. The car shown in the illustration is operated by a gasoline motor.

A number of tests were conducted last spring at Miami and it is claimed that the car was successfully operated at a speed of 25 miles an hour on a 45-foot radius curve.

PIPING AND POWER STATION SYSTEMS—LXVI.

BY W. L. MORRIS, M. E.

Class U 12—Tile Sewers—Sumps.

It is sometimes impossible to drain parts of a building by gravity and to remove such water a sump is provided with some form of pump or ejector. In locating a sump it should be remembered that (1) as a sump must be placed lower than the entire drainage system, it is unavoidably in a damp place; (2) through oversight or accident a sump may overflow; being (3) located in a remote part of the building, it will receive but little attention. These conditions make the use of belts and electrical machinery very unreliable unless placed with care. A centrifugal pump is well suited for this service because it will handle any sand, ashes and grit that may be carried to it from the drains.

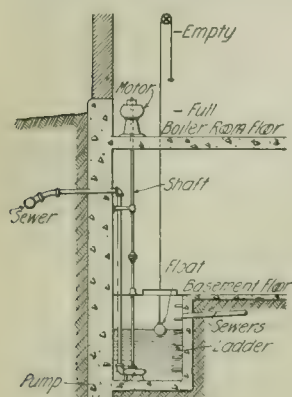


Figure 394 (U 12-1).

include a stop valve to permit of shutting off steam to the sump during the normal working of the plant.

Class V 1—Sundry Gauge Connections.

The general requirements for gauges on steam lines are described in connection with Figures 125 and 127. A gauge should be provided for each section of the following mains, separated by a valve: Steam header, feed, auxiliary, atmospheric exhaust, vacuum exhaust, dry vacuum, circulating water, fire, low pressure, oil, compressed air and city water. Provision should also be made for installing gauges for each boiler, and if an automatic feed valve is used one should be placed between the pilot and the feed valve; each engine to show steam, intermediate and vacuum pressures; each feed pump between the governor and the steam cylinder and between the stop valve and water cylinder at discharge; fire pump, to show steam and water pressure, and in some instances to show vacuum on the suction; condenser circulating pump to show discharge pressure (also provide attachment for vacuum gauge on suction); dry vacuum pump between stop valve and pump and to show air suction; automatic pumps to show condition of discharge valve; oil pumps to show pressure on discharge; engine oil piping; each condenser between a stop valve and the condensing space; economizers, to be placed near blow-off to aid in handling valve properly. Gauges thus installed serve two purposes: they show whether or not pressure exists and also indicate the amount of that pressure.

In addition to these gauges it would be well to install a pressure recording gauge and a feedwater temperature recording gauge, a permanent draft gauge showing chimney draft and another between boiler and economizers. If a specially sensitive draft gauge is used it can be made to serve two or more points by having a shut-off valve for each branch.

A simple and sensitive draft gauge is shown in Figure 395 (V 1-1). Water is placed in one of the glass cups and oil in the other. Instead of the draft being measured from one surface to another in these glasses, the draft is measured in

the smaller tubes. A column of oil 10 inches high has approximately the same weight as 9 inches of water and for every tenth of an inch draft the gauge shows one inch. If 0.7 inch draft were observed on the gauge about seven inches would be indicated on the scale attached to gauge. A movement of 10 inches in the small glasses with $\frac{1}{8}$ -inch bore would cause a movement in the large glasses (difference in levels) of 0.1 inch, so if properly scaled the gauge may show 1.1 inch draft when a movement of 10 inches has occurred in the $\frac{1}{8}$ -inch glasses. This gauge can be readily made by any engineer having a lathe. The pattern work is extremely simple and rods and glasses are standard.

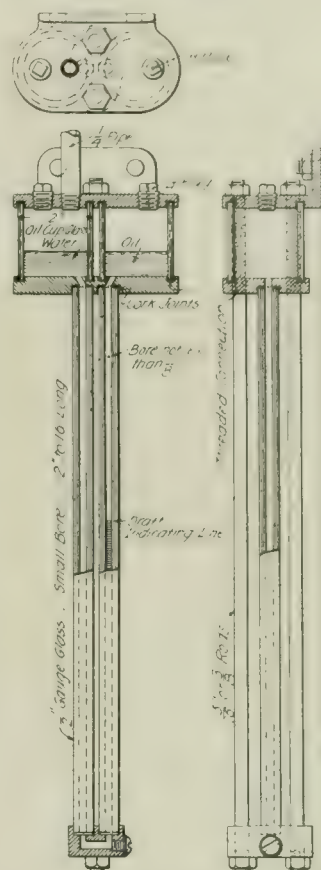


Figure 395 (V 1-1).

water is blown into the pit. If an ash hopper is provided to retain ashes ready for discharging into an ash conveyor, it will be found best to keep water out of the pit. Water in the pit causes the slide grates to rust, and washes in grit, making them troublesome to operate. If an open funnel is used to receive the blow-off from gauge cocks it should be drained to the ash pit. As but little water will be discharged from the funnel, and as it will always be open to atmosphere, the blow-off water may blow back through it. This will necessitate a check valve at the bottom of funnel branch to make it a safe connection. The blow-off lines from the bottoms of the column and water gauge should run separately down to a point within reach from the floor and a valve be placed in each connection before it connects into a common discharge.

Steam gauges are sometimes placed at the top of a column. A gauge should not thus be subjected to the sudden pressure changes and the liability of becoming shut with scale from the repeated blowing of the water column. The boiler feed regulator should not be a part of the water column, but independent, having separate steam and water connections, so that any scaling in one will not affect the other. When so connected if a water column does not agree with the working of the feed valve, it will be evident that something is wrong; but if both connections were taken off of the same steam and water connections they might both show a false water level.

Class V 3—Sundry Connections for Damper Regulators.

In general the hydraulic damper regulator requires a pressure line from the bottom of the steam header, a water

Class V 2—Sundry Water Column Connections and Feed Regulators.

Water columns and connections are shown in Figures 115 to 124. Boiler feed regulators are shown in Figures 194 to 199. These illustrations show the steam, water and feed valve connections. In addition to the usual water column connections there should be a blow-off connection from the bottom of the column to the blow-off line. In many plants the columns are blown into the ash pit: a satisfactory practice unless too much

line to the controlling valve that admits water to the plunger, and a waste water line from this controlling valve to relieve pressure on the ram. There are two general classes of regulators. One type causes the damper to be opened or closed completely when the pressure for which it is set is reached and to remain so until the other extreme pressure is reached. The other type is designed to open and close the damper gradually, the position of the damper at all times corresponding with the various pressures. Regulators of the latter class do not maintain the steam at a definite pressure, but control the fire purely from a commercial standpoint. They obtain from the coal the greatest possible number of heat units that are obtainable by damper control. Figure 396 (V 3-1) shows a regulator of this type; the pressure from the steam line is connected to the under side of the diaphragm and the pressure on diaphragm is counterbalanced by a weight on a lever. Some types use a weight to load the lever, others use springs; that

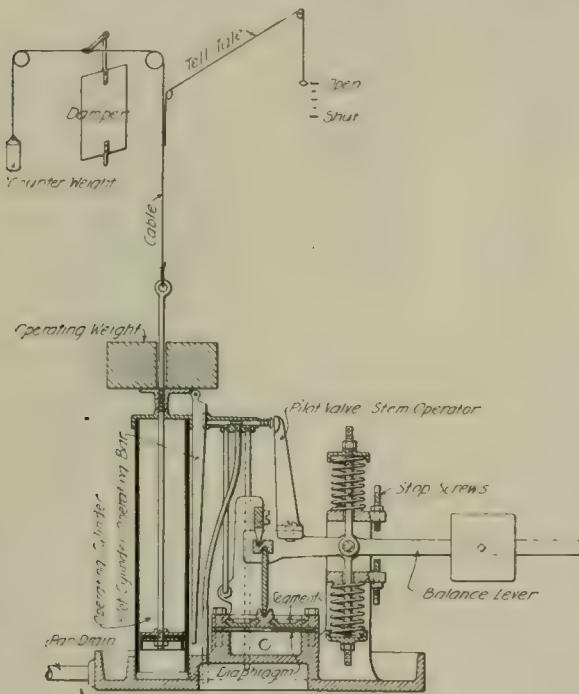


Figure 396 (V 3-1).

shown is provided with both. Either one alone will not give the desired adjustment for the regulator.

It is generally found most economical to allow about five pounds variation in pressure from the time the damper starts to move until it is full open or closed. When two springs are used the full range of pressure variation is adjustable as follows: If the upper spring is loaded to 10 pounds in tension and no load is put on the bottom spring, then the balance lever will move from one stop screw to the other with a very slight added pressure. If top spring is loaded to 40 pounds and lower one to 30 pounds, it will then require a very considerable pressure variation to carry the lever from one stop to the other. It will be noted that the pilot valve cylinder is moved by the balance lever and the valve stem is operated by the tapered stem operating bar, which in turn is controlled by the movement of the piston and the operating weight carried on piston rod. If the balance bar moves but one quarter of its range then the stem operating rod need travel only its length to bring the valve parts back to a neutral position. Here the pressure to the cylinder is held just sufficient to sustain the operating weight in a fixed position.

The pilot valve should move very freely in its cylinder and, to avoid excessive leakage and rapid wear, the water fed to the operating cylinder should be at low pressure, using a large and long cylinder if greater power is required. When the pressure is highest, the operating weight will be at its

highest point and damper will be closed. The counterweight need only start the damper in closing, the draft tending to close the damper; ordinarily the counterweight would not weigh more than one-third as much as the operating weight.

The most satisfactory operation is obtained by setting the spring load on the balance lever for the lowest pressure to be carried, say 100 pounds, and either slide weight out or hang on weights for the higher pressures. It will be noted that the diaphragm has but little travel and that it is supported over its entire surface. The strain caused by the pressure is transmitted to the segment jointed blocks shown.

Any regulator will leak to a considerable extent when new and continue to leak by continuous wire drawing past the valve, therefore each should be provided with a pan the full size of the regulator. The water that passes through the pilot valve should be filtered or settled, so that no particles of grit will get into the valve and interfere with its proper working. The connection to the diaphragm or pressure chamber should have sufficient length to insure ample condensation of any leakage losses and not endanger the rubber diaphragm by bringing steam in contact with it.

If ample provision is made to catch the drips and leaks from the regulator it should be placed in engine room in charge of the engineers, and to aid the firemen in handling the boilers there should be some form of telltale carried to the front of the boilers where the firemen can observe the working of the regulator. (See Figure 396.) The economy effected with an efficient regulator is sufficient to pay for one of the most approved types in a very short time.

Class V 4—Sundry Relief Valve Connections.

There are many types of relief valves, as previously illustrated and described, as follows: Safety valves, on boilers, Figures 128, 129 and 130; cylinder reliefs, Figure 159; intermediate receiver reliefs, Figures 43 and 134; heater reliefs, Figures 206 and 226; pump reliefs, Figure 216; and special types of relief valves, Figures 182, 183 and 184. Relief valves are also required on economizers and air compressors.

The boiler safety valves are constructed so that a less pressure is needed to hold them open than that required to open them, but they will not close until a lower pressure is reached. There results a larger discharge opening, a quicker discharge, and the valve operated a much less number of times, thus greatly reducing the wear. If the steam pulsations at a safety valve nozzle are considerable, say three pounds, then the pop relief must be set higher, say five pounds, to prevent the valve from chattering on its seat.

Water reliefs are generally plain spring-loaded valves that open very slightly when they start to blow. The valves shown in Figures 182 and 183 are specially suited for large discharges of water, and that shown in Figure 184 for smaller quantities. In asking prices on ordinary relief valves, it should be stated what amount should be discharged; the pressure at which the valve should start to discharge; increase in pressure allowed to give ultimate capacity required; the number of feet of discharge pipe; number and style of fittings in discharge; the pressure relief pipe is to discharge into. These different points all enter into the capacity of a valve and if not properly selected it is possible that the pressure will run to double that for which it is set before the full quantity is discharged. The discharge both to and from the relief valve should be short. The usual practice for fire pumps is to bolt the relief valve to the discharge pipe and discharge into an open funnel. Long pipes should be avoided unless comparatively large valves and pipes are used.

(To be continued.)

Steam turbines of the Parsons type, aggregating 870,000 horsepower, have been manufactured up to date. Of this amount 200,000 horsepower came from American builders and 350,000 horsepower from the original Parsons works in England.—Machinery.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Duty of Motormen as to Keeping Lookout Ahead.

Paducah City Railway v. Alexander's Administrator, 104 *Southwestern Reporter*, 375.—The court of appeals of Kentucky says that it is the duty of motormen in charge of street cars to keep a lookout ahead for persons using the street, and for persons on or so near its track as to be liable to collide with or to be struck by cars, and to exercise ordinary care to discover persons so on or near its track, and to use ordinary care to avoid colliding with, striking or running the car over such persons. All that is required of the motormen in respect to the matters under consideration is to exercise ordinary care. If this degree of care is exercised the company will not be liable for injuries or accidents; and whether or not it has exercised it is a question for the jury.

Abutters Cannot Enjoin Track Elevation on Opposite Side of Highway.

Cobb and others v. Warren Street Railway Company, 67 *Atlantic Reporter*, 654.—The supreme court of Pennsylvania had here a case in which a bill of complaint was filed by plaintiffs whose property was on the north side of the highway, to restrain the defendant company from elevating its electric railway track on the south side of the highway in order to reach an elevated crossing over the Western New York & Pennsylvania railroad tracks. The court of common pleas decided that, as the plaintiffs' property extended only to the center of the highway, and as no part of it was taken and no additional servitude was added to it, and as the defendant had the consent of the township supervisors and owners of all the land not owned by it on the opposite or south side of the highway, and as none of the plaintiffs would thereby be specially injured, they had no standing to prevent the erection of said elevated approach to the overhead crossing over the steam railroad tracks, and that the plaintiffs' bill should be dismissed. The supreme court affirms thereon the decree dismissing the bill.

Touching Taxation in Tennessee.

State v. Taylor, 104 *Southwestern Reporter*, 242.—The supreme court of Tennessee holds that a bill filed on the relation of a revenue agent to obtain a mandamus against a county trustee wherein it was alleged that it had come to the knowledge of the relator that, in violation of the provisions of the law, the property of a street railway company was assessed at less than its actual cash value, and glaringly and inadequately assessed for taxation, etc., made out a case for the jurisdiction of the county trustee to reassess or back assess the property of the street railway company, within Subdivisions 2, 3 and 5 of Section 31 of Chapter 258 of the Tennessee acts of 1903.

In Section 3 of Chapter 513 of the acts of 1905, which provides that every person, or corporation, owning, leasing or operating interurban and street railroad properties, including electric light and power properties when owned or operated in conjunction with street railroad properties, shall file with the comptroller of the state biennially a schedule or schedules giving certain information, the court holds that the language upon the subject of electric lighting, viz., "including electric light and power properties when owned or operated in conjunction with street railroad properties," applies only to the case of electric lighting operations arising solely from the running of an electric railway plant as a railway, and to the sale of its surplus electricity so generated, and does not cover the case of a street railway company, or interurban company, owning and operating a separate electric light plant, or a plant run under Chapter 406 of the acts of 1903 for the purpose of conducting the business of electric lighting; and in

this view, that the provisions of said Section 3, upon the subject of electric lighting, do not constitute a separate subject in violation of the state constitution. What would be the result in the case of a distinct plant owned or leased and operated by an electric railway company, and not an integral part of its railway business, the court thinks did not arise in the present case, and need not be considered.

Conductor on Running Board and Speed of Car.

Savage v. Rhode Island Company, 67 *Atlantic Reporter*, 633.—The supreme court of Rhode Island says that it must have been known to a conductor that there were poles and trees and similar obstructions all along the line of the road; and, while he would be justified (in the absence of special warning or of actual knowledge) in assuming that he could safely stand and pass along the running board without danger in the ordinary way, he would not be justified in assuming that he could at any time or place swing out to any distance he might find convenient for the purposes of passing passengers standing upon the running board. If it became necessary, as it often is, so to swing out and pass, it would plainly be his duty to look ahead and see that he could pass safely in that manner.

The court also holds that the element of speed could not properly be made a part of the allegations of the defendant's negligence in any count of the declaration; nor could it have been properly so made, because the speed of the car was subject to the control of the conductor. He had full right to regulate the speed of the car as he saw fit, to slow down or even stop, if necessary, in order that he might safely collect his fares. In the event of a very crowded car, with many people standing upon the running board, in view of the danger of losing hold, or being jolted off the car while in motion, or in view of the danger of hitting obstructions near the rail in passing them, when it was necessary to pass around persons so standing, it might frequently be necessary to stop the car until fares could be safely collected, and the conductor would have a perfect right so to do. The speed of the car must at all times be subject to the control of the conductor, both because of the duty to obey municipal ordinances relating to speed, and because it might often be necessary to lessen the speed as a matter of safety to the passengers as well as to the conductor himself. If the testimony as to speed was properly admissible at all, and was in any way an element in contributing to the accident, it was evidence of contributory negligence on the part of the conductor himself. The court can see no other way in which such testimony would throw any light upon the situation.

Students in Commercial College Not Entitled to Public and Private School Rates of Fare.

Commonwealth v. Connecticut Valley Street Railway Company, 82 *Northeastern Reporter*, 19.—The supreme judicial court of Massachusetts says that, under Section 72 of Chapter 112 of the revised laws of Massachusetts, street railway companies are required to transport "pupils of the public schools," while "traveling to and from the school houses in which they attend school," at a rate of fare not exceeding one-half the regular fare charged for the transportation of other passengers between the same points. By Chapter 479 of the statutes of 1906 this section was amended by the insertion of the words "or private" after the word "public," so that the requirement now applies to pupils of the public or private schools.

The defendant refused to transport at this rate one Chapin, who was attending the Northampton Commercial College, which is an institution owned and conducted by a private person for his own profit, in which are taught, among other subjects, telegraphy, shorthand, typewriting, bookkeeping, office practice, phonography, commercial law, penmanship, letter writing, English grammar, arithmetic and rapid calculation. It had 180 students, of an average age of 16 to 19 years, the eldest being 50 years of age. Forty of these were from

towns in which the defendant operates its railway, and these 40 were of the same average age. The eldest was 29 years of age. An indictment having been found against the defendant for a violation of the law, the question arose at the trial whether Chapin was a pupil of a private school, within the meaning of the statute.

The court holds that he was not. It says that the legislature did not intend to provide in this chapter for the transportation of adults attending the evening schools or the evening high schools, nor for the "young men or boys" attending the nautical schools, nor for the persons attending the industrial schools, nor for the children attending vacation schools, in no one of which does attendance take the place of the regular attendance required by law in the public schools. And it declares itself of the opinion that the students in the Northampton Commercial College are not pupils of a private school, such as are referred to in Chapter 479, statutes of 1906.

Using Old Car and Burning Out of Fuse—Fuse Box Attached to Sill—Customary Speed.

Lord v. Manchester Street Railway, 67 Atlantic Reporter, 639.—The supreme court of New Hampshire says that as it is common knowledge that all mechanical devices wear out, it cannot be said as a matter of law that a fuse is not more likely to burn out in an old electrical appliance than in a new one. Hence there was no presumption that the defendants were prejudiced by the statement of the plaintiff's counsel, to the effect that they were in fault for using an old car, knowing that its electrical equipment would deteriorate with age. In the absence of evidence that electrical equipment is excepted from the general rule as to the effect of long-continued use upon mechanical appliances, the statement of counsel was merely the conclusion fairly inferable from the evidence as to the age of the car.

Again, the court says that the defendants knew the location of the fuse box. They were aware that the fuse was designed to burn out whenever the wires were overloaded, that no one could foresee such a happening or predict the violence of the explosion and the extent of the electrical display accompanying it, and that passengers were sometimes so frightened by the noise and flame that those in charge of the cars had difficulty in averting accidents. It was incumbent upon the defendants so to equip and operate their cars as to render it improbable that passengers who were themselves in the exercise of care would suffer injury; and this obligation was imposed for the benefit of those who the defendants either knew, or ought to have known, were liable to be injured by a non-performance of the duty.

It was clear that it might reasonably be found from the evidence that a man of ordinary prudence, possessed of the defendant's knowledge of the situation and its dangers, would not use for the conveyance of women and children a car with its fuse box attached to the sill—in other words, that the defendants negligently failed to provide a safe car. It could also be found that their fault in this respect was the legal cause of the injury for which the plaintiff sought to recover, if there was evidence tending to prove that they ought reasonably to have anticipated such an accident as the natural and probable result of the continued use of the unsafe car; and it was obvious that there was such evidence, unless it was to be held as a matter of law that street railway proprietors who equip their cars with an appliance which they know may explode at any moment, producing at the same time a loud detonation and sheets of flame, are not bound to anticipate that a female passenger seated in close proximity to the device may be so startled by such an explosion as to jump from the car because of fright.

Evidence as to the customary speed of the defendants' cars at the place of the accident was competent as tending to show the speed of the car upon which the plaintiff's intestate was riding at the time of her injury.

News of the Week

Recent Accidents.

On December 7 a street car of the Pittsburg Railways Company jumped the track on a steep hill in Allegheny, Pa., and rolled down an embankment, being completed overturned. It is reported that 36 persons were injured, three of them probably fatally.

An interurban passenger car and an express car collided head-on on the Chicago South Bend & Northern Indiana Railway near Milburn, Ind., on December 7. Both motormen were severely injured and the cars were badly wrecked, as both were running at a high speed. The accident occurred near a curve at the foot of a grade at a point where a turnout was being constructed and was nearly completed.

Chicago Union Traction Reorganization.

Judge Grosscup will render a decision on December 16 on the petition for an order directing that the property of the Chicago Union Traction Company be turned over under foreclosure of mortgages to the Chicago Railways Company in accordance with the modified plan of reorganization. At the hearings on the petition which took place during the week the various interests concerned were represented. The Guaranty Trust Company of New York, through its attorneys, claimed exceptional consideration. This company demands a cash settlement on the ground that its lien is superior to all other claims. It holds receivers' certificates for about \$1,500,000, representing money borrowed during the early stage of the receivership. All other interests have assented to the reorganization plan.

The question of the financial responsibility of the Chicago Railways Company was raised during the proceedings. Judge Grosscup ruled that it was the city council of Chicago and not the court which granted the ordinance to the Chicago Railways Company. The question of the financial responsibility of the company, he said, was for the city to decide.

Marshall E. Sampsell and Henry Blair, receivers of the Chicago Union Traction Company, were examined by one of the attorneys for the Guaranty Trust Company regarding the letter written to Mayor Busse and the city council in September last, promising that the earnings above the cost of operation would be devoted wholly to rehabilitation of the property and that interest on the bonded debt should be passed. Mr. Sampsell said that he had been informed by the mayor and certain aldermen that no extension of time would be given the company in which to settle the differences unless existing and contemplated rehabilitation work was completed. Mr. Sampsell said that he had made up his mind to default on the bond interest anyway, as there was no money on hand to meet the fixed charges.

Negotiations for Settlement of the Cleveland Controversy.

The principal developments in the Cleveland street railway situation during the past few days has centered around the efforts to arrange a settlement between the Cleveland Electric Railway and the city under the holding company plan. As stated in last week's issue of the Electric Railway Review, F. H. Goff has been appointed to represent the Cleveland Electric Railway in the negotiations, and he immediately agreed that the holding company plan was the only feasible basis for a settlement, in view of the results of the last election, at which Mayor Johnson was supported by the people. At the public meeting of the city council on Wednesday, December 4, preliminary steps were taken to decide upon the valuation of the Cleveland Electric property, which must be determined in order to effect the lease to a holding company. This is regarded as the crucial point in the negotiations and the one on which the success of the plan depends. Other vital points to be settled are the terms of the lease, the terms of a security franchise which will protect the stockholders in case of a default of the holding company, and the personality of the directors of the holding company.

N. D. Baker, city solicitor, and S. H. Tolles, law partner of Mr. Goff, were selected to determine the dates of expiration and the value of the Cleveland Electric franchises. President Andrews of the Cleveland Electric and President du Pont of the Municipal Traction Company, then named assistants to determine the physical values as follows: To appraise track and pavement, Charles H. Clark of the International Railway of Buffalo, representing the Cleveland Electric, and City Engineer Hoffman, representing the city; to appraise rolling stock and miscellaneous equipment, J. J. Stanley, general manager of the Cleveland Electric Railway, and W. T. Cook, superintendent of the Forest City Railway; to appraise land values, A. S. Taylor and C. D. Moore, real estate experts; to appraise

buildings, J. W. Vanderwerf and W. S. Lougee. Mr. Andrews and Mr. du Pont will personally appraise the power stations and electrical equipment. Resolutions were passed by the council recognizing Mr. Goff as mediator for the Cleveland Electric Railway and Mr. Johnson for the city. The appraisers were directed to report at a meeting on Tuesday of this week.

The work of calculating the valuation of the property was started at once. The various appraisers met with Mr. Andrews and Mr. du Pont on Thursday to receive instructions and methods of procedure were outlined. The various items were gone over and an agreement was reached on many of the details. Questions of theory were left for the mayor, Mr. Goff and the two presidents to settle.

Another meeting of the city council to discuss the settlement plans was held on Tuesday of this week. H. J. Davies, secretary and treasurer of the Cleveland Electric, and Prof. E. W. Bemis were appointed a committee to determine what percentage of the company's receipts is net profit. It was agreed to appoint two committees later to determine the increase or decrease of gross receipts and to tabulate the final results of the entire valuation.

The appraisers simply reported progress and promised final reports on Monday, December 17.

In the course of the general discussion Mr. Goff advocated that the Cleveland Electric Railway and the Forest City Railway be consolidated by an exchange of stock before the lease to a holding company and that a 25-year security franchise be granted to the merger company, providing for six fares for 25 cents. Mayor Johnson was agreeable to a consolidation, but said he would never agree to six tickets for 25 cents. Mr. Goff's statement that a large portion of the Cleveland Electric earnings had gone into the property for betterments was met by Mr. Johnson with the declaration that certain important franchises would expire next February. The statement caused some surprise because the franchises referred to have been considered as running for a longer time, but the point will be taken up by the men selected to appraise the franchise value.

At the regular meeting of the council on Monday, December 9, the ordinance providing for the relocation of the Cleveland Electric tracks near the public square was passed, with a provision that the cost be paid by the city from the amount paid by the Cleveland Electric for the use of the Central-Quincy route. The plan was opposed as illegal, but Mayor Johnson refused to consider that aspect of the matter, saying that the necessity for such a step to relieve the traffic congestion was more important than the legal questions involved.

New York Public Service Commission.

On December 4 the New York public service commission issued a final order requiring the Coney Island & Brooklyn Railroad to thoroughly repair its open cars and have them fully equipped with up-to-date appliances by April 15.

In response to inquiries as to why the commission had not yet advertised contracts for the construction of the Fourth avenue subway in Brooklyn, Chairman Willcox announced on December 7 that the commission has every intention of building the so-called triborough route, and that in addition it is the intention to have all new subways so constructed that they will accommodate cars of a larger and better type than those now in use. Mr. Willcox said that the form of contract was in the hands of Chief Engineer Seaman, who succeeded George S. Rice on December 1, and therefore has hardly had time to become familiar with the details.

"It appeared to the commission," Mr. Willcox said, "that all future subways should be projected on a larger scale, so as to provide for wider usefulness in many directions. The original plans of the Fourth avenue subway contemplate a tunnel with a depth of 13 feet, and with a clearance of four inches above the top of the car. This would leave no margin for larger equipment or for running cars of other types through the tunnel. The commission is of the opinion that it is not wise to construct a tunnel with so narrow limitations, especially in view of the important connections this subway will make and the large travel which it will doubtless have to accommodate."

On December 8 the commission passed a final order requiring the Interborough Rapid Transit Company, the Union Railway and the New York City Railway to exchange transfers so as to permit of a journey from Westchester to City Hall square for eight cents, one 5-cent fare and three cents for a transfer, instead of two 5-cent fares, as at present. Only eight cents is now charged for the northbound trip and the order was given for the sake of consistency.

On the same day the chief engineer and the general counsel of the commission were directed to prepare plans and specifications for the section of the Fourth avenue subway, Brooklyn, between Ashland place and Sackett street. This

section was omitted when the plans for the other sections were prepared, until the plans for a city sewer could be determined upon.

On December 8 Mr. Bassett of the commission presented a report in behalf of the committee to investigate the Brooklyn bridge traffic. This report declared that more cars, both elevated and surface, were running across the bridge in the rush hours now than ever before, and quoted a report of Bridge Commissioner Stevenson that in November, between 5 and 6 p. m., there was a daily average of 298 cars, as against 264 a year ago. Under favorable conditions on some days as many as 320 cars crossed the bridge in that hour, whereas last year never more than 300 crossed in the hour. Commissioner Stevenson said this increase was due to improvements in operation on the part of the operating company, the interest taken by the operating officials since the advent of the public service commission, and the hearty co-operation of the police. It was stated that although the bridge congestion is still very great, the traffic can be handled in a fairly orderly manner until the Battery tunnel shall be operated.

The commission on December 5 issued an order to the Interborough Rapid Transit Company to show cause, at a hearing on December 17, why the service on the Ninth avenue elevated line should not be increased by the addition of 58 cars to the 222 trains now run southbound from Thirty-fourth street between 6:30 and 9 a. m., and why 62 cars should not be added to the 252 trains at present running north between 4:30 and 7 p. m. On December 9 the commission issued another order to the company to show cause why the service on the Third avenue elevated line should not be increased by the addition of 91 cars in the morning rush hours and 139 cars in the evening. The hearing will be held on December 20.

No more sessions of the general traction investigation will be held until after the first of the year, although several hearings will be held on orders to make service improvements.

In a decision given out on December 10 the commission for the second district defined its policy in regard to certificates of public convenience and necessity for street surface roads granted by the former board of railroad commissioners. The decision states that if the holders of such a certificate fail to begin actual construction within two years from the date of the granting of the certificate, the commission may at its discretion annul the certificate. It is further stated that preliminary engineering work and attempts to obtain franchises are not considered as construction work.

West Jersey & Seashore Railroad.—On December 20, at the next meeting of the Pittsfield, Mass., section of the American Institute of Electrical Engineers, Mr. C. E. Eveleth will present a paper on "The Electrical Equipment of the West Jersey & Seashore Railroad."

Rochester Employes' Association.—The Rochester Railway Employes' Association will hold its eighth annual ball on January 7, 1908, at the Eureka Club, Rochester, N. Y. The association extends to all who will be in Rochester that evening a hearty invitation to be present.

Seek Interurban Mail Service.—H. H. Polk, president of the Interurban Railway Company, Des Moines, Ia., has been appointed one of a subcommittee of the Greater Des Moines committee to investigate the matter of mail carrying by interurban lines, with the object of influencing the postoffice department to establish a mail service on the Interurban and the Ft. Dodge Des Moines & Southern Railroad.

Pay-As-You-Enter Cars for Buffalo.—It is announced that the International Railway of Buffalo, N. Y., will begin operating pay-as-you-enter cars about the first of the year on all of its lines passing Shelton square. The company has secured from the city council permission to erect a small booth in the square, where a man will be stationed to make change for intending passengers, so that they may have fares ready before entering the car.

Reducing Number of Passes in Portland.—The Portland (Ore.) Railway Light & Power Company has recently decided to discontinue issuing complimentary passes to persons rendering no equivalent therefor and no new passes will be issued except for business reasons. A large number of city employes have heretofore received passes, but President Joselyn has written to the mayor asking him to furnish a list of those he believes entitled to the privilege.

New Cars Promised for St. Paul.—C. G. Goodrich, vice-president of the Twin City Rapid Transit Company, has written to the corporation attorney of St. Paul, Minn., stating that 15 new cars, built in the company's shops, will be turned out in January, and 25 a month thereafter, until 150 have been built. Last March the council passed an ordinance providing for an increase of service on nearly all of the company's lines. The company was then building its new Snelling avenue shops and

moving its old shops to the new plant and was consequently unable to furnish the required new cars. The council passed a resolution requesting the corporation attorney to bring suit at his discretion against the company for violation of the ordinance, but in view of the promises of new cars next month the matter will be held in abeyance.

Cement Show at Chicago.—The first annual cement show will be held at the Coliseum, Chicago, December 17 to 21, 1907, under the auspices of the Cement Products Exhibition Company, of which Edward M. Hagar of the Universal Portland Cement Company is president. An elaborate display of cement products and cement machinery of all kinds will be on exhibition. Communications should be addressed to L. L. Fest, manager, at the New Southern hotel, Chicago.

Report on St. Louis Fuel Tests.—Prof. L. P. Breckenridge, engineer in charge of steam engineering division of the technologic branch of the United States geological survey, announces that Bulletin No. 325, Series Q, Fuels 5, "A Study of 400 Steaming Tests with Deductions," will be ready for distribution within the next six weeks. This bulletin will relate to the work of the geological survey fuel testing plant at St. Louis. Copies may be had by addressing the director of the survey at Washington.

Los Angeles-Pacific Company Suspends Construction.—It is reported that about 600 men employed in the construction department of the Los Angeles-Pacific Company, Los Angeles, Cal., have been laid off temporarily. Most of the construction work upon which the company was engaged has been completed and no new construction will be started until financial conditions improve. The plans for the proposed new passenger terminal for interurban cars and for the subway by which they will enter the city have not been abandoned, but have been temporarily postponed.

Owl Car Service in Des Moines.—The Des Moines City Railway Company on December 1 established an all-night service on nearly all of its lines, operating on an hourly headway from 12 p. m. to 5 a. m. A 10-cent fare is charged. At the end of each month the company will file with the city clerk figures showing the results of the service and if it proves remunerative it will be made permanent. Several members of the city council have tried to pass an ordinance requiring the company to establish an "owl car" service, but the matter has been dropped until the service can be fully tested.

Indiana Commission Orders Joint Interlocking Plant.—The Indiana railroad commission has ordered that the interlocking plant at Clymers, Ind., now owned jointly by the Vandalia and Wabash railroads, be changed to accommodate the Lafayette & Logansport Traction Company also. The cost of the changes is to be borne by the traction company, which is also required to pay \$1,036 to the Vandalia. The cost of the maintenance and operation of the plant is to be divided equally among the three companies. The traction company has long sought to be allowed to use the interlocking, but was opposed by the Vandalia.

Street Railway Y. M. C. A. at Nashville.—The employees of the Nashville Railway & Light Company, Nashville, Tenn., are now organizing a branch of the Street Railway Young Men's Christian Association. Roy J. Clarke, heretofore assistant secretary of the Y. M. C. A. at Memphis, Tenn., has been appointed secretary. The association will be under the supervision of a committee of managers. A membership fee of \$5.00 a year will be charged. The quarters of the association will be at the company's transfer station and will be provided with a reading room, locker and bath rooms, lunch room, pool room, etc. Evening classes in mechanical and electrical subjects will be held.

American Institute of Electrical Engineers.—The regular monthly meeting of the Toledo section of the American Institute of Electrical Engineers was held on Friday, December 6. C. E. Robertson addressed the meeting on the subject of "Rotary Converters," illustrating his remarks by blackboard sketches, as well as by prints. He indicated the numerous ways in which a rotary converter may be used and analyzed the phases for which machines are designed, the cycles under which they are operated and the consequent speed of rotation. He also explained the voltage relations of the alternating and direct current terminals at no load and at full load for the several usual types of converters.

Not Required to Carry College Students at Half Fare.—Judge N. W. Finley of Dallas, Tex., has made a ruling that the act of the legislature requiring street railway companies to issue half-fare tickets to school students does not apply to students over 17 years of age or to students of schools of higher grade than the public high schools of the state. A law of 1903 requires half-fare tickets for students and the

anti-pass law of 1906 forbids giving a lower rate to persons not included in the provisions of the law of 1903. The Dallas Consolidated Electric Street Railway recently stopped selling half-fare tickets to college students and the ensuing complaints necessitated an interpretation of the law.

Not Required to Install Overhead Return System.—The common council of Richmond, Va., on December 5 refused to pass an ordinance requiring the Virginia Passenger & Power Company to install a double overhead trolley system as a means of protecting the city water mains against electrolysis. A substitute ordinance was then adopted providing for a compromise of the city's claim against the company for previous damages by electrolysis, and requiring the company to thoroughly bond its rails. The council was influenced in its decision by experts, who testified that the double trolley system was not an infallible remedy for electrolysis, and because it was deemed inexpedient to require the company to go to the expense of a double trolley.

Schenectady Railway Reduces Service.—On December 1 the Schenectady Railway made a considerable reduction in its service between Schenectady and Albany, Troy and Saratoga, N. Y. Since the reduction of the force employed by the General Electric Company in Schenectady it is stated that the railway's traffic has fallen off heavily. The headway on the Albany line was increased from 15 to 20 minutes, on the Troy line from 30 to 45 minutes, and on the Saratoga line from 1 hour to 1 hour and 20 minutes. The new schedule eliminates a 15-minute layover at terminals on the Troy line. It is stated that on January 1 the sale of commutation tickets from Schenectady to Troy and Albany will be discontinued and that the regular round trip rate of 40 cents will be charged, instead of 25 cents, the commutation rate. The steam road fare is 70 cents.

Petition for Withdrawal of Des Moines Franchise Litigation.—A petition signed by a number of individuals and business firms of Des Moines, Ia., has been presented to the Civic League of that city asking it to withdraw its litigation against the franchises of the Des Moines City Railway Company. Judge Smith McPherson of the federal court at Des Moines last spring decided that the company's franchises were perpetual. The league appealed to the United States supreme court. Owing to a belief that the Des Moines City Railway and the Inter-Urban Railway will not make any extensive improvements or extensions until the franchise case is settled, the present petitioners believe that the best interests of the city will be subserved by a withdrawal of the appeal to the supreme court. A decision is not expected inside of a year. It is stated, however, that the company does not wish the appeal dismissed, but desires a permanent settlement of the franchise question, and that under the present financial circumstances it would be unable to make any extensive improvements in any case.

Steam Railway Electrification.—The regular meeting of the Cornell University branch, American Institute of Electrical Engineers, was held in Sibley College on Friday evening, December 6. The speaker was W. N. Smith, electric traction engineer Westinghouse, Church, Kerr & Co., who presented a paper entitled "Practical Aspects of Steam Railway Electrification." The speaker dwelt particularly upon the necessity of a study of electrification from all points of view. In the discussion Prof. H. W. Hibbard, head of the railway mechanical engineering department, Cornell University, expressed his appreciation of this kind of treatment of the problem. Professor Hibbard felt that to a certain extent the steam railroad man had been ignored in the electrification problem. He emphasized that there was no antagonism to electrification on the part of steam railroad men, where the conditions seemed to warrant its introduction. He did not feel, however, that electrification should be forced upon steam railroads, but rather that it should be adopted as necessary when conditions fully warranted such adoption. The steam railroad man was first and foremost a transportation engineer regardless of the source of motive power. Prof. V. Karapetoff discussed the problem from the standpoint of power supply, comparing the steam locomotive to a "power plant on wheels." He also drew attention to the gasoline-electric car.

The weight of any locomotive, steam or electric, is determined by the maximum drawbar pull which it is expected to exert in order to start a given trainload on the ruling grade. Within this weight it is comparatively easy to build an electric locomotive with sufficient power to slip its wheels at all feasible speeds. But the power which can be concentrated in a steam locomotive of the same weight is, at the present state of the art, distinctly limited and the drawbar pull of the steam locomotive drops off very quickly as the speed increases.—Electric Trunk Line Age.

Construction News

FRANCHISES.

Athens, Ga.—The Atlanta & Carolina Railway Company, Atlanta, Ga., has been granted a franchise for the operation of its line through Athens. Work is to be started on the road within one year and be completed within three years from the date of the franchise. James W. English is president.

Bluefield, W. Va.—The Bluestone Traction Company has been granted a 47-year franchise for an extension of its line into South Bluefield, via Bland street.

Defiance, O.—The Defiance Paulding & Ft. Wayne Electric Railway Company has applied for a franchise to operate its line through Defiance. The road will be built from Detroit to Ft. Wayne, serving the towns of Wauseon, Lyons, Defiance, Paulding and New Haven, Ind. Eight miles of the old Wabash canal between Defiance and Ft. Wayne recently was purchased by the company. K. V. Haymaker, Defiance, O., is interested.

Hayward, Cal.—By the recent granting of a 40-year franchise to the Oakland Traction Company, the completion of the company's lines of the Hayward division through Hayward in the near future is said to be assured. The line will operate over Castro street and will be double-tracked, replacing the old narrow-gauge track. The company paid the city \$100 and agrees to grade and macadamize the right of way through Hayward.

Ithaca, N. Y.—The questions at issue between the city of Ithaca and the Ithaca Street Railway Company, regarding the terms of a new franchise which the company offers to accept in place of the franchise which it holds, may be settled at a public hearing which will be held on Wednesday, December 18. The company offers to surrender its existing unlimited franchise and accept a new 50-year franchise instead, provided the "six for a quarter" clause is eliminated. It also agrees to pay to the city \$10,000 before December 1, 1908, and 1 per cent of its receipts in excess of \$25,000 a mile. The new franchise does not cover new streets, but is only for the improvement of lines in streets already occupied by the company's tracks.

Marinette, Wis.—The Menominee & Marinette Light & Traction Company has filed a surrender of its present term franchise to accept an indeterminate franchise under the public utility law passed by the last legislature.

New Carlisle, Ind.—The Chicago South Bend & Northern Indiana Traction Company has secured a franchise for the operation of its line through New Carlisle. Construction will now be resumed on the Laporte extension and it is expected that by March 1, 1908, service between South Bend and New Carlisle will be afforded. It is stated that by June 1, 1908, the line will be in operation to Laporte and that Chicago will be reached by way of Michigan City, Ind., about six months later, or by the first of January, 1909. Samuel Riddle, general manager and purchasing agent, South Bend, Ind.

Pueblo, Colo.—The promoters of the interurban railway which is to be built from Pueblo to Rocky Ford and other points in Colorado have asked for right of way along the county road. An effort was made to secure private right of way, but the property owners along the proposed route refused to sell except at figures which the company considered unreasonable. It is stated that if the right of way grant is obtained work will be started by December 15, as provided in the franchise. H. C. Van Natta, chief engineer.

South Amboy, N. J.—The Jersey Central Traction Company has been granted a franchise for a line through South Amboy.

South Bend, Ind.—A franchise has been granted by the county commissioners to the Indianapolis Logansport & South Bend Traction Company for the operation of its cars over that portion of Main street lying south of the city limits and on other public highways after the cars leave the Michigan road. Work must be begun not later than May 1, 1908, and the road be in operation by January 1, 1909. A general freight and passenger service will be maintained. S. S. Perley, president, South Bend, Ind.

Sumter, S. C.—John L. Alnutt has applied to the city council for a franchise to operate 10 miles of electric line in Sumter. This will be part of an interurban system which will serve the section near that city.

Walla Walla, Wash.—The Washington-Oregon Traction Company has applied to the city council for a franchise to construct electric lines in the streets of Walla Walla. The

company agrees to commence work within four months, provided the bonds of the company can be sold. The line is to be in operation within three years.

RECENT INCORPORATIONS

Burgrahaw Traction Company, Burlington, N. C.—Incorporated in North Carolina to equip and operate an electric railway in and connecting the towns of Burlington, Graham and Haw River. The company also will purchase and sell electricity, gas or other illuminating power for private or public use and will buy and sell real estate. Capital, \$250,000, of which \$30,000 is said to have been subscribed by Junius N. Harden, John M. Cook and J. W. Murray.

Gillespie (Ill.) Electric Railway.—Incorporated in Illinois to construct and operate an electric railway from Gillespie to the mines in Macoupin county. Incorporators: H. T. Bycroft, P. R. Isaacs, H. W. Rice, G. W. Schmidt and S. P. Preston, all of Gillespie, Ill.

Portland Eugene & Eastern Railway.—Incorporated in Oregon to build an 800-mile interurban system of electric railways from Portland to Salem, Eugene, Yaquina, Prineville and Ontario, Ore., with branches as follows: From Eugene by way of Springfield and the Mackenzie river valley to Prineville and across the state to Ontario; from Eugene to Yaquina bay points, and from Eugene to Florence, Cottage Grove, Corvallis, Wendling, Mehana and Dallas in Lane, Polk and Lincoln counties. It is stated that power will be developed from the Mackenzie, Santiam and Deschutes rivers in central Oregon. Capital stock, \$1,000,000. Incorporators: J. O. Story, J. C. Brancher, G. Brancher, A. Welch, E. M. Hall and John McNary.

TRACK AND ROADWAY.

Ardmore Traction Company, Ardmore, Okla.—Donald Fitzgerald, New York City, who is interested in the construction of this road, is reported as saying that between three and four miles of street railway extensions will be in operation by next July. Construction work on the first section probably will be started within a few days.

Aurora (Ill.) Railways Company.—This company has filed an amended charter for its proposed line in Aurora and it is announced that construction work will begin immediately if the pending franchise is granted.

Bartlesville Interurban Railway, Bartlesville, Okla.—W. G. Thummel, chief engineer, writes that about 50 per cent of the grading on this proposed interurban line, which will connect Bartlesville and Dewey, has been completed and that work on the two steel bridges has been started. The Missouri Valley Bridge & Iron Company, Leavenworth, Kan., has secured the contract for these bridges, as well as for all the pile structures on the line. Bids for tracklaying, rails, ties, etc., will be asked for in the near future.

Boston & Providence Interurban Electric Railway, Boston, Mass.—This company has been authorized by the Massachusetts state board of railroad commissioners to build an electric railway from Forest Hill, the terminus of the Boston end of the line, through Hyde Park, Dedham, Westwood, Norwood, Canton, Sharon, Foxboro, Mansfield, Attleboro and Seekonk to the state line.

Bristol & Kingsport Railway, Bristol, Tenn.—John I. Cox is president of this company, which proposes to build an electric railway about 25 miles long. F. H. Cothran, chief engineer, is now making surveys.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—It is stated that this company's line will be completed and in operation by the first of the year from Angola to Buffalo, leaving only about 25 miles to be built from Angola to Erie. Current will be obtained from the Niagara Lockport & Ontario Power Company's plant.

Charleston & Summerville Electric Railway, Charleston, S. C.—Announcement is made that W. O. Spriggs of New York City has been elected president of this company, which is building a 22-mile interurban railway between Charleston and Summerville, S. C. The company's recent application for an extension of time in which to complete the road has been granted. Considerable construction already has been done and it is stated that the new management will resume the work in the near future. F. S. Wright, New York City; Julian Grimke, Charleston, S. C.; and George Tupper, Summerville, are also interested. D. E. Baxter & Co. of New York are the contractors.

Columbus Magnetic Springs & Northern Railway, Delaware, O.—H. E. Buck, secretary and general manager of this road, writes that tracklaying has been completed between Magnetic Springs and Richwood, O., 5½ miles, and that the track is now being ballasted. The road will be 20 miles long

and will connect Delaware and Richwood by way of Scioto and Magnetic Springs. The overhead construction, power house and substations have been completed. Construction work was started about a year ago, but was delayed on account of non-delivery of materials. The early operation of the road between Magnetic Springs and Richwood is expected. William Galbraith, Pittsburg, Pa., is president.

Columbus (Ga.) Railroad.—It is reported that this company is making surveys for an electric line to be built from Columbus north along the Chattahoochee river to West Point, Ga., 34 miles. F. E. Reidhead, manager, Columbus, Ga.

Connecticut Company, New Haven, Conn.—The first car was operated over the electrified East Hartford-Rockville interurban division of this road on December 4, when several railroad commissioners and officials of the road made an inspection trip over the line. Several details are yet to be completed before the line is opened for traffic. By the new service it is stated that the running time between Hartford and Rockville, Conn., will be reduced by 30 minutes.

Denver, Colo.—John Brisben Walker, who is building a railway to the summit of Mt. Morrison, is endeavoring to interest Denver business men in a proposition to construct an electric road from Denver to a connection with his line at the foot of Mt. Morrison. A company is said to have been organized and work will be started as soon as the preliminary stock issue of \$150,000 has been subscribed. It is intended to have the road in operation by July 4, 1908. The line is to be broad gauge and laid with 70-pound rails.

Eldorado Springs Tiffin Monegaw Springs & Lowry City Railroad, Tiffin, Mo.—J. S. Harrison, secretary and general manager of this company, which was recently organized to build an electric railway connecting Eldorado, Tiffin and Monegaw Springs, Mo., writes that only preliminary work has been done and that surveys have not yet been made.

Frederick, Md.—Announcement is made that surveys will be started in the near future on the proposed electric railway from Frederick by way of Buckeystown, Poolesville and Seneca, Md., to Great Falls, where it will connect with the Great Falls & Old Dominion Railway. Connection also will be made at Frederick with the Washington Frederick & Gettysburg, which has under construction an electric line to Thurmont and Emmitsburg, Md. D. Columbus Kemp, Joseph D. Baker and others of Frederick, Dr. Llewellyn Jordan, B. H. Warner and others of Washington are interested.

Gary & Interurban Railway, Gary, Ind.—Construction work on this company's street railway line in Gary was started on December 7. The section which will be built first will extend three miles along Broadway, the principal street of the town, and will connect with several important steam roads. The company has a 50-year franchise, with options for extending these rights with the growth of the city. It is stated that inside of a year cars will be running over three of the streets of Gary. According to the terms of the franchise, when the city has reached a population of 50,000, 3-cent fares will be established. Other interurban lines may use the company's tracks if desired. The franchise is owned by the Chicago-New York Electric Air Line Railroad.

Hamilton, Ont.—An application for a charter will shortly be made to construct an electric railway along the face of the mountain north of the Mountain drive and connecting with the east end incline. T. H. Pratt of Hamilton is interested in the project.

Hamilton Radial Electric Railway, Hamilton, Ont.—Power is being sought by this company to extend its lines to within the limits of the city of Toronto and to secure special bonding powers for that purpose; also to extend the existing line from Brantford to Woodstock and thence to Windsor.

Illinois Traction System.—The first caisson for the bridge across the Mississippi river from Venice, Ill., to St. Louis, Mo., was placed on December 8. The bridge will be built by the Central Illinois Construction Company. The Missouri Valley Bridge & Iron Company of Leavenworth, Kan., has the subcontract.

Lincoln, Neb.—J. W. Wilson of Cincinnati, O., is promoting an electric interurban railway from Lincoln to Auburn and Falls City, Neb. J. H. Miles, a banker of Falls City, is said to be interested.

Logansport & Marion Traction Company, Marion, Ind.—Announcement is made that surveys on this proposed line from Logansport to Marion, Ind., will be started about January 1.

Milner & North Side Railroad, Milner, Idaho.—Considerable grading has been done on this line, which, when completed, will be 65 miles long and will connect Milner, Jerome,

Wendell and Gooding, Idaho. The power station of the company will be located at Shoshone Falls. D. C. McWatters, president and general manager, Milner, Idaho.

Madison & Gulf Railway, Madison, Fla.—This company has applied for a charter for an electric railway. Capital stock, \$50,000. President, J. D. Shaw; secretary and treasurer, J. I. Stafford.

Missouri Valley Traction Company, St. Joseph, Mo.—The preliminary survey for the main line of this proposed 65-mile interurban road has been completed from St. Joseph to Excelsior Springs, Mo. Surveys are now in progress on the spur line from Lathrop to Mirabile, Mo., 10 miles. It is stated that the power house will be located at Lathrop instead of at Plattsburg, Mo., as originally planned. Thomas B. Campbell, president, St. Joseph, Mo.; C. W. Campbell, chief engineer.

Mt. Hood Railway & Power Company, Portland, Ore.—The first shipment, consisting of nine carloads of rails, has been received by this company and 11 miles of grading on the main line between Portland and Bull Run are completed in readiness for tracklaying. It is stated, however, that work will be suspended until after the holidays, when an effort will be made to secure the remaining right of way by condemnation proceedings. Five miles of grading on a branch line have also been completed. From a point 1½ miles from Gresham four surveys have been made into Portland. It is stated that an order for 1,600 tons of rails was placed with the Lackawanna Steel Company, Lackawanna, Pa.

Murphysboro Electric Railway Light & Power Company, Murphysboro, Ill.—This company, recently formed to build an interurban railway from Murphysboro to Carbondale, Ill., has elected the following officers: P. H. Eisemeyer, president; W. C. Alexander, vice-president and general manager; John G. Hardy, secretary; Willard Hall, treasurer, all of Murphysboro, Ill.

New Castle, Pa.—It is stated that the proposed electric line to be built between New Castle and Beaver Falls, Pa., will be completed and placed in operation some time during the coming year. Trackage rights through Wampum, Pa., and between Wampum and Ellwood City are said to have been secured. It is stated that connection will be made with the Mahoning & Shenango Railway & Light Company's line at Mahoningtown, from which point cars will operate direct to New Castle. The complete plans of the company which will control the new line have not been made public, but it is stated that Ellwood City, Zellenople and Pittsburg capitalists are interested.

Oakland (Cal.) Traction Company.—This company has recently completed a line between Park street and Thirteenth and Washington streets, Oakland.

Ocean Shore Railway, San Francisco, Cal.—This company has commenced the daily operation of a train over its new line from Twelfth and Mission streets in San Francisco, to Pedro Valley, 20 miles south. For the present one train per day only will be operated. J. D. Harvey, president, San Francisco.

Ohio Electric Railway.—It is stated that the recently electrified line of the Columbus & Lake Michigan Railway will be opened for traffic between Lima and Kalida, O., before January 1. It is expected that the line will be completed for its entire length, from Lima to Defiance, by March.

Ontario (Cal.) Interurban Railway.—This company is being organized at Ontario, Cal., for the purpose of building an electric railway connecting Ontario, Pomona, Chino and Newport, Cal. Right of way is being secured and it is expected that construction work will be started soon. The road will be 32 miles long and as planned will be built to Newport Bay, where the government may build a harbor. The company will be capitalized at \$500,000. Charles Frankish, Ontario, Cal., is the chief promoter.

Ontario & West Shore Railroad, Goderich, Ont.—It is announced that this company proposes to build an electric railway from Goderich northeast to Owen Sound, Ont., about 75 miles.

Oregon Electric Railway, Portland, Ore.—We are officially advised that this company has laid 50 miles of track this year from Portland to Salem, Ore., via Tualatin, Wilsonville and West Woodburn. It is also proposed to build two branches, from Portland to Forest Grove, Ore., 26 miles, and from Salem to Albany and Eugene, Ore., 68 miles. The Forest Grove line is expected to be completed by August, 1908. Guy W. Talbot, vice-president and general manager.

Peru, Ind.—The project to build an interurban line from Peru to South Bend, by way of Rochester, Argos and Plymouth, in connection with the Indianapolis and Peru branch of the

Indiana Union Traction Company's line between Peru and Indianapolis, is being revived. The company organized two years ago, composed of Benjamin E. Wallace, James O. Cole, Jerome Herff and Harry Masters of this city, has incorporated and within the last few days Indianapolis capitalists have become interested in the project.

Pullman Lacrosse & Columbia River Railroad, Lacrosse, Wash.—It is reported that surveys have been completed from Pullman to Lacrosse, Wash., 47 miles, on the proposed line from Pullman to Hooper, Wash., 62 miles. Surveying is now in progress on the remainder of the road. H. M. Greene, president; Roy Malony, chief engineer.

Raleigh Electric Company, Raleigh, N. C.—This company is now engaged in double-tracking its Fayetteville street line in Raleigh. It is planned to build about five miles of new track and the work is well advanced. H. H. Carr, general manager.

Red Bud Interurban Railroad.—This company has been formed to build an interurban electric railway from Red Bud to Belleville, Ill. Conrad Becker, Herman Schreiber, Dr. C. C. Smith, Red Bud, Ill.; John Keller, Becker, Ill.; and Mr. Benjamin, Belleville, Ill., are interested.

St. Tammany & New Orleans Railroad, New Orleans, La.—Work has been started on this road, which is to connect Covington, Abita Springs and New Orleans, La. Preston Herndon, the company's engineer, has been clearing the right of way at Ponchatoula bayou and from this point work will proceed in both directions.

Seattle-Everett Interurban Railway, Seattle, Wash.—Harry C. Todd, secretary, writes that this company has laid 2½ miles of track this year, from Ballinger to Hall Lake, Wash. The remainder of the line, from Hall Lake to Everett, Wash., is to be completed in 1908.

Southwest Missouri Railroad, Webb City, Mo.—A. H. Rogers, president, announces that the branch line from Joplin to Duenweg, Mo., has been completed and is ready for operation.

Texas Traction Company, Dallas, Tex.—Tracklaying for this company's interurban line has been completed through Plano, Tex., and is now in progress in McKinney, where the power station is being built. The grading for the entire distance between Dallas and Sherman has been finished and tracklaying will be pushed as far into the winter as the weather will permit. Half of the order for ties and a third of the steel ordered have been delivered. The Postoak and Choctaw bridges are said to have been completed, as well as the 2,000-foot trestle over the East Fork bottom lands. Work on the bridges south of McKinney, Tex., will be started soon, the steel being now on the ground. J. F. Strickland, president, Dallas, Tex.

Toledo, O.—M. R. Black of Toledo is promoting an electric railway from Prairie Depot to Bradner, O., and it is stated that he is meeting with success in securing the right of way.

Washington Spa Springs & Greta Electric Railway.—Announcement is made that construction work on this electric railway, which will connect Washington, Bladensburg and Branchville, will be started on January 1 next. The road will be about eight miles long and current will be furnished from Beverly, Md., where the power house of the company will be located. The officers are as follows: President, B. J. Stephens, Hyattsville, Md.; vice-president and general manager, S. S. Yoder; secretary, Fillmore Beall; treasurer, R. N. Ryan, all of Washington, D. C. Charles D. Eldridge, Myersville, Md., is electrical engineer.

Yakima Valley Transportation Company, North Yakima, Wash.—This company has completed tracklaying from Wide Hollow to the Northern Pacific tracks, the first 3-mile section of its proposed 125-mile system of interurban lines in the Yakima valley. It is stated that the overhead work is completed for this section and that practically all the equipment is on the ground, ready for the operation of the first car on December 20. Officials of the company are reported to have announced that the construction of the Moxee valley section of the road will be started toward the Columbia river, and this 25-mile section built as fast as material can be secured.

POWER HOUSES AND SUBSTATIONS.

Mansfield (O.) Railway Light & Power Company.—This company has decided to increase the capacity of its Mansfield power house by the installation of a 500-kilowatt unit.

Sydney & Glace Bay Railway, Sydney, N. S.—The contract for the erection and equipment of a power house for this company has been let to Rhodes, Curry & Co., Amherst, N. S. The contract price for the plant and machinery is in the neighborhood of \$25,000.

Personal Mention

Mr. John J. Burleigh, one of the vice-presidents of the Public Service Corporation of New Jersey, has been elected second vice-president.

Mr. Robert Sibley, professor of electrical and mechanical engineering of the University of Montana, has resigned to engage in consulting engineering practice at Missoula, Mont.

Mr. W. H. Hall has resigned as chief engineer of the Lehigh Valley Transit Company, Allentown, Pa., and has succeeded his father, Mr. Gordon W. Hall, as manager of the Hall Iron Works, Lockport, N. Y.

Mr. George J. Roberts, chief engineer of the United Gas Improvement Company, Philadelphia, Pa., has been appointed first vice-president of the Public Service Corporation of New Jersey, and will have charge of the operation of all its gas, electric and railway properties.

Mr. J. W. Richardson, heretofore general superintendent of the Kansas City-Western Railway, Kansas City, Kan., has been appointed general manager of the company. He will be succeeded by Mr. John W. Martin, formerly superintendent of the Metropolitan Street Railway Company, Kansas City, Mo.

Mr. A. J. McDonald, heretofore connected with the auditing department of the Southern Pacific Company at San Francisco, has been appointed auditor of the Los Angeles-Pacific Company of Los Angeles, Cal., succeeding Mr. George L. Bugbee, resigned to enter the service of the Southern Pacific.

Mr. C. L. Wilcoxon has resigned as general superintendent of the Pittsburg & Butler Street Railway of Pittsburg, Pa. He was formerly connected with the Western Ohio Railway and for a year prior to February, 1907, when he left that company to go to the Pittsburg & Butler, was general superintendent, with office at Wapakoneta, O.

Mr. G. F. Faber, superintendent of the Elgin & Belvidere Electric Company at Marengo, Ill., has been appointed general superintendent of the Western Ohio Railway at Wapakoneta, O., succeeding Mr. J. K. Gray, who recently resigned to become division superintendent of the Cleveland Southwestern & Columbus Railway at Mansfield, O.

Mr. L. S. Storrs has been elected vice-president of the Worcester Consolidated Street Railway, Worcester, Mass., succeeding Mr. A. G. Bullock. Mr. L. S. Candee has been elected treasurer, succeeding Mr. J. W. Lester. The new officers are both officers of the New England Investment & Security Company of Boston, Mass., the holding company for the electric lines in Massachusetts, controlled by the New York New Haven & Hartford Railroad.

Mr. J. R. Harrigan, for the past year assistant general manager of the Buffalo & Lake Erie Traction Company, with headquarters at Erie, has resigned, effective on January 1, 1908. Mr. Harrigan formerly was general manager of the Columbus Newark & Zanesville Electric Railway, and more recently was manager of the Canton-Akron Railway Company, Akron, O. He resigned this position in November, 1906, to become assistant general manager of the Buffalo & Lake Erie Traction Company.

Obituary.

Marcellus Hopkins, president and general manager of the South Side Elevated Railroad, died at his home in Chicago on Saturday, December 7, of pneumonia, after an illness of less than a week. Mr. Hopkins was born in Pittston, Me., in August, 1844. He entered railway service in August, 1863, as a freight brakeman on the Chicago & Northwestern Railway and remained continuously with that road for 30 years, during the last 11 years of that period as division superintendent. In April, 1903, he resigned to become general manager of the South Side Rapid Transit Company of Chicago, which was later reorganized as the South Side Elevated Railroad. The road was at that time operated by steam locomotives. Mr. Hopkins assumed the management of the property in the year of the World's Columbian exposition and the crowds of people who flocked to Chicago that year gave him an excellent opportunity to display his ability in the handling of a large passenger traffic. The following year he was elected president of the company and in 1895 was appointed receiver. Two years later, when the company was reorganized as the South Side Elevated Railroad, Mr. Hopkins was appointed general manager, and upon the resignation of Mr. Leslie Carter in January of this year, he was elected president also. His son, Mr. George H. Hopkins, is assistant general manager of the South Side road.

Financial News

Berkshire (Mass.) Street Railway.—This company has filed with the secretary of state a petition to the general court for legislation to permit absorption of the Bennington & North Adams Street Railway.

Boston Suburban Electric Companies.—At the annual meeting of stockholders in Boston the following trustees were re-elected for three years: Adams D. Claffin, Charles W. Leonard, William F. Hammett, Alden Viles and Sydney Harwood.

Cleveland & Sharon Electric Railway, Cleveland, O.—Owen N. Wilcox was appointed receiver for this company on December 10. The company has 41 miles of track and \$3,000,000 authorized capital stock and \$3,000,000 authorized first mortgage bonds.

Holyoke (Mass.) Street Railway.—This company has petitioned the Massachusetts railroad commission for approval of an increase in capital stock to an amount not exceeding \$120,000, for liquidating bonded indebtedness incurred in the purchase of the Amherst & Sunderland Railway.

New York City Railway.—The following statement has been issued by August Belmont & Co.: "There is no foundation whatever for the assertion contained in an evening paper and since retracted by that paper that our firm has been connected with any transaction involving the restitution or repayment of money to the receivers of the Metropolitan Street Railway Company. We have had nothing to do with the transaction except as bankers. A fund was placed on deposit with our firm by the Central Crosstown Railroad represented by certificates of deposit. There was a question with which we were in no way concerned as to whether this fund belonged to the Crosstown road or to the receivers of the Metropolitan Street Railway Company. We had no interest in the fund. We understand it has been arranged that the receivers are to have the use of part of the fund to pay for cars of the Crosstown line, and it will be paid as the parties may agree, just as any other deposit at our banking house would be paid to the people who are entitled to it."—The Fidelity Trust Company of Philadelphia, holder of 7,800 shares of stock of the Metropolitan company, has filed a petition in the United States circuit court at New York for permission to intervene as party defendant in the action brought against the New York City Railway and the Metropolitan Street Railway, which resulted in the appointment of federal receivers for the companies. The Fidelity company alleges that there is no insolvency on the part of the Metropolitan company, inasmuch as that company is financially able to pay all obligations against it and the expenses of operation and that therefore there could be no default on the part of the Metropolitan company under the terms of the mortgage to the Morton Trust Company.—The receivers appointed by the state court have qualified by giving bonds for \$100,000 each.—Frederic R. Coudert, representing the receivers appointed by the state court, has asked the United States supreme court for permission to file a brief in the cases before the court concerning the receivership of the New York City and the Metropolitan Street Railway Companies.—Handwriting experts employed by the attorney-general of New York state and the counsel for the state receivers have examined carefully all papers in the proceedings in which the receivers were appointed by the United States court.

Philadelphia & Western Railroad, Philadelphia.—This company has executed a mortgage to the Trust Company of America, New York, as trustee, to secure an issue of \$20,000,000 of first mortgage 5 per cent bonds, subject to redemption at 107½ after 60 days' notice. Of the total amount \$4,000,000 bonds may be issued upon notice of the directors of the company to the trustee. The remaining \$16,000,000 may be used only for extensions, improvements or additions.

St. Louis Terre Haute & Quincy Traction Company, Springfield, Ill.—At a meeting of stockholders on December 3 it was voted to increase the capital stock from \$25,000 to \$50,000 and to increase the number of directors from five to nine. The following officers and directors were elected: President, Edward Yates, Pittsfield, Ill.; vice-president, H. C. Simon, Virden, Ill.; secretary and treasurer, F. W. Knollenberg, Quincy, Ill.; directors, Loren Cox, W. C. Feck, Sidney Landcraft, J. F. Tellebuescher, Quincy; J. E. Hogan, Taylorville; J. A. Wible, Kansas City; and the officers. The company plans to build an electric road from Quincy, Ill., to Terre Haute, Ind., via Taylorville and Virden.

West End Street Railway, Boston.—Application has been made to the Massachusetts railroad commission for approval of an issue of \$1,010,900 additional common stock, the proceeds to be used to reimburse the Boston Elevated Railway for expenditures for improvements of the property. The commission was also asked to authorize the issue of \$750,000 of 5 per cent 15-year bonds.

Worcester (Mass.) Consolidated Street Railway.—Approval has been given by the Massachusetts railroad commission to an issue of \$200,000 of 5 per cent bonds. The proceeds will be used to retire a floating debt incurred for construction and equipment and the purchase of real estate.

ELECTRIC RAILWAY EARNINGS.

American Railways Company, Philadelphia (Subsidiary Companies).

Gross earnings—	1907.	1906.
November	\$ 231,358.84	\$ 217,228.93
July 1 to November 30.....	1,339,901.63	1,255,957.32

Dividends Declared.

Continental Passenger Railway, Philadelphia, 6 per cent.
Indianapolis (Ind.) Street Railway, 3 per cent.
Portland (Ore.) Railway Light & Power Company, preferred, quarterly, 1¼ per cent.
Twin City Rapid Transit Company, Minneapolis, preferred, quarterly, 1¼ per cent.
Union Traction Company, Philadelphia, 2½ per cent.

DIRECTORY OF ELECTRIC RAILWAY ASSOCIATIONS.

American Street and Interurban Railway Association. Secretary, Bernard V. Swenson, 29 West Thirty-ninth street, New York.

American Street and Interurban Railway Accountants' Association. Secretary, Elmer M. White, 29 West Thirty-ninth street, New York.

American Street and Interurban Railway Claim Agents' Association. Secretary, B. B. Davis, claim adjuster Columbus Railway & Light Company, Columbus, O.

American Street and Interurban Railway Engineering Association. Secretary, J. W. Corning, electrical engineer Boston Elevated Railway, Boston, Mass.

American Street and Interurban Railway Manufacturers' Association. Secretary, George Keegan, 2321 Park Row building, New York, N. Y.

California Electric Railway Association. Secretary, L. E. W. Pioda, Oak and Broderick streets, San Francisco, Cal.

Canadian Street Railway Association. Secretary, Acton Burrows, 157 Bay street, Toronto, Ont.

Central Electric Railway Association. Secretary, W. F. Milholland, secretary and treasurer Indianapolis Traction & Terminal Company, Indianapolis, Ind. Next meeting, Dayton, O., January 24, 1908.

Colorado Electric Light Power and Railway Association. Secretary, John F. Dostal, Denver Gas & Electric Company, Denver, Colo.

Electric Railway Shop Foremen's Association. Secretary, J. R. Case, Public Service Corporation of New Jersey, Newark, N. J.

Iowa Street and Interurban Railway Association. Secretary, L. D. Mathes, general manager Union Electric Company, Dubuque, Ia.

Massachusetts Street Railway Association. Secretary, Charles S. Clark, 70 Kilby street, Boston, Mass. Meetings held in Boston on second Wednesday of each month, except July and August.

Michigan Electrical Association. Secretary, A. C. Marshall, Port Huron, Mich.

National Amusement Park Association. Secretary, C. H. Oberheide, Trenton, N. J. Annual meetings, third Tuesday of each November.

New England Street Railway Club. Secretary, John J. Lane, 12 Pearl street, Boston, Mass. Meetings held on fourth Thursday of every month.

Northwestern Electrical Association. Secretary, R. N. Kimball, Kenosha, Wis. Annual meeting, Milwaukee, Wis., January, 1908.

Oklahoma Electric Light, Railway and Gas Association. Secretary, Charles W. Ford, Oklahoma City, Okla.

Southwestern Electrical and Gas Association. Secretary, E. B. Meginnis, Dallas, Tex.

Street Railway Association of the State of New York. Secretary, J. H. Pardee, 611 West One Hundred and Thirty-seventh street, New York, N. Y.

Wisconsin Electric and Interurban Railway Association. Secretary, Clement C. Smith, president Columbia Construction Company, Milwaukee, Wis.

Manufactures and Supplies

ROLLING STOCK.

Los Angeles & Redondo Railway, Redondo Beach, Cal., is building six 47-foot passenger cars in its own shops.

Bytton Brothers, World building, New York City, have placed an order with the St. Louis Car Company for twelve 30-foot double-truck cars for export to Brazil.

Havana Central Railroad, Havana, Cuba, has awarded a contract for fifty 36-foot box cars, 60,000 pounds capacity, to the McGuire-Cummings Manufacturing Company.

Philadelphia Rapid Transit Company, Philadelphia, Pa., advises that the report in the Electric Railway Review of December 7 that it was considering the purchase of a number of pay-as-you-enter cars is not correct.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., lost nine cars in the fire which partially destroyed its car houses on Farwell avenue December 6. Three cars were badly damaged and a large number scorched. The snow equipment of the Farwell avenue car houses, consisting of three sweepers, was burned, and two salt cars totally destroyed. The Milwaukee, the private car of John I. Beggs, president and general manager of the company, was among the nine cars completely destroyed.

People's Street Railway, Nanticoke, Pa., as reported in the Electric Railway Review of November 23, has placed an order with The J. G. Brill Company for one semi-convertible double-truck car. The order was placed September 19 and delivery is to be made December 15. The specifications include the following details:

Seating capacity	Width, inside
.....40 passengers	Over all
Wheel base	Height, track to trolley
Body	base
Length of body	Underframe ..
Over all	Wood and steel

Special Equipment.

Air brakes	Heating system
....Nat. Brake & Elec. Co.	.....Consolidated Car-Heating Co.
Brake rigging	Headlights
.....The J. G. Brill Co.	.....Crouse-Hinds Elec. Co.
Control system.....	Journal boxes.....
Curtain fixtures.....	.....The J. G. Brill Co.
Curtain material.....	Motors
.....Printed duck	Sanders
Interior finish	Trucks....
.....Cherry	The J. G. Brill Co.

SHOPS AND BUILDINGS.

Milwaukee (Wis.) Electric Railway & Light Company.—The Farwell avenue car houses of this company were partially destroyed by fire on December 6. The fire is thought to have started from an overheated car stove. John I. Beggs, president and general manager of the company, estimates the loss at about \$70,000.

Springfield (Ill.) Consolidated Railway.—This company's new car house, mentioned in previous issues of the Electric Railway Review, is rapidly nearing completion. The building is two stories high and will furnish trackage for 40 cars. It will cost \$27,000.

York Railways, York, Pa.—This company has awarded a contract to Jacob Seachrist & Sons for 12 ornamental stations on the Hanover-York line.

TRADE NOTES.

Electric Service Supplies Company, Philadelphia, Pa., has appointed R. G. Widdows city salesman for Philadelphia.

American Engineering Company, Indianapolis, Ind., has had a petition filed against it in the superior court at Indianapolis for the appointment of a receiver.

Western Electric Company, Chicago, Ill., has leased the quarters formerly occupied by the First National bank, Third and Walnut streets, Cincinnati, O., and will establish a branch office there.

Theodore Thomas & Co., Chicago, announce that they have made arrangements with Harold P. Brown, New York, to handle his plastic and solid copper rail bonding in the western territory.

Pittsburg Pole & Forge Company, Pittsburg, Pa., has appointed Charles N. Wood & Co., 79 Milk street, Boston, Mass.,

its New England representatives for the sale of tubular iron or steel poles for electric railways.

American Car & Foundry Company has declared the regular quarterly dividends of 1 per cent on the common stock and of 1½ per cent on the preferred stock, both payable on January 1 to stockholders of record of December 11.

Joseph T. Ryerson & Son, Chicago, have awarded the contract for the reinforced and other concrete work on the warehouse and office buildings which they will build at Sixteenth and Rockwell streets to the Rudolph S. Blome Company, Unity building, Chicago.

Westinghouse Air Brake Company, Pittsburg, Pa., at a special meeting of stockholders on December 3, voted an increase in capital stock from \$11,000,000 to \$14,000,000. The new issue is to be distributed among present stockholders in the form of a 25 per cent stock dividend.

Expanded Metal & Corrugated Bar Company, St. Louis, Mo., has just completed shipment of 1,000 tons of open-hearth steel corrugated bars for the United States reclamation service. This material is being used on irrigation works in connection with the Tieton project. This order is one of several the company has received for corrugated bars for irrigation work.

William S. Love, general sales manager of the Wheeler Condenser & Engineering Company, died at his residence in East Orange, N. J., on December 11, of pneumonia, after an illness of nine days.



William S. Love.

Mr. Love was for many years the western representative of the Wheeler Condenser & Engineering Company, and was manager of its Chicago office from 1899 until January 1, 1907, when he removed to New York to become general sales manager of the company; he had made arrangements to again resume charge of the Chicago office on January 1, 1908. Mr. Love was graduated from the Washington University, St. Louis, Mo., in 1888, with the degree of mechanical engineer, and immediately became associated with the Pond Engineering Company of St. Louis, which repre-

sented the Armington & Sims Engine Company, the Hoppes Manufacturing Company, the George F. Blake Manufacturing Company, and the Wheeler Condenser & Engineering Company, with others, and did a general business in machinery and the equipment of power houses. Later he was elected secretary of the Pond Engineering Company, and early in 1892 took charge of its Chicago office. When the company was dissolved Mr. Love continued in business as manufacturer's agent, on his own account, until 1895, when he was made manager of the Chicago office of the Abendroth & Root Manufacturing Company, although still retaining the Wheeler Condenser & Engineering Company agency. In 1899, when the Wheeler company established a Chicago office, Mr. Love was placed in charge as manager.

R. W. Marshall & Co., with general offices at 95 Liberty street, New York, announce that they have secured more commodious quarters for their factory in one of the model factory buildings erected by the Bush Terminal Company in Brooklyn, and that material shipped to them in the future should be sent addressed R. W. Marshall & Co., Factory building No. 1, Bush Terminal, Brooklyn, N. Y.

Lord Electric Company, 213 West Fortieth street, New York, announces that W. P. Cosper, well known to the railroad trade, has made arrangements to act as its agent in the Atlantic coast states and will make his headquarters at the New York office. Mr. Cosper has had a long and successful acquaintance with the industry, having been associated with the Garton-Daniels Company and later with the Electric Service Supplies Company.

Carbolineum Wood Preserving Company, New York, has secured the services of George S. Blanchard, who until recently was interested particularly in treated lumber on the Pacific coast. Mr. Blanchard will make his headquarters at New York.

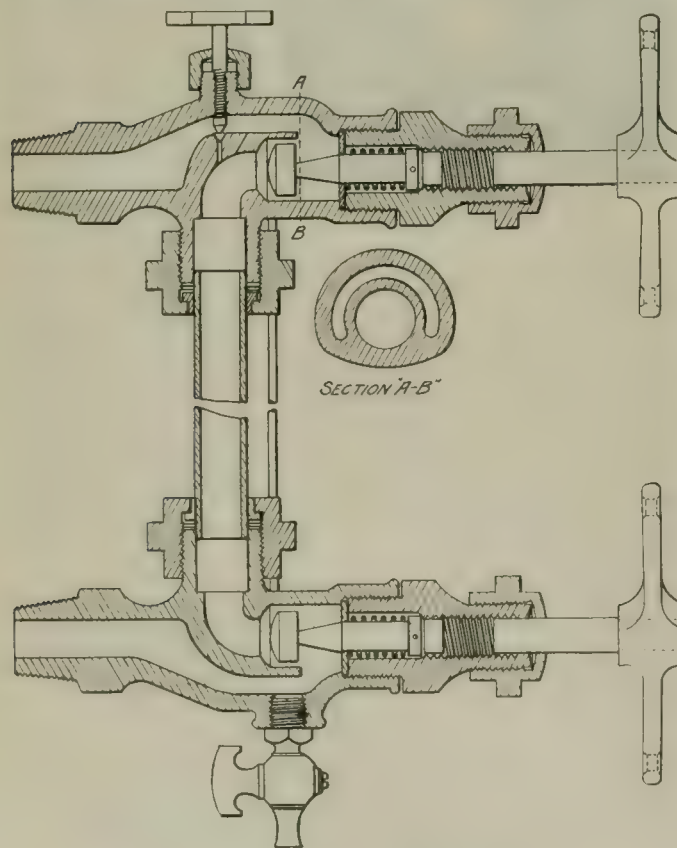
company's office in New York, but will be actively engaged as well in supervising the treating operations of the Carbolignum Timber Treating Company, which uses the natural vacuum process, with which Mr. Blanchard has had extensive experience.

Ambos-Cudmore Company, Cleveland, O., has been organized by Walter P. Ambos, manufacturers' agent, and H. H. Cudmore, formerly with the Cleveland Electrical Supply Company. The new concern will act as selling agent for the Weston Electrical Instrument Company, the Bristol Company, W. H. Bristol, Condit Electrical Manufacturing Company, Pass & Seymour, Steel City Electric Company, Machen & Mayer Electrical Manufacturing Company, Enameled Metals Company, Hartford Time Switch Company, Detroit Insulated Wire Company, and Duncan Electrical Manufacturing Company. The Ambos-Cudmore Company will have headquarters in the Citizens' building.

Independent Pneumatic Tool Company, Chicago, at the recent annual meeting of the stockholders held at Jersey City, N. J., re-elected the following directors for the ensuing year: James B. Brady and W. O. Jacquette, New York City; John P. Hopkins, John D. Hurley, James J. McCarthy, John M. Glenn; M. S. Rosenwald, Simon Florsheim, all of Chicago; and John R. Turner, Jersey City, N. J. At the annual meeting of the board of directors held at Chicago all of the present officers were re-elected for the ensuing year as follows: James B. Brady, president; W. O. Jacquette, first vice-president; John D. Hurley, second vice-president; A. B. Holmes, secretary and treasurer. The annual statement shows a gratifying increase in business over the previous year. The company has recently greatly enlarged its plant at Aurora, Ill., installing a large amount of new machinery, and now has facilities for practically doubling the output. The company states that it is in excellent financial condition, and the outlook for business during the coming year is promising.

THE GOLDEN AUTOMATIC WATER GAUGE.

Modern engineering is constantly on the alert to improve, perfect and develop to the highest condition of efficiency all useful mechanical devices, and the fact is well marked in the



The Golden Automatic Water Gauge.

department of steam engineering, especially in the application of safety appliances to high-pressure steam boilers, as high and low water alarms, feedwater regulators and automatic or self-closing water gauges. The demand for the latter is now

growing rapidly and to meet this demand and provide an appliance that will instantaneously and invariably shut off the supply of steam and water from the boiler when a glass tube is broken, and also to provide a means for gradually raising the temperature of a newly inserted glass to that of the steam, the Golden tempering and automatic water gauge was designed and patented.

The upper fitting consists of a straight unrestricted chamber leading from the boiler into another chamber containing an automatic plunger having its disc recessed in the back to enable the steam to impinge thereon more effectually when the glass breaks and thus insure immediate closing. This plunger is held open by means of a spring placed back of the brass bearing washer, which further acts as a gasket between the body and center piece carrying the quickly closing or positive shut-off valve stem. The steam-tight joint made by this method obviates corrosion of the thread by preventing the steam from touching it, thus permitting ready removal of center piece and automatic plungers for the purpose of cleaning. The pin valve shown on the top of the upper fitting provides a by-pass in the wall between the main chamber and the chamber directly leading to the water glass. This affords a means for gradually heating a newly inserted glass and gradually increasing the pressure therein and further for restoring the automatic valve to its normal or open position after the pressure on the glass has reached that of the boiler. The lower fitting differs from the upper one only in having a blow-off connection for the purpose of cleaning and draining and in that no pin valve is provided, as the one in the upper fitting is sufficient.

One feature of this gauge that highly recommends it is the location of the automatic valve where it can be kept in operative condition by the frequent daily shutting of the positive cut-offs by means of chains attached to the levers. Some other advantages claimed for this gauge are that it has unrestricted areas, few internal moving parts, few devious passageways, provision for heating the glass tube gradually, provision for increasing the boiler pressure on the glass tube gradually, and bevel valve seats.

This gauge is sold by the Golden-Anderson Valve Specialty Company, Fulton building, Pittsburg, Pa.

ADVERTISING LITERATURE.

Ohio Brass Company, Mansfield, O.—The monthly bulletin for December contains much readable matter.

Joseph Dixon Crucible Company, Jersey City, N. J.—The December number of Graphite contains 10 pages devoted to reminiscences of the Atlantic City convention, as well as other interesting matter.

Golden-Anderson Valve Specialty Company, Pittsburg, Pa.—A 60-page catalogue is required to show this company's complete line of steam and water specialties. It is well arranged and fully illustrated.

Spencer Otis Company, Chicago, Ill.—A handsome and finely illustrated catalogue is devoted to Economy rolled steel tie plates, of which there are eight different types. Much valuable information on the punching and application of tie-plates is included.

John B. Watson, 517 Drexel Building, Philadelphia, Pa.—A folder calling special attention to a number of electric cars and locomotives of different types which are offered for sale, subject to prompt delivery. Each type of car and locomotive is illustrated and briefly described.

Allis-Chalmers Company, Milwaukee, Wis.—Bulletin No. 1608 describes single-phase motor-driven centrifugal pumps. A friction clutch designed for the heaviest work, with particular regard for simplicity, durability and ease of adjustment, is described in Bulletin No. 4001, entitled "The Reliance Friction Clutch."—Bulletin No. 1203, entitled "Allis-Chalmers Roller Mills," contains valuable data regarding bearings.

Ohio Brass Company, Mansfield, O.—Among the great variety of porcelain insulators, for all voltages, manufactured by this company, is a complete line for low-tension work. These include telephone, electric light and railway feeder insulators, all of which are adequately described and illustrated in the new insulator catalogue No. 1.

General Electric Company, Schenectady, N. Y.—Recent publications include Bulletin No. 4552, which describes and illustrates the construction of direct-current indicating instruments, type D, designed for switchboard use. It gives dimension diagrams of instruments and shunts, full-sized views of the scales, and data regarding catalogue numbers, capacities, prices, etc.—Bulletin No. 4549 is devoted to the Thomson high-torque induction test meter. It contains a description of the method of operation and diagram showing method of making the test.

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.
Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free:
United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 25

CHICAGO, DECEMBER 21, 1907

WHOLE No. 243

TABLE OF CONTENTS.

Editorial:

—Municipal Projects in Great Britain.....	943
—Advantages Offered by Low Frequency.....	943
—Carmen and Spot Cash Cars.....	943
—Single-Phase Simplicity.....	944
—The Accounting Conference at Washington.....	944
—The Illinois Traction System.....	945
Windsor Essex & Lake Shore Rapid Railway (Illustrated).....	946
Book Table.....	953
Conference on Uniform Electric Railway Accounting System in Washington.....	954
Tentative Classification of Operating Expenses of Electric Railways.....	956
Tentative Classification of Expenditures for Road and Equip- ment of Electric Railways.....	958
The Nashville Interurban Railroad.....	958
Electric Locomotive for Portland Railway Light & Power Com- pany (Illustrated).....	959
The Development of Electric Transportation Service and Its Effect on St. Louis. By B. R. Stephens.....	960
A Vertical-Shaft Rotary Converter (Illustrated).....	962

Piping and Power Station Systems—LXVII. By W. L. Morris, M. E. (Illustrated).....	963
Election of Officers, Manufacturers' Association (Illustrated).....	964
News of the Week:	
—American Railway Association.....	965
—Transportation Affairs in New York.....	965
—Cleveland Settlement Negotiations.....	965
Construction News:	
—Franchises.....	966
—Recent Incorporations.....	966
—Track and Roadway.....	966
—Power Houses and Substations.....	968
Personal Mention.....	969
Consumption of Ties in 1906.....	969
Financial News.....	970
Manufactures and Supplies:	
—Rolling Stock.....	971
—Shops and Buildings.....	971
—Trade Notes.....	971
—Advertising Literature.....	971
Jefferson Unions (Illustrated).....	972

There promises to be considerable activity in the building of municipal electric lines in Great Britain in the near future.

Municipal Projects in Great Britain.

Among the corporations which have given notice of bills to be introduced in the forthcoming session of parliament asking for powers to construct new lines are those of Ayr, Birkenhead, Blackburn, Burnley, Bolton, Doncaster, Hull, Leeds, Leith, Liverpool, Morecombe and Rochdale. The London county council does not contemplate any new lines of great length, although it asks for powers to build 12 short links, the longest of which is only a little over a mile. The London United Tramways Company is planning four new lines in extension of its plan of pushing out into the suburban districts of Middlesex and Surrey. In addition to these a somewhat novel municipal enterprise is projected by the Stockport corporation, which proposes to build an electric "tramroad" of standard gauge to a connection with the Great Central & Midland Joint Railway, the bill providing for the operation of the road with wagons and carriages "adapted to the railway service." A similar (though not municipal) connection of an extension of an electric line with one of the large steam roads is projected in a bill introduced by the Pontypridd Waterworks Company for a "tramroad" to connect with the Great Western, with which company agreements are to be made "with reference to the construction, working and maintenance" of the road.

During the present year there has been considerable discussion of the frequency at which single-phase motors for railway

Advantages Offered by Low Frequency.

service should be operated. To those especially interested in the engineering features preliminary to the electrification of steam railways it has seemed wise at this early stage to determine some standard frequency. The desirability of thus adopting a standard frequency that could be used on various interconnecting projects and afford complete interchangeability of electromotive power apparatus with no variation in efficiency is well recognized. There is, however, a disagreement among prominent engineers

as to whether the recommended frequency should be 15 or 25 cycles. It is of interest, therefore, to note some reasons why a low frequency should not be underestimated. While the low frequency requires in a single-phase car equipment a heavier transformer and control apparatus the chief requisites in electrical equipment for rolling stock are a light and efficient motor, high power factor, a small diameter and a generous air gap. These requirements necessitate a small commutator, without sacrificing good commutating qualities. Such desirable qualities can best be obtained by the use of the higher commutator voltages made practicable by the lower frequency. The low frequency will also permit a smaller diameter for the revolving parts and a satisfactory power factor can be obtained with an air gap so reasonably wide as not to require too careful inspection during service.

The platform man's opinion of the introduction of pay-as-you-enter cars is clearly reflected by The Union Leader, the official

Carmen and Spot Cash Cars.

journal of the carmen of Chicago. An editorial in the issue of December 7 commends the new Chicago City Railway cars to the good graces of organized carmen. Some of the opinions expressed throw new lights and a few shadows on the excellent record that the new cars are making in Chicago: "Little fault, apparently, has been found by either patron or employe. From the employes' side of it only one objection that may seem at all formidable has been raised so far, and that from the fact that the conductor may suffer from cold through constant standing on the rear platform. This objection, however, has not presented itself seriously as yet. No serious objection has presented itself from the employes' viewpoint. The closing of the front vestibule in itself is a boon to Chicago motormen. In addition to this, the platform heater and protecting bar surrounding the motorman are two benefits that none can appreciate so well as the man who has experienced the troubles of operating a car under the old conditions. No doubt the pay-as-you-enter system has features that appeal strongly to an operating management. It is but natural and businesslike to believe this.

Increase of receipts through decrease of accidents and insurance of fare collection is a strong point with any management. But, on the other hand, the terrors of winter have vanished for the motorman, and the fear of chance bells has been dispelled from the conductor. And for this, at least, let us be thankful."

SINGLE-PHASE SIMPLICITY.

We describe and illustrate in this issue an interurban road which, on account of its method of current distribution, is of particular interest to electric railway engineers. The cars of the Windsor Essex & Lake Shore Rapid Railway, to which we refer, are operated by single-phase current. A type of 3-wire generator is used which permits of two pressures for direct feeding without the use of step-up transformers. Current is distributed to the cars at 6,600 volts pressure. The trolley wire is fed at one end from the power house and at a point 18 miles distant from the power house, where an auto-transformer station receives current at 13,200 volts, being fed by a transmission line from the same generators that feed the trolley wire at the power house.

Simplicity is the keynote all through the distribution system of this road. The installation is thoroughly built, but owing to the double-voltage delivery of the generators the wiring circuits are far less complicated than are usually found. In the power house are two 500-kilowatt 25-cycle single-phase flywheel type generators, driven by cross-compound condensing engines. Each generator has three armature terminals, from which are obtained single-phase alternating current at 13,200 volts pressure and at 6,600 volts pressure. One of the terminals is grounded, one delivers current at 6,600 volts and the third at 13,200 volts pressure. This 3-wire armature winding is especially flexible for railway work, not only because from it can be directly fed both transmission lines and working conductors, but because by a slight change in the terminal connections the entire output can be delivered at 6,600 volts. Each of the two generators in the power station feeds two busbars carrying current at the two voltages. Each bus comprises but a single wire, requiring only the simplest circuits essential for single-phase delivery. There are no step-up transformers in the power station, yet the advantages of two voltages are realized by feeding a 13,200 volt transmission line and a 6,600-volt trolley direct from one generator. The transmission line comprises a single No. 0 wire, carried at the tops of the trolley poles transmitting current from the 13,200-volt busbar in the generating station to a step-down station at about the midpoint of the road, the power station being located at one end, where water and coal facilities are available.

To one accustomed to the usual 3-phase transmission system the simplicity of the single-wire transmission line is striking. This wire feeds a 300-kilowatt capacity auto-transformer inclosed in a fireproof structure adjacent to the track. One end of the transformer is grounded to the track rails, thus completing a single-phase circuit from one terminal of the generator, over the transmission line, through the auto-transformer and back by way of the rail return to the grounded terminal of the generator. From the midpoint of the transformer current is taken off at 6,600 volts potential to feed the end of the trolley wire most distant from the power station.

The control circuits of the motor equipments under the rolling stock equal in simplicity the circuits in the power house and transmission line. Each car is equipped with two 100-horsepower motors mounted on separate trucks. The cars are double-ended. On each platform is a controller comprising two drums geared together and wired to vary the voltage across the motors by properly changing the tapping point on the coils of an auto-transformer carried under the car body. The ratio of this transformer is such that the highest voltage that can be impressed across the terminals of a motor is 240.

In our issue of November 30 we called particular atten-

tion to an interurban road which operates its cars by direct current at 1,200 volts potential between the trolley and the track. The installation here described, the cars of which operate at 6,600 volts potential, includes so few complicated electrical features that on the score of simplicity it may be considered a worthy rival of the direct-feeding high-voltage direct-current trolley system.

THE ACCOUNTING CONFERENCE AT WASHINGTON.

The conference at Washington during the present week did not result in the adoption of a uniform accounting system for electric railways. The practical outcome of the meetings is summed up in the decision to formulate a system which shall be amplified sufficiently to meet the requirements of large roads and can be abbreviated into the reduced number of primary accounts which would be needed by roads of small mileage and earnings. In another part of this issue there are published an account of the proceedings at Washington and the main features of the report of the committee representing the American Street and Interurban Railway Association, the American Street and Interurban Railway Accountants' Association, the Street Railway Association of the State of New York, the New York public service commission (second district), the National Association of Railway Commissioners and the interstate commerce commission.

No difficulty was experienced by the committee in agreement upon a tentative classification of construction expenditures. This classification comprises 61 primary accounts, divided into three general accounts, covering (I) road, (II) equipment, (III) general expenditures. Under "road" there are 35 primary accounts under the headings "right of way," "roadway," "electric line," "buildings and fixtures" and "permanent equipment." The headings under "equipment" cover the revenue and service equipment and the electric equipment of each. The last recommended classification of construction accounts of the American Street and Interurban Railway Accountants' Association contains 15 primary accounts, numbered A to O, inclusive. The new tentative classification is more amplified than the old in every respect. For "equipment," for instance, there are 19 primary accounts in the tentative classification, while three sufficed in the old.

The tentative classification of operating expenses recommended by the members of the committee representing electric railways follows substantially the classification approved by the Accountants' association at its meeting in Atlantic City in October last. The classification which is recommended provided that agreement with the steam railway accounts is necessary is on entirely different lines from any that has heretofore been publicly suggested. It contains substantially the five general accounts which have been recommended in the recent classifications compiled, including provision for traffic expenses as a separate general account and for the established accounts covering maintenance, transportation and general expenses. With this classification, numbering 116 primary accounts, small roads would be justified in finding fault; a tentative classification for small roads, however, contains, as suggested, but 21 primary accounts.

The most striking differences between the two classifications of operating expenses are in the depreciation accounts. The classification which is recommended provided there must be close agreement with the steam railway classification goes much farther in its recognition of depreciation as an operating expense than the system prescribed by the interstate commerce commission for steam railways. The interstate commerce commission requires steam railways to make provision in the fiscal year beginning July 1, 1907, for depreciation of the different classes of equipment only, and it is making a special study of depreciation of way and structures, with the probable intention of prescribing additional depreciation ac-

counts in the next fiscal year; but the classification for electric railways as published by the special committee for consideration if agreement with steam railway accounts is necessary provides for depreciation estimates under maintenance of way and equipment, covering roadway, electric line, buildings and structures, service equipment and revenue equipment. The extent to which this classification has gone in its recommendation of depreciation for maintenance of way and structures may be seen by a study of the items under this general account. Excepting the account for the "depreciation estimate roadway" and that for "other maintenance of way expenses" there are 14 primary accounts under maintenance of way. Of these 14 accounts all but two, "ballast" and "roadway and track (labor and expenses)" are included as subaccounts under one primary account, "depreciation estimate roadway." Under the primary account, "depreciation estimate electric line," six subaccounts are given; under "depreciation estimate buildings and structures," six subaccounts; "depreciation estimate service equipment" contains four subaccounts; "depreciation estimate revenue equipment" has seven subaccounts; and three subaccounts are provided under "depreciation estimate maintenance of shop and power apparatus."

The expectation is that, while the committee on "Depreciation" is making a special study of that subject, the members of the three other committees, whose names are published elsewhere in this issue, will formulate new classifications. The new system will, it is expected, be promulgated by the interstate commerce commission by June 1, 1908, becoming effective for the fiscal year beginning July 1, 1908, for electric railways within its jurisdiction.

THE ILLINOIS TRACTION SYSTEM.

The remarkable development of the Illinois Traction System, as outlined in the paper presented elsewhere in this issue by B. R. Stephens, traffic manager, is especially interesting. First, for the reason that, although the inception and growth of this great system is typical of that of most of the large electric railway systems of the country, there is no other instance in which the development of a united system has been so rapid or so extensive. Second, because it is one of the best possible illustrations of the great demand for increased transportation facilities, at a low rate of cost, to the smaller cities and towns, which has come about within the last few years. This demand, which it is the especial function of the electric railway to satisfy, is caused by the present inadequacy of the service furnished by the steam railroads, at least so far as the smaller communities are concerned.

In spite of the fact that the United States, with its 307,000 miles of railway track, has had the most extensive transportation development in the world, it has become generally recognized during the past few years that its service is at present quite insufficient for the requirements of such a restless, progressive people as the American nation. As Mr. Stephens says, the freight service of American railroads, generally speaking, is hardly more adequate to handle the business offered than it was 20 years ago. This is in accordance with the statement made by so high an authority as J. J. Hill of the Great Northern Railway last winter, that 100,000 miles of new railway track are needed to carry on the commerce of the country.

The same truth applies, in less degree, perhaps, to the passenger service. While no one can deny that the improvements made in the passenger service are nothing short of marvelous, and that in point of speed and comfort our best trains can hardly be surpassed, yet the fact remains that the service given small towns and rural localities while the steam roads had a monopoly was entirely insufficient. As the energies of the steam railroad freight official are necessarily concentrated on increasing his train tonnage, so as to handle the

largest amount of business with as few movements as possible, so the efforts of the passenger official are as necessarily directed to securing the through business. In order to make possible the use of the expensive and luxurious equipment and the attainment of the high speed demanded by the traveling public of the present day the service must be so arranged that the trains will be kept full most of the time and the less important stops must be eliminated. Consequently the smaller communities have been neglected.

The reasons why the electric railway is enabled to handle this less important traffic and still make a profit by the use of smaller units, have been often rehearsed, but concrete facts showing how this business has developed on what is now the longest interurban railway system under one management in the country are of great interest.

The Illinois Traction System had its beginning in 1901 with a short, cheaply constructed line, laid with 40-pound rails, from Danville to Westville, Ill., an extension of the Danville street railway over a distance now traversed by the company's cars in 27 minutes. The operation of this line immediately proved so successful that it was outgrown almost as soon as it was completed.

President W. B. McKinley foresaw the opportunities for the future indicated by the success of this line and the subsequent extensions were rapid. How the lines were extended to Champaign, Decatur, Bloomington, Peoria, Springfield and to East St. Louis is related at length in Mr. Stephen's paper.

In building the various extensions the McKinley syndicate has pursued the policy throughout of laying as much track as possible while the lines were in demand and the attitude of the public toward the pioneer could be relied upon to furnish the right of way and franchises, using the most economical standards of construction where necessary to get the lines in operation at once and making the more permanent improvements later.

This growth in seven years from a small city street car line to the largest interurban system in the country, with a trackage of 482 miles, serving 85 cities and towns, and with gross earnings (December 31, 1906) of \$3,013,107, operating through a territory traversed by several important trunk line railroads, is the best possible index of the efficiency of the interurban railway as compared with the steam railway. Not only has this road taken away much of the local passenger business of its steam competitors, by furnishing a more frequent service at lower rates, but it is giving them sharp competition in the handling of express and carload freight, and has this year begun the operation of sleeping and refrigerator cars.

The company is now expending \$2,500,000 on a bridge across the Mississippi river at St. Louis, in order to secure an entrance to the city, and is expending nearly \$1,000,000 for terminal facilities, both freight and passenger, within the city. Plans have been formulated and the preliminary work is now being done for a connection with a line running into Chicago. The next two years will thus furnish an opportunity for observing the efficiency of the interurban road for long-distance travel in competition with steam roads and the results will be awaited with interest.

We realize that in steam locomotive practice the term drawbar pull is much more freely used than the term horsepower. Nevertheless, we believe that the latter is a better criterion for the actual capacity of a locomotive, because it takes into consideration not only drawbar pull, but also the speed at which said drawbar pull can be exerted; in other words the real hourly ton mileage capacity of the locomotive. —Electric Trunk Line Age.

The Southwestern Traction Company, London, Ont., is said to be planning the construction of a summer hotel and sanitarium at New Orchard Beach, Port Stanley, Ont.

WINDSOR ESSEX & LAKE SHORE RAPID RAILWAY.

The first single-phase electric railway to be built and operated in Canada was the Windsor Essex & Lake Shore Rapid Railway, which ran its first car in September of this year. This road is of particular interest to electric railway engineers and operators on account of the use of 3-wire single-phase generators for supplying current to both a 6,600-volt trolley circuit and a 1-wire 13,200-volt transmission line. The extreme simplicity of this method of current distribution for an electric railway will be recognized on reading the detailed description included in this article.

The northern terminus of the road is Windsor, Ont., across the river from Detroit. In Windsor a terminal station and

however, but a very limited passenger service is offered. From Essex to Kingsville, which is located on the north shore of Lake Erie, there is no steam railroad competition. The route of the new line between Kingsville and Leamington parallels the north shore of Lake Erie.

The roadbed is built on the public highways in the towns



Windsor Essex & Lake Shore Rapid Railway—Catenary Trolley Construction at Curve in City Street.

office building close to the Detroit river ferry slips has been procured, so that close connection may easily be made by passengers transferring between the electric cars and the ferries to and from Detroit, which cross the river in less than 10 minutes' time. Through the city of Windsor the electric road has a street franchise permitting it to operate its cars with the overhead trolley carrying current at 6,600 volts pressure. From Windsor the line takes a southeasterly direction, serving the following named towns, distant from Windsor the stated mileages: Pelton, 8; Maidstone, 12; Essex, 16; North Ridge, 20; Cottan, 21; Kingsville, 28. An extension is now under construction to Leamington, eight miles east of Kingsville. An extension from Leamington still farther east to Wheatley is proposed.

Between Windsor and Essex the electric road parallels a branch line of the Michigan Central Railroad, over which,



Windsor Essex & Lake Shore Rapid Railway—Typical Trolley Suspension Bracket for Long-Radius Curve.

and either at the side of a highway or on a private right of way parallel with it for the intervening distances. The track is laid with 80-pound T-rails with continuous joints, and is



Windsor Essex & Lake Shore Rapid Railway—Section-Break Insulator as Installed in Trolley Circuit.

well ballasted with broken stone and gravel. The rail joints are electrically connected with No. 000 bonds soldered to the ball of the rail outside of towns and to the web under the fishplates in streets. Cross bonds are installed five to the mile. The bonds were supplied by the Lord Electric Company. At Essex, where the main line of the Michigan Central

Railroad is intersected, a complete interlocking system is being installed.

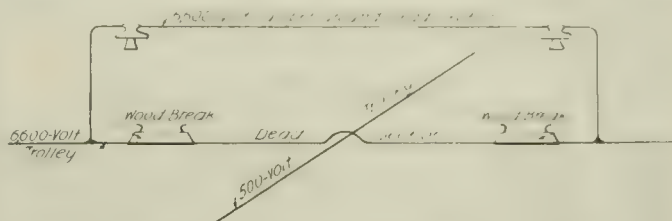
Overhead Construction.

An especially permanent type of overhead construction has been installed throughout the entire route between the power station at Kingsville and the ferry terminal in Windsor. It is interesting to note that 6,600 volts pressure is carried on the trolley in towns. The overhead construction was therefore designed and built with especial care.

The working conductor is a No. 000 grooved copper wire. It is supported by hangers spaced 10 feet apart along a $\frac{7}{16}$ -inch steel strand single cable forming the messenger. Outside of towns the messenger is hung from rod-supported angle iron brackets and within towns the catenary cable is supported by spans of $\frac{5}{16}$ -inch stranded steel cable with wood and porcelain insulators. The overhead fittings were supplied by the Westinghouse company. Illustrations are presented showing details of the trolley supports on straight line and curve construction. The line is head guyed at intervals of 1,100 feet.

At Windsor a 500-volt trolley line of the Detroit United Railway system is intersected and an interesting piece of overhead construction was required to prevent any possibility of the electrical crossing of the two overhead conductors, one at 6,600 volts and the other at 500 volts. A sketch is reproduced showing the details of the wiring at this crossing. As

for a safe distance on either side of the intersecting 500-volt trolley, which is crossed with an ordinary 90-degree trolley pan insulated for 500 volts. The length of the dead section in the 6,600-volt trolley is sufficient to assure that should a trolley pole leave the 500-volt wire it will not be able to swing far enough to make a connection with the high-pressure trolley. The dead section in the 6,600-volt trolley also requires that the single-phase cars drift across this intersection. The continuity of the 6,600-volt circuit on either side



Windsor Essex & Lake Shore Rapid Railway—Arrangement of Circuits at Intersection of 6,600 and 500 Volt Trolley Wires.

of the dead section is made complete by a jumper carried on high-tension line insulators and protected by grounded guard wires.

Thirty-foot wooden poles are used for all construction except that in the streets of Windsor. These poles are set



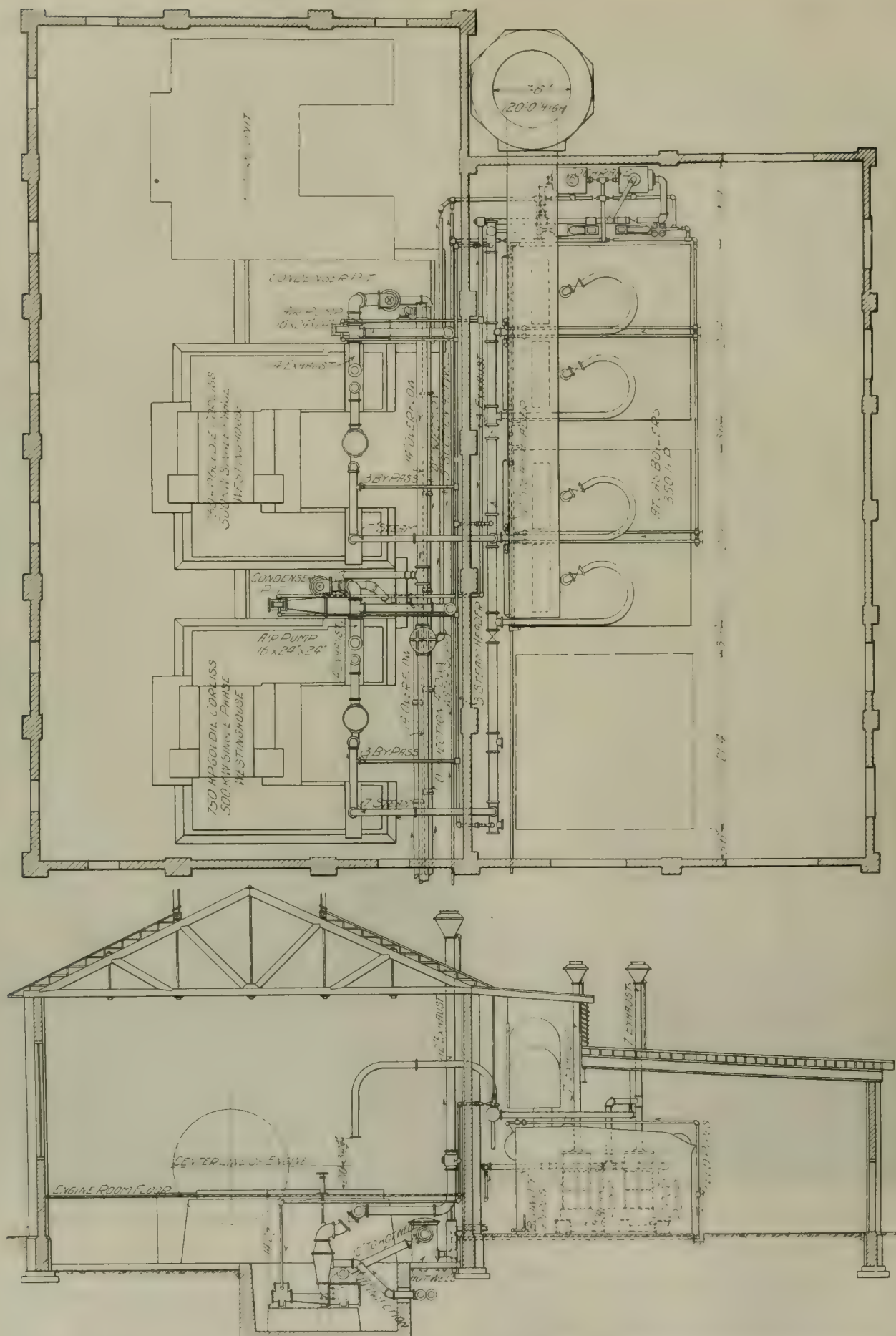
Windsor Essex & Lake Shore Rapid Railway—General View of Kingsville Power Station and Repair Shops.

the 500-volt line was in operation before the 6,600-volt trolley was built, it became necessary for the builders of the new line to take the necessary precautions to prevent trouble. A complete separation of the circuits was made by installing about 25 feet on either side of the 500-volt line intersected a long wood break trolley insulator placed in the 6,600-volt trolley.

This provides a dead section of catenary supported trolley

in earth and are reinforced near the surface of the ground with a 4-foot by 2 by 12 inch breast block.

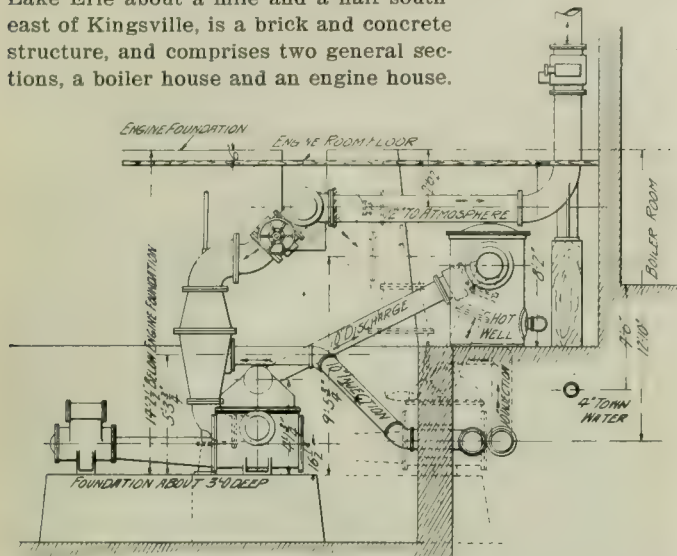
Where span construction is used in the streets of Windsor the span wires are supported by concrete poles supplied by the Concrete Pole Company, St. Catharines, Ont. These poles are of two sizes, designed for 1,000 and 3,000 pounds strain. Both types of poles are rectangular in section. The smaller



Windsor Essex & Lake Shore Rapid Railway—Foundation Plan and Sectional Elevation of Power Station, Showing General Arrangement of Piping and Boilers.

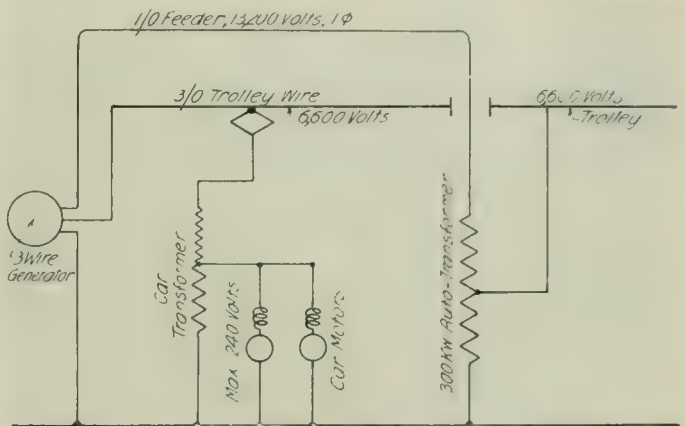
pole is 10 inches square at the butt and 6 inches square at the top, reinforced with four $\frac{3}{8}$ -inch round steel rods placed within the four corners. The 3,000-pound pole is 16 inches square at the butt, 10 inches square at the top and is similarly reinforced with four 1-inch round steel rods.

The power station building, located on a bluff overlooking Lake Erie about a mile and a half south-east of Kingsville, is a brick and concrete structure, and comprises two general sections, a boiler house and an engine house.

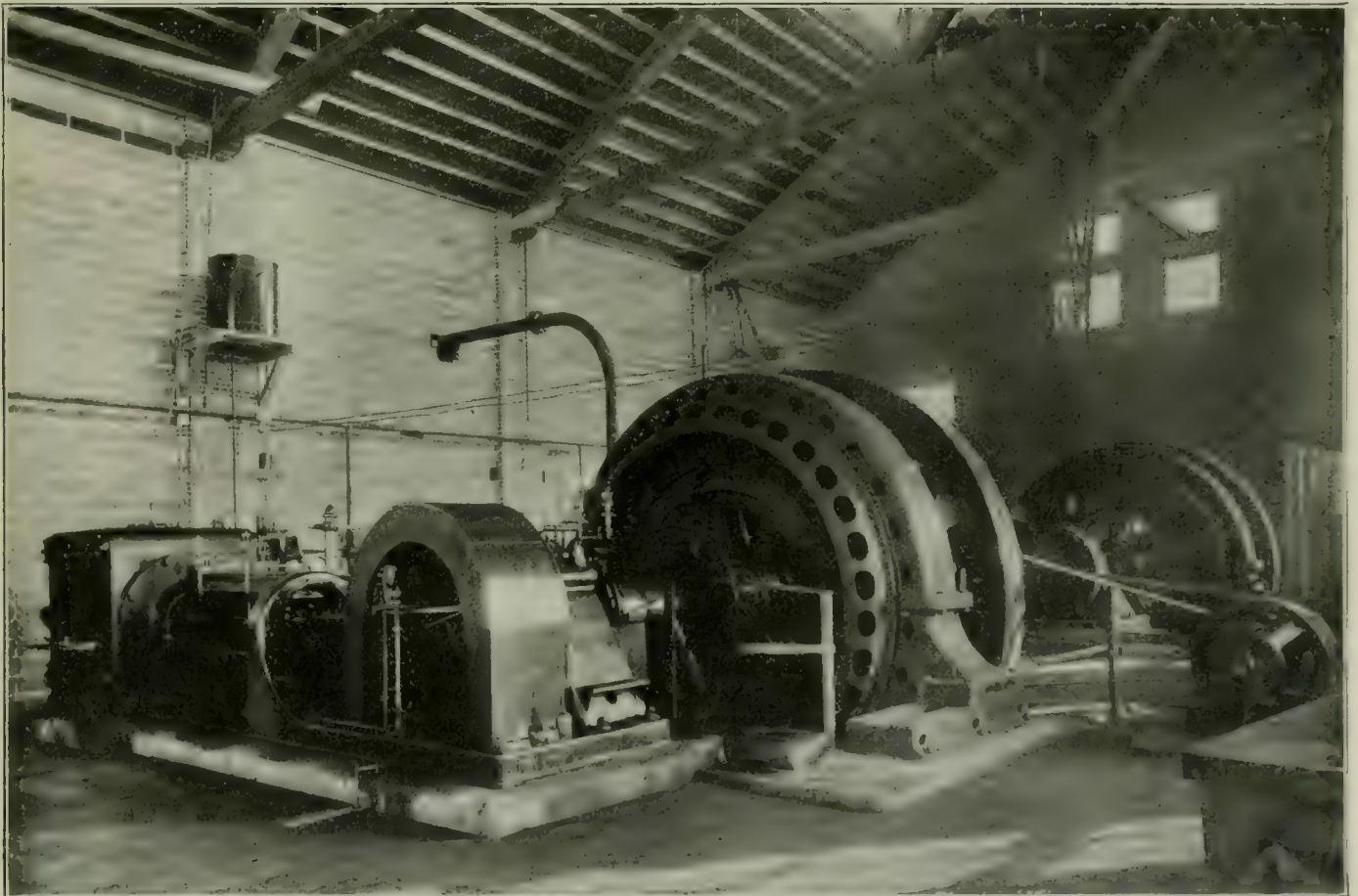


Windsor Essex & Lake Shore Rapid Railway—Details of Condenser Piping in Power Station.

Coal is brought to the boiler house over a steam railroad siding and as yet is unloaded by hand. The boiler equipment comprises four 350-horsepower Atlas boilers, installed in batteries of two boilers each, and hand fired with coal. The building is large enough to accommodate two more boilers. The installation has been so arranged that at a later date natural gas, which soon will be available, may be used for firing. The exhaust gases from the boilers pass to a stack 7 feet 6 inches inside diameter, 5 by 9 foot flue opening and 120 feet high. This stack was built by the Alphons Custodis Chimney Construction Company. The boilers are provided



Windsor Essex & Lake Shore Rapid Railway—Diagram Showing Principal Transmission and Car Circuits.



Windsor Essex & Lake Shore Rapid Railway—Interior of Power Station During Erection, Showing Engines and 500-Kilowatt Single-Phase 3-Wire 13,200-6,600-Volt Generators.

The boiler house has ground dimensions of 88 by 49 feet and the engine house 106 by 54 feet. These two sections have one wall in common. The building has a timber truss roof covered with gravel composition over the boiler house and metallic shingles over the engine room.

with "Cyclone" shaking and dumping grates, supplied by the Canadian Steam Boiler Equipment Company, Limited, Toronto. The boiler auxiliaries include two Cochrane feedwater heaters of 1,500-horsepower capacity.

Steam at 125 pounds pressure is distributed through a

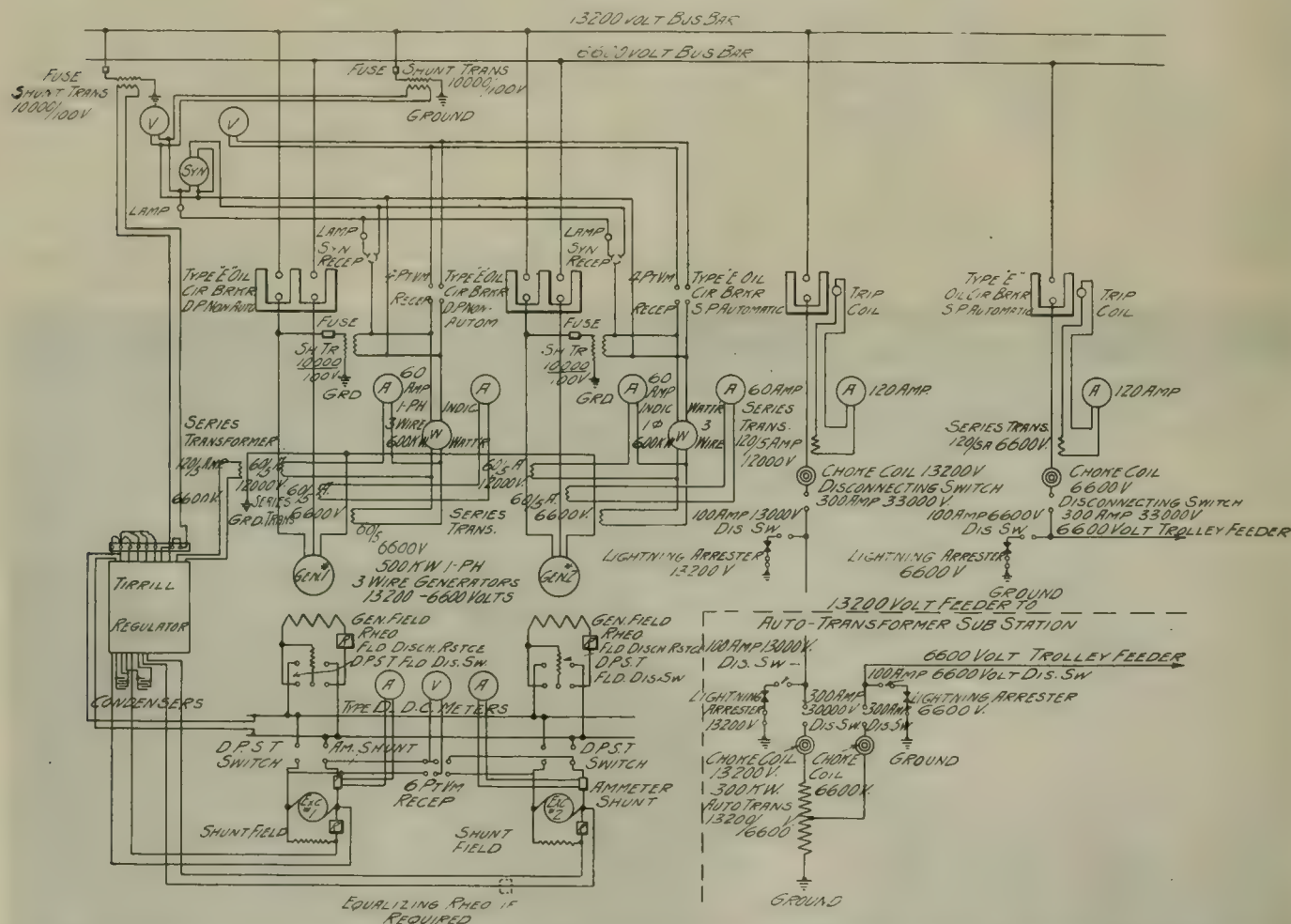
single 12-inch header extending the length of the boiler house and parallel with the fire wall. The engine connections pass through the fire wall to the two main units. Each main unit comprises a Goldie cross-compound Corliss engine, built by the Goldie & McCulloch Company, Gault, Can., driving a Westinghouse generator. The engines have cylinders 20 by 40 by 36 inches and are rated at 750-horsepower capacity. The valve mechanism is a recently designed type of Corliss gear with steam actuated dashpots and two eccentric motions. Each engine unit is lubricated by a Richardson's automatic oiler and a White Star continuous oiling system supplied by the Pittsburg Gauge Valve & Supply Company. The flywheels weigh 14 tons and the engine is provided with a belt-driven governor. The engine room is of sufficient size to accommodate a third unit.

Each of the two engines has a jet condenser equipment and pumps supplied by the Canada Foundry Company. These condensers are located in concrete pits below the basement

three terminals of each machine is grounded. The exciting current for each generator is furnished by a 30-kilowatt 125-volt belted generator, the field current of which is varied by a Tirrill regulator to obtain a smooth voltage regulation for the large units.

A wiring diagram is presented showing the principal electrical connections of the two generators and auxiliaries in the Kingsville power station, together with the connections of the 13,200-volt feeder and the single auto-transformer substation which feeds a distant part of the 6,600-volt trolley line. It will be noted that the two 3-wire generators feed each of two buses, one carrying current at 13,200 volts potential and the other at 6,600 volts potential. The bus of the lower potential feeds direct to the trolley wire, while the one of higher potential feeds a single-wire transmission line serving an auto-transformer substation located at Maidstone, 18 miles from the power station.

The switchboard for regulating and controlling the output



Windsor Essex & Lake Shore Rapid Railway—Power Station Wiring Diagram, Showing Main Connections for Two 3-Wire Single-Phase Generators, Transmission Line and Auto-Transformer Substation.

floor and close to the heavy concrete foundations of the engines. The condenser pumps draw their water from Lake Erie.

Electric Generators.

Each of the engines just described has mounted on its shaft the field of a 500-kilowatt 25-cycle single-phase 3-wire flywheel type generator, built by the Canadian Westinghouse Company, Limited. The windings of these generators are such that from the terminals may be obtained current at 13,200 volts pressure and at 6,600 volts pressure. The two windings may be used in series for obtaining these two voltages or may be connected in parallel for obtaining the full capacity of the machine at 6,600 volts. One of the

of the Kingsville generating station comprises five panels: one exciter, two machine, one 6,600-volt feeder and one 13,200-volt feeder. The auxiliary switchboard equipment includes a synchroscope. The switchboard is an angle iron and gray marble structure standing on a foundation of concrete, comprising three reinforced posts. Inclosed in concrete cells back of the switchboard are two machine and three feeder switches. These are distant-controlled oil-break type E switches. The high-tension wiring within the station is comprised of lead covered cable inclosed in fiber conduit. Messrs. Gordon & Helliwell, Toronto, were the architects of the Kingsville power station. The Canada Foundry Company supplied and installed the mechanical installation and the Cana-

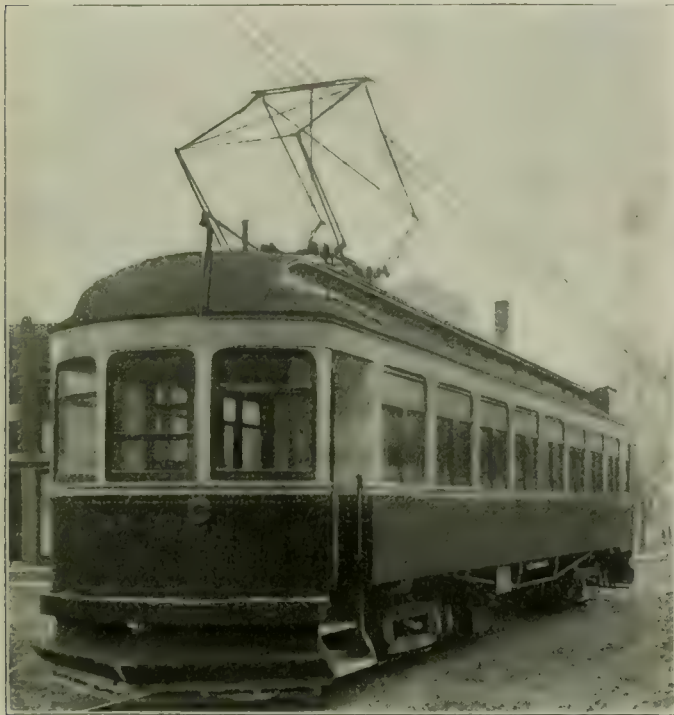
dian Westinghouse Company, Limited, supplied and installed the electrical equipment.

Transmission Line.

The method of feeding the 6,600-volt trolley is of particular interest, inasmuch as there is used an auto-transformer

by a transmission line carried at the tops of the poles along the right of way. This transmission line comprises a single No. 0 wire of hard-drawn copper supported on 3-piece 40,000-volt insulators supplied by the Lima Insulator Company. The working pressure of the line is 13,200 volts. This single high-tension wire feeds a 300-kilowatt auto-transformer, which, in turn, feeds the Windsor section of the trolley wire supplying current at 6,600 volts pressure to the part of the line most distant from the power house.

An accompanying sketch shows diagrammatically how simple is the transmission and feeding system of this single-



Windsor Essex & Lake Shore Rapid Railway—Front End of Passenger Equipment with Pantograph Raised, Showing Pilot for Removing Snow.



Windsor Essex & Lake Shore Rapid Railway—Interior of 3-Compartment Passenger Car, Showing Revolving Chairs in Smoker.

substation requiring only a single wire for the transmission line. The trolley wire between Windsor and the Kingsville power station is divided into two sections. An 18-mile sec-

phase railway. The auto-transformer at Maidstone is installed in a concrete building 12 by 12 by 14 feet in dimensions. The circuit-breaker and switch for handling the current fed



Windsor Essex & Lake Shore Rapid Railway—Standard 3-Compartment Passenger Equipment.

tion from the power house to Maidstone is fed direct from the 6,600-volt bus of the 3-wire generators in the power station. The section between Maidstone and Windsor, about 12 miles, is independent of the power house section and is fed

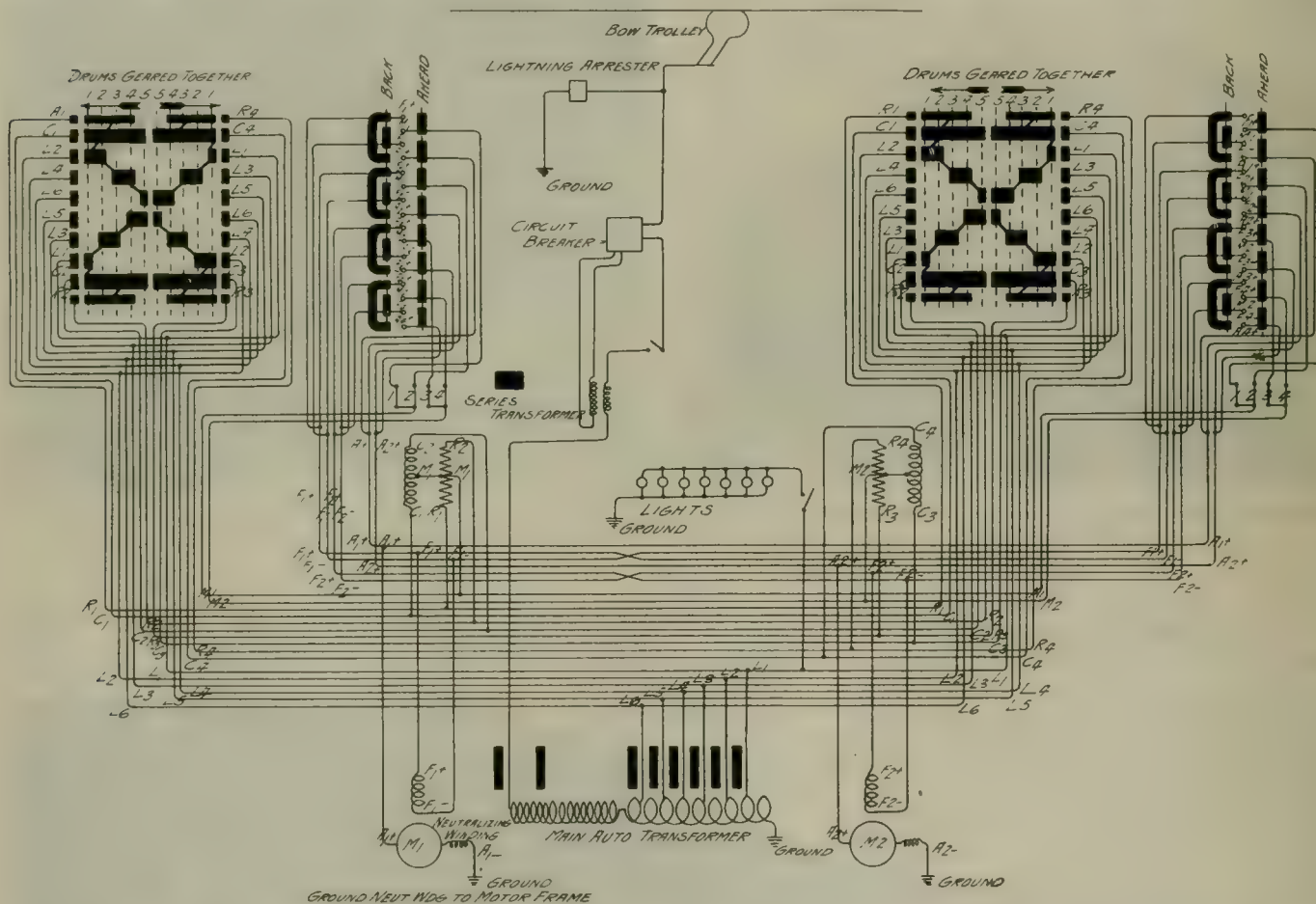
through this transformer are located at the origin of the transmission line in the power station. Lightning protection and hand operated disconnecting switches complete the auto-transformer substation equipment at Maidstone.

The rolling stock equipment includes five new 3-compartment passenger cars equipped with motors, and four trailers and two express cars which are being rebuilt from trailer cars formerly operated on the New York City elevated lines.

Rolling Stock.

The new motor cars present an attractive exterior, as illustrated herewith. These cars were built by the Ottawa Car Company, Limited. They are 55 feet long, 8 feet 6 inches wide over all and the bodies are supported by six sills. The outside sills comprise a steel plate with wood on either side, the wood having sections $4\frac{3}{4}$ by 6 and $1\frac{3}{4}$ by 6 inches, while the steel plate is $\frac{1}{2}$ by 6 inches in section. The intermediate sills are of wood, $3\frac{3}{4}$ by 6 inches, and the two centers sills

with two Westinghouse No. 132 single-phase motors rated at 100-horsepower each. The control equipment includes an auto-transformer supported from beneath the car sills by 4 by 4 by $\frac{3}{8}$ inch angles. As the cars are double-ended two of the type 451 Westinghouse drum controllers are used to vary the voltage of the current fed through the auto-transformer to the motors. A wiring diagram is presented showing detail connections of the entire wiring on one of these cars. The simplicity of the circuits is at once noted. It should be remembered that the pantograph trolleys on these cars collect current at 6,600 volts pressure, which current is fed to the motors at a maximum pressure of 240 volts. With the auto-transformer no resistance grids are required, the various steps in the feeding of the motors being obtained by the drum



Windsor Essex & Lake Shore Rapid Railway—Diagram of Car Wiring, Showing Connections for Two Single-Phase Motors and Platform Drum Controllers.

comprise $\frac{1}{2}$ by 6 inch iron plate between two pieces of wood $2\frac{1}{4}$ by 6 inches each.

The interior of the car is divided into three compartments. There is a smoking compartment at either end of the car, it being the practice to use as the smoker whichever compartment is forward. The interiors of the cars are finished in oak. Each smoking compartment has four fixed double seats and eight cane seated revolving chairs. The main compartment has four fixed double seats and 11 rattan covered double seats of the "walkover" type. The toilet compartment is placed at one end of the center portion of the car. The cars are heated with Baker "Mighty Midget" heaters installed in the vestibules. The various fittings of the cars include continuous parcel racks, Curtain Supply Company window fixtures, American trolley catcher, Westinghouse spring operated pantograph trolley and chime whistle.

The car bodies are mounted on two Brill trucks with 6-foot 6-inch wheel base. The center to center distance between truck centers is 31 feet 4 inches. Each car is equipped

with two Westinghouse No. 132 single-phase motors rated at 100-horsepower each. The control equipment includes an auto-transformer supported from beneath the car sills by 4 by 4 by $\frac{3}{8}$ inch angles. As the cars are double-ended two of the type 451 Westinghouse drum controllers are used to vary the voltage of the current fed through the auto-transformer to the motors. A wiring diagram is presented showing detail connections of the entire wiring on one of these cars. The simplicity of the circuits is at once noted. It should be remembered that the pantograph trolleys on these cars collect current at 6,600 volts pressure, which current is fed to the motors at a maximum pressure of 240 volts. With the auto-transformer no resistance grids are required, the various steps in the feeding of the motors being obtained by the drum

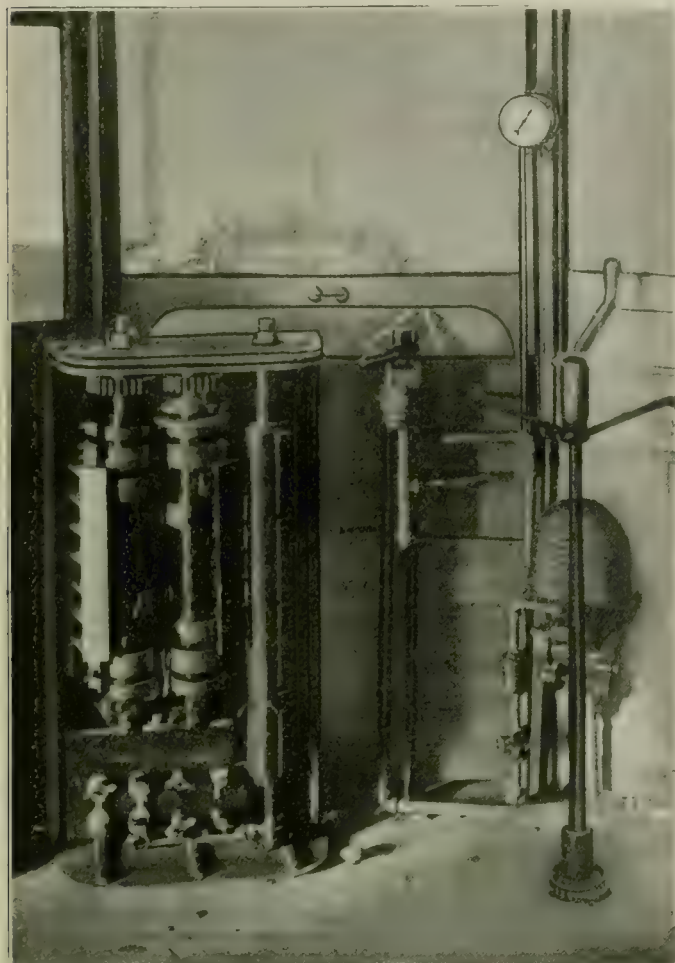
controllers, which, on being revolved, vary the point in the auto-transformer coil from which the feeding current is taken. Each car is equipped with Westinghouse SME schedule air brakes having the quick recharge and graduated release features. The motor cars carry D-1 pumps operated by single-phase motors. The cylinders on the motor cars are 10 inches in diameter and those on the trailer cars are 8 inches in diameter. All cars have automatic slack adjusters. Sterling hand brakes are used.

Service and Personnel.

Inasmuch as there will be no direct steam road competition over a considerable portion of the route, it is expected that a comparatively large freight and express business can be built up. The company has a contract with the Canadian Express Company, which maintains six offices along the line and has its own messenger on the cars during two round trips per day. All classes of freight will be accepted for transportation. Passenger service will be operated on hourly

headway. The operating headquarters are at Kingsville, Ont.

The officers of the company are as follows: President, John Piggott; first vice-president, Charles Magee; second vice-president, W. E. McKeough; secretary, W. T. Piggott; treas-



Windsor Essex & Lake Shore Rapid Railway—View in Vestibule, Showing Arrangement of Air-Compressor Governor, Brake Handles and Drum Controller for Two Single-Phase Motors.

urer, W. C. Crawford; general manager, W. N. Warburton; chief engineer of power plant, S. C. DeWitt.

BOOK TABLE.

The Gas Engine in Principle and Practice. By A. H. Goldingham. New York, 1907. Published by Gas Power Publishing Company, St. Joseph, Mich. Cloth, 195 pp., 6 by 9 in., 107 illustrations. Price, \$1.50.

The recent installations of gas engines for driving electric generators to supply current for operating electric railway and lighting systems, warrant a particular study of the subject of internal combustion engines by those who would keep pace with the rapid advancement in prime movers.

In several small railway shops gas engine units have been utilized to operate the machinery, pending the installation of the electrical apparatus. The economy obtained from having the machine shop equipments available during the early stages of railroad construction has been such that the gas engines in one instance in particular have paid for themselves before the electric road began operation. For this reason the units are retained and serve to drive a portion of the repair shop machinery. These varied uses of gas engines in railway work show that attention to the subject of gas engines is increasing.

The present book by Mr. Goldingham comprises a series of articles published in *Gas Power*, combined with other descriptive matter and tables collected by the author. The

book includes a comparison of the 2-cycle and 4-cycle types of internal combustion engines, descriptions of various designs and notes on gas producers and oil vaporizers. The text is simple and non-mathematical, slight reference being given to the theoretical side of the subject.

The latter portion of the book comprises comprehensive notes on gas producers and gases, together with instructions for installing, testing and operating, as well as regulating the performance of internal combustion engines.

The Car Wheel. Giving the results of a series of investigations by George L. Fowler, M. E. Pittsburg, Pa., 1907. Published by the Schoen Steel Wheel Company. Cloth, 161 pp., 6 by 9 in.

The large industry which has been built up by the Schoen Steel Wheel Company is based upon the superior strength of steel and the large mileage which can be obtained from steel wheels and their low cost which make possible their use in freight service. In order to show the superior strength and other physical properties of the rolled steel car wheels, made by the Schoen company, a number of elaborate tests and investigations have been made by George L. Fowler and the results are given in detail in this volume. The work relates entirely to forged and rolled steel wheels made from a high grade of tire steel blooms.

The various chapters relate to the design of the solid forged and rolled steel wheel; the comparative physical and chemical test of these wheels as compared with steel tires and cast-iron wheels; a micrographic record showing the penetration of work and character of heat treatment; the shelled out wheel and possible explanation of the cause of wheel and tire failures; some areas of contact between wheels of various diameters under loads, and the rail; the coefficient of friction between the rail and wheel, tractive values and slipping; lateral stresses of wheels against the rail and braking stresses of wheel flanges.

The concluding chapter is a presentation of the advantages claimed for the Schoen solid forged and rolled steel wheel as based upon the results of the investigation set forth in the previous chapters, together with the demonstration of service tests. The whole series of investigations in connection with the qualities of steel wheels and their service is one of the most valuable that has ever been undertaken. The micrographic investigation which shows the penetration of the work and the character of the heat treatment has been done very carefully, and it is accompanied by numerous photograph illustrations which show very clearly the steel structure. The investigation in regard to the areas of contact between the wheel and the rail under different loads is particularly interesting, as it enables us to determine the unit pressure per square inch on the wheel and the rail under different conditions. The investigation of the lateral stress of the wheels against the rail and the braking stresses of steel flanges which were made in actual service cannot be regarded as entirely satisfactory or conclusive as the testing apparatus in the track obtained the pressure only at one point and it is expected that the more elaborate investigation recently made by the Pennsylvania Railroad will throw much more light on this subject. The volume contains handsome illustrations of the elaborate hydraulic machinery and rolling mills which are used by the Schoen company in the manufacture of steel wheels. The book is handsomely printed and beautifully illustrated and must be regarded as a valuable contribution to the technical literature relating to railroad rolling stock.

W. F. Cummins, Jr., city clerk of Yazoo City, Miss., writes that the city has issued \$50,000 20-year 5 per cent bonds for the purpose of building 3.1 miles of street railway line, to be operated by the city. Work on the road is to begin about February 1, 1908. The city has an estimated population of from 12,000 to 15,000, and it owns a municipal electric power plant, built in 1904 at a cost of \$250,000.

CONFERENCE ON UNIFORM ELECTRIC RAILWAY ACCOUNTING SYSTEM IN WASHINGTON.

The proposed uniform accounting system for electric railways was discussed at meetings held in Washington, D. C., on December 16 and 17. The result of the formal meeting held on December 17 at the office of the interstate commerce commission was the appointment of committees to formulate and recommend classifications which, so far as possible, shall be adjustable to and uniform with the system prescribed by the commission for steam railways.

Depreciation and General Committees.

These committees comprise a special committee to consider and report on the subject of depreciation, and three other committees representing, respectively, the American Street and Interurban Railway Association, the American Street and Interurban Railway Accountants' Association and the state railway commissions. The committees are as follows:

On "Depreciation"—Gen. George H. Harries, vice-president Washington (D. C.) Railway & Electric Company; John I. Beggs, president Milwaukee (Wis.) Electric Railway & Light Company and United Railways Company of St. Louis; Frank R. Ford of Ford, Bacon & Davis, New York; Arthur W. Brady, president Indiana Union Traction Company, Anderson, Ind.; C. S. Sergeant, vice-president Boston (Mass.) Elevated Railway.

American Street and Interurban Railway Association—George H. Harries, Washington Railway & Electric Company; C. Loomis Allen, vice-president Utica & Mohawk Valley Railway, Utica, N. Y.; Frank R. Ford of Ford, Bacon & Davis, New York; Arthur W. Brady, president Indiana Union Traction Company, Anderson, Ind.; W. B. McKinley, president Illinois Traction System, Champaign, Ill.

American Street and Interurban Railway Accountants' Association—W. F. Ham, comptroller Washington (D. C.) Railway & Electric Company; Fred E. Smith, auditor for receiver Chicago Union Traction Company; W. H. Forse, Jr., secretary and treasurer Indiana Union Traction Company, Anderson, Ind.; H. L. Wilson, comptroller Boston (Mass.) Elevated Railway; P. S. Young, comptroller Public Service Corporation, Newark, N. J. This committee may be changed somewhat as all of the members will not be able to attend the meetings in Washington.

Representatives of states—W. O. Seymour, member Connecticut railroad commission, Hartford, Conn.; Clinton White, member Massachusetts railroad commission, Boston; William J. Meyers, chief division of statistics and accounts, New York public service commission, second district; Thomas Yapp, assistant secretary Minnesota railroad commission, St. Paul, Minn.; C. F. Balch, special examiner interstate commerce commission.

Report of Committee Appointed on November 22.

Preceding the appointment of these committees the conference heard the report of the special committee on "Classification of Electric Railway Accounts," appointed at the preliminary meeting on November 22. This report was made to Prof. H. C. Adams, in charge of statistics and accounts, interstate commerce commission. The classifications recommended by the committee are published in another part of this issue of the Electric Railway Review. In the introductory letter to Professor Adams, dated December 3, 1907, the committee states:

The members of the committee have to report that they met on November 29 and have spent that and the following days to the present date in consideration of the matters intrusted to them. They find themselves unable to agree upon a complete scheme of accounts, nor have they been able to agree upon the importance of conformability to the system of accounts already promulgated by the interstate commerce commission for steam railway carriers. They do, however, agree as follows:

That if it is necessary that the system of accounts to be prescribed for steam and interurban railway companies shall conform closely to that prescribed for steam railway carriers, the classifications "Exhibit A" and "Exhibit B" are practicable and conform to the system of accounts prescribed for steam carriers as closely as the differing conditions of the two classes of carriers permit. ["Exhibit A" is the classification of road and equipment expenditures, published herewith. "Exhibit B" is the classification of operating expenses, published herewith,

which agrees with the essential particulars of the steam railway classification.—Eds.]

The members of the committee who are actively connected with the administration of street and interurban properties do not, however, believe that the classification of operating expenses outlined in "Exhibit B" meets the needs of the managements of such properties to a sufficient degree, and therefore recommend in lieu thereof the classification herewith designated as "Exhibit C." [The two classifications, Exhibits "B" and "C" are compared in the report as "Exhibit D." The comparative statement is published herewith.—Eds.]

And the members of the committee connected with the interstate commerce commission and state commissions are of the opinion that except for its lack of conformability to the scheme of accounts prescribed for the steam railway carriers, the scheme designated above as "Exhibit C" may be made by suitable subdivision and expansion to meet the requirements of the various commissions.

The committee recognize that various important elements of a complete system of accounts have not been completely provided for in "Exhibit C," the principal one among these being the matter of depreciation. The committee agree in recognizing the necessity of provision for depreciation in any complete scheme of operating expense accounts designed to show or to approximate the cost of operation. They are not, however, able to agree upon the practical method by which depreciation shall be accounted for, nor are the committee able to agree to what extent, if any, it is necessary to provide in the scheme of accounts for the matter of joint facilities, which is recognized in the system of accounts promulgated for steam railway carriers.

Of somewhat similar character to the matter of joint facilities is that of power produced in the power plant of a street or interurban carrier, but utilized outside the transportation operations of the carrier. The committee are not able to agree as to the proper method of accounting for the cost of production of such power and the revenue derived from the sale thereof.

Neither are the committee able to agree upon the best method of disposing of the matter of rents, nor upon the extent to which it is important and practicable to provide for the distinction between the elements of cost of production, interest, and profit in the amounts paid or received as compensation for the use of facilities owned by one corporation and furnished to another for a gross rent, or for products furnished for a gross sum.

Nor are the committee able to agree to what extent, if any, a scheme of amortization accounts should be provided through which to secure suitable disposition of extraordinary casualties, abandoned property, and expiring intangible assets, such as limited franchises, patent rights, and the like.

The report is signed by the following: George H. Harries, chairman American Street and Interurban Railway Association; William F. Ham, American Street and Interurban Railway Accountants' Association; C. Loomis Allen, Street Railway Association of the State of New York; William J. Meyers, New York public service commission (second district); William O. Seymour, National Association of Railway Commissioners; C. F. Balch, interstate commerce commission.

Requirements of Small Roads to be Considered.

It was finally decided, after discussion, to begin in the development of a new accounting system with consideration of the requirements of the smaller electric railway properties, and to progress toward the larger companies. In the following tentative classification of operating expense accounts, which was suggested for small roads, there are only 21 primary accounts, and the numbers inclosed in brackets signify the corresponding accounts in the classification which was suggested provided essential agreement with the steam railway classification is necessary:

I. Maintenance of Way and Structures.

1. Maintenance of way (1 to 15).
2. Maintenance of electric line (17 to 24).
3. Maintenance of buildings and structures (26 to 32).
4. Maintenance of service equipment (42 to 45).
5. Availability maintenance expenses (34 to 36).
6. Adjustment accounts (39 to 41).

II. Maintenance of Equipment.

7. Maintenance of revenue equipment (47 to 52).
8. Maintenance of electric equipment of revenue equipment (53 to 58).
9. Maintenance of power equipment (61 and 62).
10. Miscellaneous maintenance of equipment (60 and 63).
11. Adjustment accounts (64 to 68).

III. Traffic Expenses.

12. Traffic expenses (70 to 72).

IV. Transportation Expenses.

A. Power.

13. Operation of power plant (73 to 78).

14. Purchased power (81).

15. Adjustment accounts (79 and 80).

B. Operation.

16. Wages of carmen (83 to 88).

17. Miscellaneous transportation expenses (82 and 89; 89 to 100).

18. Injuries and damages (101 to 103).

19. Adjusting accounts (104 and 105).

V. General Expenses.

20. General expenses (106 to 114).

21. Adjustment accounts (115 and 116).

Consideration of Depreciation.

After consideration of depreciation as an operating expense, it was decided to place the matter in the hands of the special committee named in the foregoing, with the understanding that this committee shall consider the subject thoroughly and report to the interstate commerce commission and to the members of the convention.

List of Those Present.

The following were present at the conference on December 17:

A. F. Weber, chief statistician, New York public service commission, first district.

W. J. Meyers, chief of division of statistics and accounts, New York public service commission, second district.

C. F. Balch, special examiner, interstate commerce commission, Washington, D. C.

Frank R. Ford, New York, representing: United Railways Investment Company; American Cities Railway & Light Company; Birmingham Railway Light & Power Company; and Memphis Street Railway.

Alex. Rennick, third vice-president Philadelphia Rapid Transit Company.

J. N. Shannahan, general manager Washington Baltimore & Annapolis Electric Railway, Baltimore, Md.

E. F. Peck, general manager Schenectady, (N. Y.) Railway.

Charles O. Kruger, second vice-president and general manager Philadelphia Rapid Transit Company.

R. A. Dyer, Jr., Syracuse, N. Y., representing Rochester Syracuse & Eastern Railroad; Auburn & Syracuse Electric Railroad; and Syracuse Lake Shore & Northern Railroad.

John I. Beggs, president Milwaukee Electric Railway & Light Company; United Railways Company of St. Louis; and Sterling Dixon & Eastern Electric Railway.

T. B. Bradley, auditor Richmond Light & Railroad Company, New Brighton, N. Y.; and Staten Island Midland Railway.

C. Gordon Reel vice-president and general manager Kingston, (N. Y.) Consolidated Railroad.

J. H. Pardee, operating manager J. G. White & Co., New York, representing Eastern Pennsylvania Railways Company; Pottsville (Pa.) Union Traction Company; Tri-City Railway Company, Davenport, Ia.; Moline East Moline & Watertown Railway, Moline, Ill.; and Helena (Mont.) Light & Railway.

J. Ledlie Hees, Philadelphia, Pa., president and general manager Fonda Johnson & Gloversville Railroad (electrical division).

C. A. Pearson, Jr., Philadelphia, Pa., representing Bangor Railway & Electric Company; Lewiston Augusta & Waterville Street Railway; Grand Rapids (Mich.) Railway; St. Joseph (Mo.) Railway Light Heat & Power Company; East St. Louis & Suburban Railway Company; and Portland (Ore.) Railway Light & Power Company.

G. L. Estabrook, Philadelphia, Pa., representing Bangor Railway & Electric Company; Lewiston Augusta & Waterville Street Railway; Grand Rapids (Mich.) Railway Company; St. Joseph (Mo.) Railway Light Heat & Power Company; East St. Louis & Suburban Company; and Portland (Ore.) Railway Light & Power Company.

W. G. McDole, auditor Cleveland (O.) Electric Railway.

C. L. S. Tingley, Philadelphia, Pa., representing American Railways Company; Bridgeton & Millville Traction Company; Scranton Railway Company; Altoona & Logan Valley Electric Railway; Springfield (O.) Railway Company; Peoples Railway Company, Dayton, (O.); and Chicago & Joliet Electric Railway.

W. B. Brockway, New York, representing United Railways Investment Company and American Cities Railways & Light Company.

A. Stuart Pratt, Boston, representing the properties man-

aged by Stone & Webster.

F. E. Smith, auditor for receiver Chicago Union Traction Company.

H. L. Urlson, comptroller Boston Elevated Railway.

Charles S. Sergeant, vice-president Boston Elevated Railway.

Howard Abel, comptroller Brooklyn Rapid Transit System.

E. S. Benson, consulting accountant, Interborough-Metropolitan Company, New York.

William O. Seymour, railroad commission Connecticut.

W. H. Davis, comptroller United Traction Company, Albany, N. Y.

Lewis Leilic, Public Service Corporation of New Jersey.

Thomas N. McCarter, president Public Service Corporation of New Jersey.

W. H. Forse, Jr., secretary and treasurer Indiana Union Traction Company.

George A. Harris, general auditor Fonda Johnston & Gloversville Railroad, electric division, and Adirondack Lakes Traction Company.

George F. McCulloch, Indiana Union Traction Company.

W. F. Ham, comptroller, Washington (D. C.) Railway & Electric Company.

H. J. Pierce, president, and T. W. Wilson, general manager International Railway, Crosstown Street Railway and Electric City Railway, Buffalo, N. Y.

J. C. Collins, secretary and auditor Rochester Railway, Rochester & Eastern Rapid Railway, Rochester & Suburban Railway and Rochester Electric Railway.

H. M. Beardsley, secretary and treasurer Elmira (N. Y.) Water Light & Railroad Company and Elmira & Seneca Lake Traction Company.

C. Loomis Allen, vice-president and general manager Syracuse Rapid Transit Railway, Utica & Mohawk Valley Railway and Oneida Railway; also special representative of Oneonta & Mohawk Valley Railway.

Arthur L. Linn, Jr., general auditor Mohawk Valley Company, Utica & Mohawk Valley Company, Oneida Railway, Syracuse Rapid Transit Railway, Rochester Railway, Rochester & Eastern Railway, Rochester & Sodus Bay Railway and Rochester & Eastern Railway.

J. F. Calderwood, vice-president and general manager Brooklyn Rapid Transit Company.

P. S. Young, Public Service Railways Company, Newark, N. J.

Bernard V. Swenson, secretary and treasurer American Street and Interurban Railway Association, New York.

James Marwick, representing Twin City Rapid Transit Company and Duluth Street Railway.

Arthur W. Brady, Indiana Union Traction Company, Anderson, Ind.

Robert I. Todd, Indianapolis Traction & Terminal Company and Terre Haute Indianapolis & Eastern Traction Company.

Dana Stevens, Cincinnati Traction Company, Ohio Traction Company and Ohio Electric Railway.

Clinton White, Massachusetts railroad commission, Boston, Mass.

Thomas Yapp, assistant secretary Minnesota railroad commission.

D. Dana Bartlett, general auditor, representing Massachusetts Electric Companies, Boston & Northern Street Railway, Old Colony Street Railway, Nashua Street Railway and Newport & Fall River Street Railway.

First Meeting of the Committees.

The committees appointed on December 17 met with Professor Adams on December 18, and after an all-day conference, agreed, substantially, as follows: That the accounting system to be formulated for electric railways shall be, so far as possible, adjustable to and uniform with the system prescribed for steam railways. The commission desires to have, not only the electric railway accounting methods, but also those of the express companies, the Pullman Company and pipe line companies conform as nearly as possible to the general lines of the steam railway classifications. The interstate commerce commission system, it is understood, will be prescribed for electric railways beginning with the fiscal year starting July 1, 1908.

Details of the conclusions of the committees at the meeting on December 18, together with a discussion of the subjects suggested and talked over will be embodied in a circular letter which Professor Adams will send to all electric railway companies.

TENTATIVE CLASSIFICATIONS OF OPERATING EXPENSES OF ELECTRIC RAILWAYS.

(Prepared by the special committee and recommended for adoption, provided essential agreement with the steam railway accounts is necessary.)

I. Maintenance of Way and Structures.

Maintenance of Way.

1. Ballast.
2. Ties.
3. Rails.
4. Rail fastenings.
5. Frogs, switches and special work.
6. Underground construction.
7. Paving.
8. Roadway and track (labor and expenses).
9. Tunnels.
10. Bridges and culverts.
11. Over and under grade crossings.
12. Grade crossings, fences, cattle guards and signs.
13. Signals and interlocking plants.
14. Telegraph and telephone.
15. Other maintenance of way expenses.
 - a. Superintendence.
 - b. Injuries to persons.
 - c. Stationery and printing.
 - d. Insurance.
 - e. Other expenses.
16. Depreciation estimate "Roadway."
 - a. Ties.
 - b. Rails.
 - c. Rail fastenings and other material.
 - d. Frogs, switches and special work.
 - e. Underground construction.
 - f. Paving.
 - g. Tunnels.
 - h. Bridges and culverts.
 - i. Over and under grade crossings.
 - j. Grade crossings, fences, cattle guards and signs.
 - k. Signals and interlocking plants.
 - l. Telegraph and telephone.

Electric Line.

Transmission Lines—

17. High-tension transmission lines.

Distribution System—

18. Overhead feeders.
19. Underground feeders.
20. Track bonding.

Conductors—

21. Overhead trolley lines.
22. Third-rail conductors.
23. Conductor rails.
24. Miscellaneous electric line expenses.
 - a. Superintendence.
 - b. Injuries to persons.
 - c. Stationery and printing.
 - d. Insurance.
 - e. Other expenses.
25. Depreciation estimate "Electric Line."
 - a. High-tension power transmission lines.
 - b. Overhead feeders.
 - c. Track bonding.
 - d. Underground feeders.
 - e. Overhead trolley lines.
 - f. Third-rail conductors.

Maintenance of Buildings and Structures.

26. Power plants.
27. Power substations.
28. General offices.
29. Car houses and shops.
30. Stations, waiting rooms and other buildings.
31. Docks and wharves.
32. Miscellaneous buildings and structures expenses.
 - a. Superintendence.
 - b. Injuries to persons.
 - c. Stationery and printing.
 - d. Insurance.
 - e. Other expenses.
33. Depreciation estimate "Buildings and Structures."
 - a. Power plants.
 - b. Power substations.
 - c. General offices.
 - d. Car houses and shops.
 - e. Stations, waiting rooms and other buildings.
 - f. Docks and wharves.

Availability Maintenance Expenses.

34. Care of track.
35. Removal of snow and ice.
36. Cleaning, sprinkling and oiling roadbed.
37. Injuries to persons.
38. Other miscellaneous maintenance expenses.
39. Other than railway operation—Cr.
40. Maintaining joint tracks, yards and terminals—Dr.
41. Maintaining joint tracks, yards and terminals—Cr.

Maintenance of Service Equipment.

42. Snow equipment.
43. Work cars.
44. Electric locomotives (utility).
45. Miscellaneous service equipment.
46. Depreciation estimate "Service Equipment."
 - a. Snow equipment.
 - b. Work cars.
 - c. Electric locomotive (utility).
 - d. Miscellaneous service equipment.

II. Maintenance of Equipment.

Maintenance of Revenue Equipment.

47. Passenger cars.
48. Combination cars.
49. Express cars.
50. Mail cars.
51. Freight cars.
52. Locomotives.

(Recommended for adoption, without regard to the necessity of essential agreement with steam railway accounts, by the members of the special committee representing electric lines.)

I. Maintenance of Way and Structures.

Maintenance of Roadway and Track.

1. Ballast.
2. Ties.
3. Rails.
4. Rail fastenings and joints.
5. Special work.
6. Underground construction.
7. Paving.
8. Roadway and track labor.
9. Tunnels.
10. Bridges, trestles and culverts.
11. Over and under grade crossings.
12. Fences, road crossings, cattle guards and signs.
13. Signals and interlocking system.
14. Telephone and telegraph system.
15. Miscellaneous roadway and track expenses.
 - a. Included in Account No. 15.
 - b. Included in Account No. 95.
 - c. Included in Account No. 15.
 - d. Included in Account No. 94.
 - e. Included in Account No. 15.

Not provided for.

Maintenance of Electric Line.

Transmission Lines—

16. High-tension transmission lines.

Distribution System—

17. Overhead feeders.
18. Underground feeders.
19. Track bonding.

Conductors—

20. Overhead trolley.
21. Third rail.
22. Conductor rails.
23. Miscellaneous electric line expenses.
 - a. Included in Account No. 23.
 - b. Included in Account No. 95.
 - c. Included in Account No. 23.
 - d. Included in Account No. 94.
 - e. Included in Account No. 23.

Not provided for.

Maintenance of Buildings, Fixtures and Grounds.

24. Power plants.
25. Substation plants.
26. General offices.
27. Car houses and shops.
28. Stations, waiting rooms and other buildings.
29. Docks and wharves.
30. Miscellaneous expenses of buildings, fixtures and grounds.
 - a. Included in Account No. 30.
 - b. Included in Account No. 95.
 - c. Included in Account No. 30.
 - d. Included in Account No. 94.
 - e. Included in Account No. 30.

Not provided for.

- See Account No. 80.
 See Account No. 81.
 See Account No. 80.
 See Account No. 95.
 Not provided for.
 Not provided for.
 See Account No. 83.
 See Account No. 83.

- See Account No. 44.
 See Account No. 43.
 See Account No. 45.
 See Account No. 49.

Not provided for.

II. Equipment.

Maintenance of Revenue Cars.

33. Passenger cars.
34. Combination cars.
- See Account No. 36.
35. Mail cars.
36. Freight and express cars.
37. Locomotives (revenue).

TENTATIVE CLASSIFICATIONS OF OPERATING EXPENSES OF ELECTRIC RAILWAYS.—Continued.

Maintenance of Electric Equipment of Revenue Equipment.

- 53. Electric equipment of passenger cars.
- 54. Electric equipment of combination cars.
- 55. Electric equipment of express cars.
- 56. Electric equipment of mail cars.
- 57. Electric equipment of freight cars.
- 58. Electric equipment of locomotives.

- See Account No. 43.
- See Account No. 42.
- See Account No. 44.
- See Account No. 43.
- See Account No. 42.
- See Account No. 44.
- See Account No. 45.
- 59. Depreciation estimate "Revenue Equipment."
 - a. Passenger cars.
 - b. Combination cars.
 - c. Express cars.
 - d. Mail cars.
 - e. Freight cars.
 - f. Locomotives.
 - g. Electric equipment of revenue cars.

Miscellaneous Maintenance of Equipment Expenses.

- 60. Shop machinery and tools.
- 61. Power plant equipment.
- 62. Substation equipment.
- 63. Apportioned (Clearing Account).
- 63. Other equipment expenditures.
 - a. Superintendence.
 - b. Injuries to persons.
 - c. Stationery and printing.
 - d. Insurance.
 - e. Other expenses.
- 64. Other than railway operations—Cr.
- 65. Maintaining joint equipment—Dr.
- 66. Maintaining joint equipment—Cr.
- 67. Equipment borrowed—Dr.
- 68. Equipment loaned—Cr.
- 69. Depreciation estimate "Maintenance of Shop and Power Apparatus."
 - a. Shop machinery and tools.
 - b. Electrical power plant apparatus.
 - c. Substation apparatus.

III. Traffic Expenses.

- 70. Soliciting and administering.
- 71. Advertising and attractions.
- 72. Traffic supplies and expenses.
 - a. Stationery and printing.
 - b. Insurance.
 - c. Miscellaneous traffic expenses.

IV. Transportation Expenses.

Power.

- 73. Wages of power plant employes.
- 74. Fuel for power.
- 75. Water for power.
- 76. Lubricants for power.
- 77. Other supplies and expenses of power plants.
- 78. Operating substations.
- 79. Power transferred—Cr.
- 80. Other than railway operations—Cr.
- 81. Purchasing power.

Operation of Cars.

- 82. Supervising.
- 83. Passenger motormen.
- 84. Passenger conductors.
- 85. Passenger trainmen.
- 86. Freight, express and other motormen.
- 87. Freight, express and other conductors.
- 88. Freight, express and other trainmen.
- Included in Accounts Nos. 95 and 99.
- 89. Interlocking, block and other signals—operation.
- 90. Telegraph and telephone—operation.
- See Account No. 95.

- 91. Stationery and printing.

See Accounts Nos. 92 and 99.

- 92. Clearing wrecks.
- 93. Station employes.
- 94. Station supplies and expenses.
- 95. Car supplies and expenses.
- 96. Car house employes.
- 97. Car house expenses.
- 98. Express service.
- 99. Other transportation expenses.
 - a. Switchmen, crossing flagmen, watchmen and other car service employes.
 - b. Drawbridge expenses.
 - c. Other expenses.
- 100. Insurance.
- 101. Loss and damage.
 - a. Passenger.
 - b. Freight.
- 102. Damage to property.
 - a. Property.
 - b. Stock on right of way.
- 103. Injuries to persons.
- 104. Operating joint tracks, yards and other facilities—Dr.
- 105. Operating joint tracks, yards and other facilities—Cr.
- Not provided for.

See Accounts Nos. 34 and 36.

See Account No. 35.

See Accounts Nos. 65, 66, 67 and 68.

See Accounts Nos. 40 and 41.

Maintenance of Electric Equipment of Revenue Cars.

- 38. Electric equipment of passenger cars.
- 39. Electric equipment of combination cars.
- See Account No. 41.
- 40. Electric equipment of mail cars.
- 41. Electric equipment of freight and express cars.
- 42. Electric equipment of locomotives (revenue).

Maintenance of Utility Equipment.

- 43. Work cars.
- 44. Snow equipment.
- 45. Electric locomotives (utility).
- 46. Electric equipment of work cars.
- 47. Electric equipment of snow equipment.
- 48. Electric equipment of electric locomotives (utility).
- 49. Miscellaneous equipment.

Not provided for.

Maintenance of Power Plant Equipment.

- 50. Shop machinery and tools.
- 51. Generating plant equipment.
- 52. Substation equipment.
- 51. Shop supplies and expenses.
 - a. Not mentioned.
 - b. See Account No. 95.
 - c. See Account No. 70.
 - d. See Account No. 94.
 - e. See Account No. 51.

Not provided for.

See Account No. 82.

Not provided for.

IV. Traffic.

- 84. Salaries of traffic staff.
- 86. Advertising.
- 85. Miscellaneous traffic expenses.
 - a. Included in Account No. 85.
 - b. Included in Account No. 94.
 - c. Included in Account No. 85.

III. Transportation.

Operation of Power Plants and Substations.

- 52. Wages of power plant employes.
- 53. Fuel for power.
- 54. Water for power.
- 55. Lubricants for power.
- 56. Miscellaneous supplies and expenses of power plants.
- 57. Operation of substations.
- Not provided for.
- 58. Purchased power.

Operation of Cars.

- 59. Superintendence of transportation.
- 60. Wages of passenger motormen.
- 61. Wages of passenger conductors.
- 62. Wages of passenger trainmen.
- 63. Wages of express and freight motormen.
- 64. Wages of express and freight conductors.
- 65. Wages of express and freight trainmen.
- 66. Wages of miscellaneous car service employes.
- 67. Operation of signal and interlocking system.
- 68. Operation of telephone and telegraph system.
- 69. Car service supplies.

70. Printing and stationery (car service).

71. Tickets and transfers.

72. Miscellaneous car service expenses.

73. Wages of station employes.

74. Station supplies and expenses.

Included in Accounts Nos. 69 and 72.

75. Wages of car house employes.

76. Car house supplies and expenses.

77. Express and freight, collections and delivery.

Included in Accounts Nos. 66 and 72.

Included in Account No. 94.

79. Loss and damage.

Included in Account No. 95.

See Accounts Nos. 82 and 83.

78. Dining, buffet, parlor and sleeping car service.

Miscellaneous.

- 80. Cleaning and sanding tracks.
- 81. Removal of snow and ice.
- 82. Rent of equipment.
- 83. Rent of tracks and terminals.

TENTATIVE CLASSIFICATIONS OF OPERATING EXPENSES OF ELECTRIC RAILWAYS.—Concluded.

V. General Expenses.

106. Salaries and expenses of general officers.
 107. Salaries and expenses of clerks and attendants.
 108. General office supplies and expenses.
 109. Law expenses.
 110. Insurance.
 111. Relief department expenses.
 112. Pensions.
 113. Stationery and printing.
 114. Other expenses.
 115. General administration joint tracks, yards and other facilities—Dr.
 116. General administration joint tracks, yards and other facilities—Cr.
- Divided among Accounts Nos. 15, 24, 32, 63, 72, 100 and 110.
Divided among Accounts Nos. 15, 24, 32, 63 and 103.
- Clearing Accounts.
- Shop expenses.
 - Store expenses.
 - Stable expenses.
 - Work equipment—operation.

The text of this classification agrees substantially with the text of the tentative classification of operating expenses of electric railways, which harmonizes closely with the classification of operating expenses of steam railways.

V. Administrative and General Expenses.

- Administrative.
87. Salaries of officers.
 88. Salaries of clerks.
 89. General office expenses.
 91. Law expenses, general.
 - Included in Account No. 94.
 93. Pensions and relief.
 90. Printing and stationery, general.
 92. Miscellaneous general expenses.
- Not provided for.
94. Insurance.
 95. Injuries and damages.
- Apportionment Accounts.
- Included in Account No. 51.
 - 101. Store expenses.
 - 102. Stable expenses.
 - Not provided for.

The text of this classification agrees substantially with the text of the classification of operating expenses drafted by the American Street and Interurban Railway Accountants' Association.

TENTATIVE CLASSIFICATION OF EXPENDITURES FOR ROAD AND EQUIPMENT OF ELECTRIC RAILWAYS.

(Recommended by the Special Committee.)

I. Road.

Right of Way.

1. Engineering and superintendence.
2. Right of way.
3. Real estate other than right of way.

Roadway.

4. Grading.
5. Ballast.
6. Ties.
7. Rails.
8. Track fastenings and other material.
9. Frogs, switches and special work.
10. Paving.
11. Tracklaying and surfacing.
12. Roadway tools.
13. Tunnels.
14. Bridges, trestles and culverts.
15. Over and under grade crossings.
16. Fencing right of way.
17. Grade crossings, cattle guards and signs.
18. Interlocking and other signal apparatus.
19. Telegraph and telephone lines.

Electric Line.

20. High-tension transmission lines.
21. Overhead feeders.
22. Track bonding.
23. Underground feeders.
24. Overhead trolley lines.
25. Third-rail conductors.
26. Conductor rails.

Buildings and Structures.

27. Generating plant buildings.
28. Power substation buildings.
29. General offices.
30. Stations, waiting rooms and other buildings.
31. Docks and wharves.

Permanent Equipment.

32. Generating plant equipment.
33. Substation equipment.
34. Shop machinery and tools.
35. Cost of road purchased.

II. Equipment.

Revenue Equipment.

36. Passenger cars.
37. Combination cars.
38. Express cars.
39. Mail cars.
40. Freight cars.
41. Locomotives.

Electric Equipment of Revenue Equipment.

42. Electric equipment of passenger cars.
43. Electric equipment of combination cars.
44. Electric equipment of express cars.
45. Electric equipment of mail cars.
46. Electric equipment of freight cars.
47. Electric equipment of locomotives.

Service Equipment.

48. Work cars.
49. Snow equipment.
50. Electric locomotives (utility).
51. Miscellaneous equipment.

Electric Equipment of Service Equipment.

52. Electric equipment of work cars.
53. Electric equipment of snow equipment.
54. Electric equipment of locomotives (utility).

III. General Expenditures.

55. Law expenses.
56. Stationery and printing.
57. Insurance.
58. Taxes.
59. Injuries to persons.
60. Interest and commissions.
61. Other expenditures.

THE NASHVILLE INTERURBAN RAILROAD.

H. H. Mayberry, president of the Nashville Interurban Railroad, Stahlman building, Nashville, Tenn., writes as follows regarding the construction of the road:

About a year ago we made a contract with a New York construction company to construct, equip and put in operation our electric line from Nashville, via Franklin and Columbia, to Mt. Pleasant, Tenn., an approximate distance of 67 miles. This line is composed of three divisions—Nashville to Franklin, Franklin to Columbia and Columbia to Mt. Pleasant—the distance from Nashville to Franklin being approximately 20 miles.

We found the construction company unable to carry through its contract, and it was rescinded by mutual consent during the late summer, we having decided to construct our own line in divisions. In other words, we decided to construct and put in operation the Nashville and Franklin division, settle up its bills, demonstrate its earning power, and if it proved to be what we had every reason to believe it would be, a good dividend earner, then to construct the division between Franklin and Columbia, put it in operation, make settlement, demonstrate its earning power, and if satisfactory, build and equip the Columbia-Mt. Pleasant line.

We are not promoters, but plain business men endeavoring to develop our section and bring to life securities that are safe, conservative dividend earners under any and all

conditions if the road is properly managed. We are just about completing our roadbed from Nashville to Franklin, and with 60 days of fair working weather we will have it completed and paid for; in fact, we have increased our forces in the construction of the roadbed during the tight times, and instead of having monthly payrolls, we have been able to pay our men in currency every Saturday night, and expect to continue this until the roadbed is completed.

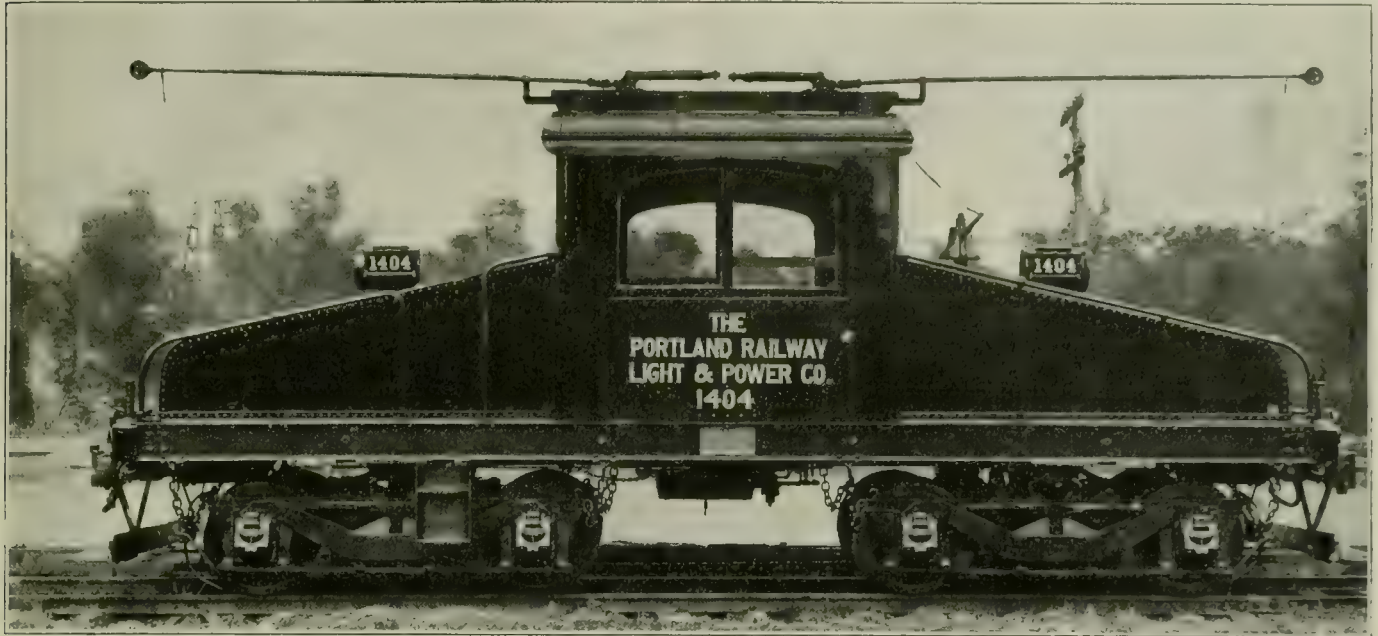
We are now just ready to take up the question of purchasing bridges, cross-ties, rails, rolling stock, copper, etc., necessary for overhead construction. We will use 70-pound rails. Our contracts will be made so as to secure delivery that will make it possible to complete construction and put the road in operation during the month of June. The Nashville and Franklin division will be bonded for \$400,000.

You doubtless will agree with us that if there is any section in the south that offers a great field for interurban development, this Tennessee basin is the spot. Nashville is a city in excess of 120,000 people and has not a single interurban electric line, so you can readily appreciate that our line should reap great benefits from such a large city without competition in the interurban business. The country is not only thickly settled, but the people are prosperous and they are educated to ride—the steam railroads have done this for us. The population, exclusive of Nashville, to Mt. Pleasant is in excess of 45,000, within a radius of a mile and a half from the line; the towns of Franklin, Columbia and Mt. Pleasant we believe to be the blue ribbon towns of Tennessee.

ELECTRIC LOCOMOTIVE FOR PORTLAND RAILWAY LIGHT & POWER COMPANY.

The General Electric Company and the American Locomotive Company have recently completed a 40-ton switching locomotive for the Portland Railway Light & Power Company of Portland, Ore., which is illustrated in the accompanying engravings. The engine is 31 feet long over couplers, the rigid wheel base is 6 feet 6 inches, the width 9 feet 6 inches,

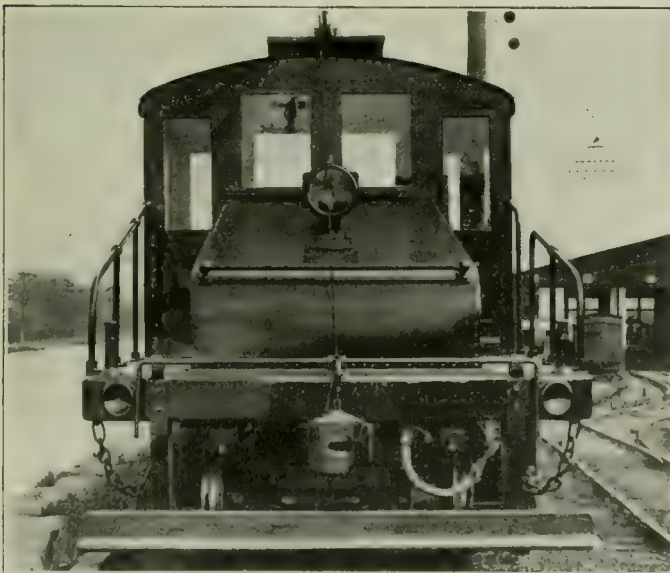
troubles under excessive conditions of overload. The maximum torque demanded of a locomotive under starting conditions, particularly on a grade, is often four or five times that required under ordinary running conditions, and in switching service an electric locomotive is often operated with power on the motors a very small proportion of the time. The time lost in coasting, making switches without power, waiting for trains and other delays amounts to over 75 per cent of the time that a locomotive is engaged in service that could fairly



Electric Locomotive for Portland Railway Light & Power Company—Side View.

and the weight on drivers is 81,000 pounds. The main frame platform is built of 10-inch channels secured to cast-iron end sills, and the floor is of $\frac{3}{8}$ -inch sheet steel.

The trucks are of the bar frame rigid bolster type, with equalizers and semi-elliptic springs between the equalizers, similar to trucks frequently built for locomotive tenders. The



Electric Locomotive for Portland Railway—End View.

driving axles are 6 inches in diameter, and the wheels, 33 inches in diameter, have Taylor fused steel tires.

The motor equipment consists of four G. E. 205-B motors, which type is one of the latest commutating pole motors developed by the General Electric Company. The advantage of this type of motor is principally its freedom from commutator

be called continuous. These facts show the advantage of using for switching service a type of motor which, while it might have a capacity well adapted to low average output, is also capable of excessive momentary overload.

An illustration of the adaptability of the commutating pole motor to such service, it may be noted that the equipment of the four motors on this locomotive at their 1-hour rating will develop a tractive effort of 9,200 pounds at a speed of $16\frac{1}{2}$ miles per hour. Under starting conditions the same equipment is easily capable of slipping the wheels under a 40-ton locomotive and giving a tractive effort of 20,000 to 25,000 pounds without danger from commutating troubles.

The locomotive is equipped with multiple-unit control, with controllers located at positions diagonally opposite in the corners of the cab. It is also equipped with two trolleys in order to avoid the necessity of turning the trolley in ordinary switching service and to provide for conditions of carrying capacity when engaged in traffic so heavy as to call for full locomotive capacity. In the center of the cab is located an air compressor having a capacity of 50 cubic feet of free air per minute at 90 pounds pressure.

Rev. George S. Henninger of Linton, Ind., is said to have patented a device which will warn persons passing around the rear of a car when a car on the other track is approaching from the opposite direction. A foot trap, operated by the motorman when he sees a car on the other track approaching while his car is standing, causes a bell to ring and also raises a small semaphore on the rear end of the car, bearing the words, "Danger, Car Coming." At night the semaphore may be lighted:

The Newton (Mass.) Street Railway has applied to the board of aldermen of Waltham, Mass., for a permit to haul steam railroad freight cars over its tracks to a large manufacturing plant.

THE DEVELOPMENT OF ELECTRIC TRANSPORTATION SERVICE AND ITS EFFECT ON ST. LOUIS.*

BY B. R. STEPHENS, TRAFFIC MANAGER ILLINOIS TRACTION SYSTEM.

Compared with the general progress of the business interests of this country, I doubt, with very few exceptions, if adequate progress has been made by the steam roads in the last 20 years in the handling of freight, except, possibly, such as has been brought about by the construction of lines to territories that may not have been earlier served. The reason for this lies in the fact that the most strenuous effort of every railroad manager is directed to the increase of train tonnage. It can be readily understood that such a practice is not beneficial to the mercantile interests. It is quite true that the steam roads within the last 20 years have increased their terminal freight facilities and their facilities at the smaller stations; they have added tracks to the industries located on their lines and in a great many instances the most prosperous roads have double-tracked. With some of the greater trunk lines double tracks for passenger service and double tracks for freight service are now in use. Notwithstanding this we still find the ultimate object of the main track improvements is for the handling of larger engines and consequent larger trains loaded to their maximum capacity, with a consequent lack of betterment of the time made on shipments.

Comparative Efficiency of Steam and Electric Roads.

In my personal experience 12 years ago I obtained the first actual comparison of the efficiency of electric lines as compared with the service given by steam roads. I was connected with a small coal road in Ohio and in the mining district we operated passenger trains in the morning and afternoon for the handling of miners between the towns and the mines located in that territory, a distance of approximately 10 miles. Another steam road, which did not reach this territory, conceived the idea of building an electric line, operating the passenger service with electric cars and the freight with the ordinary steam locomotive. The country was exceedingly broken and the construction was consequently very expensive, but when the officials put these cars in operation they found them to be a paying investment and the steam road with which I was connected lost absolutely every cent of its passenger business in that territory and was compelled to discontinue its service. We made a struggle, of course; we met the rates and attempted to meet the electric service, but all to no avail. We were forced to the acknowledgement that the frequent service of interurban cars was absolutely what the public required. This electric line has now spread out and covers about 80 miles of that immediate territory.

Later on, in my connection with the Toledo St. Louis & Western Railroad, I found that where the electric lines entered the field in Indiana the steam roads lost the patronage as far as the electric lines were able to handle the traffic.

Commencing with my connection with the McKinley syndicate in Indiana in 1900, the construction of electric lines was almost entirely on the basis of a street railway; a 40, 50 or 56 pound rail was used. It was not unusual for these lines to run around a piece of property with the sharpest of curves when there were right of way complications, and the time consumed in the handling of passengers between terminals was necessarily slow. I remember distinctly that in the construction of the line from Ft. Wayne to Huntington, Ind., there was scarcely half a mile of straight track out of 25. In the following year, 1901, this line was extended to Wabash, and in the construction of this additional 20 miles our past experience had pointed out to us the necessity of faster time, the consequent reduction of curves and also of more solid construction. We determined on a right of way of 50 feet. We determined on not sharper than a 6-degree curve. We bought larger cars and larger motors with a consequent greater comfort for passengers and ability to maintain a greater rate of speed. The result of such construction and operation was immediately evident. I might say in passing that the effect on the passenger business between Huntington and Ft. Wayne was disastrous to the Wabash Railroad. Our failure was, of course, predicted, but from the commencement of operation this road not only paid its interest on the bonds, but also had a surplus which was used for the betterment of the property rather than as dividends on the stock.

Development of the Illinois Traction System.

During 1901 the first rails of what is now known as the Illinois Traction System were laid from Danville to Westville. We were compelled to use a viaduct owned by the city of Danville across the Vermilion river which would not allow the

handling of equipment exceeding 20 tons in weight. The road was laid with 40-pound steel, and the very cheapest construction was followed. But at the moment of opening the line the number of people carried was astounding. The popularity of the road was so great that the construction of lines from Danville to Catlin and from Westville to Georgetown was immediately commenced. They were placed in operation during the following year, and were successful from the beginning.

In 1902 the construction of the line from Danville to Champaign, which was a great undertaking at that time, was commenced and this road was put in operation on September 7, 1903. In this line 60-pound standard rail was used, 50-foot right of way was obtained, sharp curves were eliminated, the grades were kept below 2 per cent, and every possible effort was made to build a first-class railroad.

Our first schedule between Danville and Champaign, a distance of 34 miles, was 2 hours and 45 minutes and the line was operated for the first six months without ballast. During the following year this line was ballasted and the time of the cars reduced to 1 hour and 25 minutes, a schedule which we maintain at the present time; and now we plan to put in operation January 1, 1908, a limited car between Danville and Springfield which will cover this 34-mile portion of its route in 1 hour and 10 minutes.

During 1903 Mr. McKinley conceived the idea of building interurban lines between Decatur and Springfield and Springfield and Carlinville, a total of 80 miles. These lines were placed in operation during July, 1904, and were immediately successful. During this time we met our first opposition from the smaller towns on franchises. The people had the idea that the operation of electric railways with a city the size of Springfield for terminal would be a serious detriment to the business of those smaller towns; and on this account, possibly more than any other, detrimental curves were allowed to be built in passing through the various towns, particularly between Springfield and Carlinville.

During 1904, and almost the entire year of 1905, construction was under way on interurban lines between Decatur and Bloomington and between Hillsboro and Granite City and the extension of the line from Springfield to Carlinville and Staunton in order to give us a connection with St. Louis territory, also on the line between Springfield and Lincoln, making a total of 105 miles of track. These lines were placed in operation in the latter part of November, 1905.

The years 1906 and 1907 were spent in the construction of lines from Decatur to Champaign, 50 miles, and from Bloomington to Peoria, 40 miles, which were placed in operation during the present year. In the latter part of this year we have also constructed a line, which will be in operation on January 1, from Lincoln to Mackinaw, giving us a direct route of 170 miles from East St. Louis to Peoria. We have also effected a working arrangement with the East St. Louis & Suburban Railway for the running of our cars between Granite City and East St. Louis. At the present time the Illinois Traction System, from a small 6-mile line in 1900, has grown to an institution of 420 miles of electric railways, accomplishing this result in practically seven years. The lines were not built without a great deal of opposition. The steam roads, which are rather plentiful in Illinois, objected to crossings, but the obstacles were gradually overcome.

Competition of Steam Roads.

In the operation of the various lines nearly every steam road which we parallel has tried by the introduction of service and various other methods to decrease the amount of business handled by us. The Chicago & Alton Railway ran interurban trains between Springfield and Carlinville for six months during 1905 at a loss of \$65 per day; at the end of six months this company reached the conclusion that this \$65 per day could be expended to much better advantage for the Chicago & Alton Railway. I believe that during the operation of these trains we allowed them one-half of 1 per cent of the business.

Growth of the Passenger Traffic.

On July 1, 1906, we placed in operation two "Corn Belt Limited" runs between Springfield and Granite City, making the time in 3 hours and 30 minutes; the first day's earnings on these cars, for practically 400 miles run, were \$89.25. On November 10, 1906, our business on these through cars had grown to such an extent that we found it necessary to put on four "Corn Belt Limited" runs in each direction between Springfield and Granite City, and on March 10, 1907, we found it necessary to double the service again. We put on eight limited cars and a sleeper between Springfield and East St. Louis. At this time we commenced reaching East St. Louis as a terminal and during the summer of 1907, on Saturday and Sunday, we found it necessary to double-head these eight limited cars in order to take care of our business. This will give some idea of the enormous increase in the passenger busi-

*Paper presented before the St. Louis Credit Men's Association, St. Louis, Mo., December 12, 1907.

ness; this increase is found not only on the line between Springfield and East St. Louis, but is also true of all other divisions of the Illinois Traction System.

Growth of the Express Business.

When I came to Illinois with the Illinois Traction System, I immediately commenced to advocate the purchase and operation of an express car and finally prevailed on Mr. McKinley to allow me to give the matter a trial. In December, 1903, Mr. McKinley allowed me to use a passenger car by taking out three of the front seats on each side of the aisle and to make one round trip from Danville to Champaign and return. The first day the car was in operation it earned \$17, with a possible labor expense of about \$4.50 to \$5.00. This resulted in permission to keep the car in operation in that business, and within one month's time I had all of the seats out of the car and had obtained permission to build an express car at the Champaign shops. We have inaugurated a coal business for three mines located exclusively on our tracks and reach many other coal mines through connections with the steam roads; and for this business we have provided our own equipment. At the present time we have 18 motor express cars, 45 trailers, 600 coal cars, 7 electric locomotives and an assortment of box and flat cars for the handling of general business.

Our first business out of St. Louis in the express line was in January, 1906, when we received our freight at the Collins street warehouse, transferred it across the river on the North Market street ferry, hauled it through mud for two miles on the east side, and handled it through a barn in the northern city limits of Madison. We then built another freight house on the east side of the river, near the northern limits of the city of Venice, which we occupied until December 11, 1906, when we moved to a freight house on Eighth and Winstanley avenue, East St. Louis. This consists of a platform 16 feet wide and 80 feet long, with a rubber covered roof without sides, but over this platform we have handled from 150,000 to 250,000 pounds of merchandise per day, inbound and outbound.

In running our express cars from different distributing points, such as Danville, Decatur, Bloomington, Peoria and Springfield, we inaugurated the plan of having the local cars leave these terminals at noon, believing that the distributing houses could fill orders and deliver them to us at the freight house after they had received their mail at 8 a. m. and before the cars left at noon. We attempted this practice at St. Louis, but found, on account of the delay in the transfer across the river, that such a plan was impracticable. Consequently we have our cars leave East St. Louis at 4:30 o'clock in the morning, which gives delivery to all the stations on our lines as far north as Springfield before the following noon, to stations between Springfield and Decatur and Springfield and Lincoln the following afternoon, and to stations beyond Decatur as far as Bloomington, Peoria, Champaign and Danville the second morning. We have not bound ourselves by any of the regulations used by steam roads at the freight house in St. Louis or East St. Louis, but have attempted to adapt our service to the requirements of the shipping public. We keep our freight house at 716 Morgan street open until 6 p. m. and if a wagon should arrive at this freight house before the last transfer wagon leaves, if it be 7, 8 or 9 p. m., we make every possible endeavor to get the shipments and forward them the same night.

Passenger Rates.

Until July 1 of this year it was the practice of the steam roads to charge 3 cents per mile for 1-way tickets and 10 per cent reduction on the price of 2-way fares for round-trip tickets. The steam roads also sold a mileage book for which the purchaser paid \$30 and on which he was allowed a refund of \$10 by sending in the cover after the mileage had been used. On the Illinois Traction System 1-way fares on the basis of 2 cents per mile are given to every one without the investment of additional money. Illinois Traction System round-trip tickets may be bought at the ticket offices or from the conductors on the cars on the basis of 1½ cents per mile. Commutation books of the Illinois Traction System are sold for the benefit of school children, school teachers and workingmen, 44 rides for the school teachers and school children and 52 miles for the workingmen to be used in 30 days on the basis of 1 cent per mile. Mileage books for 500 miles are sold on the basis of 1½ cents per mile, or \$7.50, good for a single individual, or for a man and his family, or for a contractor and his men, or for a firm and its representatives.

I have said in some of our advertising that the voluntary reduction of fares is the best evidence of good faith on the part of the railroad, and this is the policy which has been pursued by the Illinois Traction System. Consider the difference in the attitude of steam roads, the lobby maintained at Springfield and in other capital cities to endeavor to keep the 2-cent fare laws from being passed; and note the calamity howls raised by the steam roads that these rates would affect their prosperity, the

suits which have been brought in various states and decisions that have been rendered in some states that the 2-cent fare laws were not legal because the general assemblies had not given them full consideration. The real fact of the matter is that the Illinois Traction System, by its voluntary reduction of fares, its frequent service and courteous treatment to patrons, carries eight times as many patrons between any two given points as were carried by paralleling steam roads prior to the construction of the interurbans.

Freight Rates.

In our freight rates we have used the railroad and warehouse commission of Illinois classification and distance tariff and have accepted, without comment, the reduction of 20 per cent in these rates made on January 1, 1906. In this classification the Illinois Traction System is called a class B road. By this is meant that the Illinois Traction System, if it desires, can charge 10 per cent more than the steam roads in its same territory on the first five classes and 5 per cent more on the last five classes, which latter are principally carloads. The Illinois Traction System has made no attempt either in open or competitive territory to take any advantage whatever of this ruling of the commission. The steam roads, in making complaints, have admitted that we practically give express service at freight rates and give this as their reason why we should attempt to charge a higher rate. But the policy of this company has been, and always will be, to work in harmony with the industries and with the business communities of our territory.

Securing an Entrance to St. Louis.

In the latter part of 1905 Mr. McKinley sent me to St. Louis to call on one of the officers of the Terminal Railroad Association in reference to our entrance to St. Louis. I called on an officer of the Terminal company and explained to him the plans in my mind. I was informed that on account of the congested condition of the available bridge no electric line could use it. I have no doubt this is true. I said to him that the electric lines would get into St. Louis; if no other way presented itself they would secure their own bridge and terminal and I felt sure that the people of St. Louis would welcome us.

We immediately proceeded to obtain a franchise in St. Louis and to lay our plans for construction of the bridge for the use of our system and such other electric lines as desire an entrance and a terminal in St. Louis. The granting of this franchise has been approved by every business man, every business organization and every newspaper in St. Louis. We were ably assisted by everyone in St. Louis. As a result, the franchise has been granted, and we have let the contract for our bridge. The contract is dated November 1, 1907, and delivery is specified in 18 months. At this time the work on the abutments is progressing rapidly. One hundred men have been working during the day for the last 30 days and arrangements have just been made to add a like force of night men in order that the work may be pushed to completion. We have spent some \$900,000 for real estate for the location of our express and passenger terminals. We expect during 1908 to lay our tracks and to operate as best we can under the franchise granted. This franchise imposes on the Illinois Traction System, without any great objection on our part, a 5-cent fare from St. Louis to Granite City. In this the people of St. Louis have obtained a wonderful advantage. At the present time no one, unless he walks, can reach East St. Louis from St. Louis for less than 10 cents.

Number of Passengers to St. Louis.

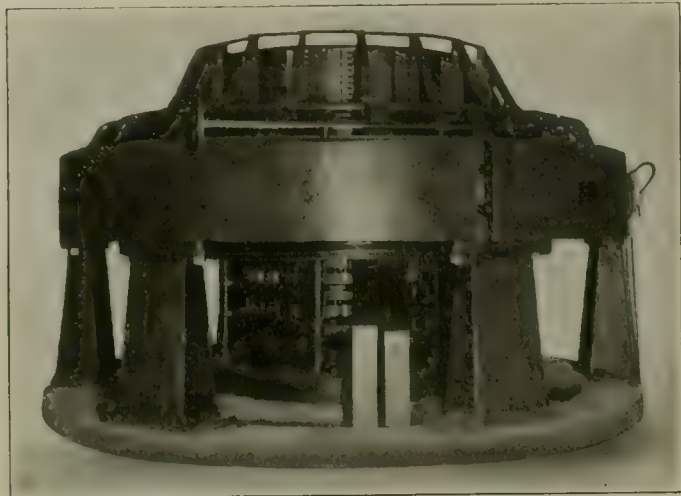
Possibly a few people in St. Louis realize the number of passengers carried to St. Louis by the Illinois Traction System. The average so far since we have been operating into East St. Louis has been about 500 per day. Undoubtedly the year 1908 will show an increase of 100 per cent in this number, and when the bridge is completed and people from Illinois can be landed in St. Louis without change of cars and in less time than it now takes us to reach East St. Louis, the patronage will certainly be enormous.

The best evidence that our present facilities are better than ever existed before is the fact that, except in isolated instances, we are never requested to trace a shipment. I do not believe you will find this true of any steam road operating into St. Louis. I believe that the people of Illinois want to come to St. Louis. I believe that our practice of continuing excursion rates, if they have been discontinued by the steam roads, is beneficial to us and that it has added materially to the prosperity of St. Louis.

The Portland Railway Light & Power Company has placed orders for the installation of an electric block signal system on its Mt. Scott line. Additional sidings are also to be constructed.

A VERTICAL-SHAFT ROTARY CONVERTER.

The Commonwealth Edison Company of Chicago has installed two vertical-shaft rotary converters, built by the General Electric Company, the first ever placed in service. The machine illustrated herewith, of 2,000 kilowatts capac-



Vertical-Shaft Rotary Converter—View of Machine in Service.

ity, is installed in the Commonwealth Edison Company's Market street substation and has been in successful operation since December 6. A second unit, of 1,000 kilowatts capacity, has been installed in the Randolph street station, but is not yet in service.

The electrical characteristics of the new machine are identical with those of the ordinary horizontal-shaft rotary converter made by the General Electric Company, but the use of the vertical shaft makes possible a number of advantages over the older type in the way of economy, simplicity and accessibility.

One of the chief advantages will be apparent from a comparison of figures showing the floor space required for the two types. The floor space required for the horizontal rotary of 1,000 kilowatts capacity is 11 feet 2 inches by 11 feet 7 inches; for the vertical machine of this size the floor space measures 9 feet 8 inches in diameter. A 2,000-kilowatt machine of the horizontal type requires a floor space of 16 feet 6 inches by 16 feet 8 inches, while the vertical machine requires a space 15 feet 3 inches in diameter. The 1,000-kilowatt horizontal machine measures 9 feet 7 inches in height above the floor, as against 7 feet 3½ inches for the vertical. The 2,000-kilowatt machine measures 12 feet 7 inches for the horizontal and 9 feet 3 inches for the vertical.

The vertical design permits of an increase of about 40 per cent in speed over a machine of the horizontal type having the same electrical characteristics and a saving of about 17

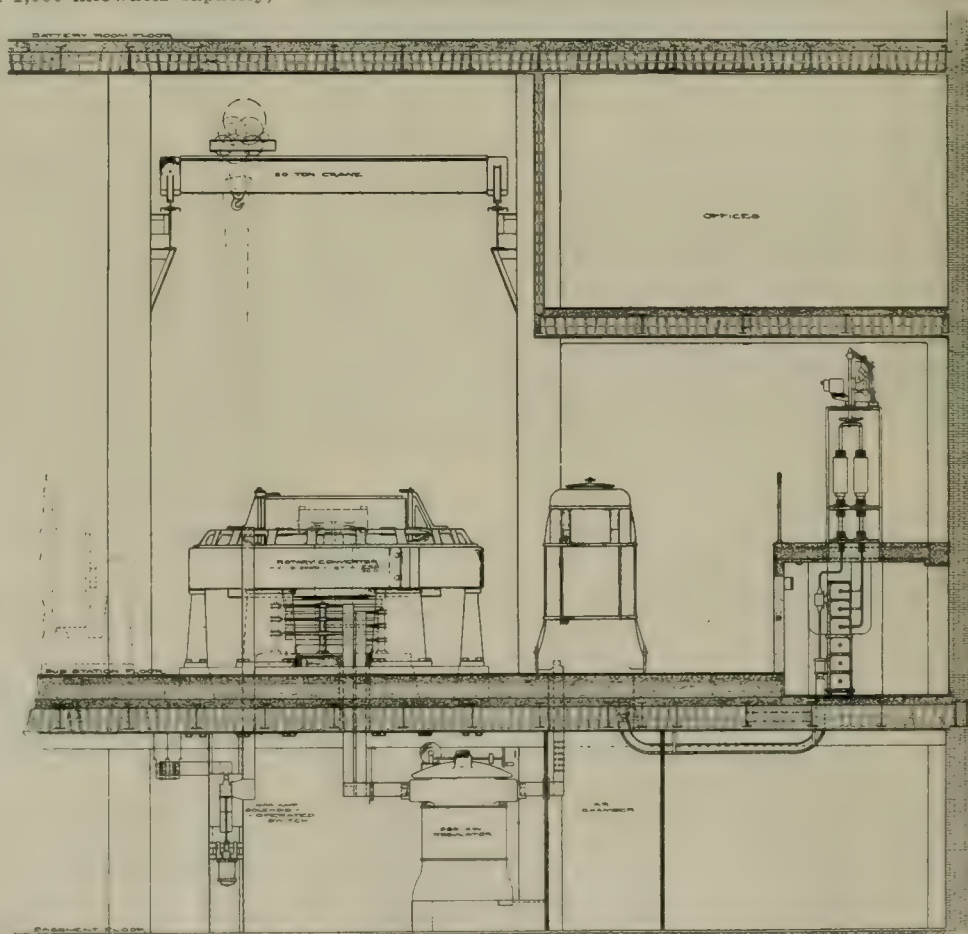
per cent in weight is gained for machines of equal capacity. The increased accessibility for adjustment, oiling or repairing will be noted by reference to the photograph. If necessary the field frame may be removed by removing the bolts.

The rotary installed in the Market street substation turns at 167 revolutions per minute and sets up a strong air current which is so directed as to prevent heating in the core and in the commutator. Current is supplied from the Fisk street station of the Commonwealth Edison Company at 9,000 volts, 25 cycles, and is converted to direct current at 240-300 volts for use in the lighting system.

There has long been a demand for a method of economizing in the floor space required for a converter. Many substations located in congested districts have outgrown their quarters, but are so situated that enlargement is impracticable. In such cases the vertical machine will fulfill an important requirement, as it permits of an increase of capacity without increasing the space allowed. The machine illustrated herewith is used for lighting purposes, but is equally applicable to steel railway use.

C. W. Stone, of the General Electric Company, has been especially active in the development of the new machine, with the co-operation of the engineering department of the Commonwealth Edison Company.

Interesting experiments on the shrinkage of wood due to the loss of moisture have recently been completed by the United States Forest Service at its timber testing station at Yale University. These experiments show that green wood does not shrink at all in drying until the amount of moisture in it has been reduced to about one-third of the dry weight of



Vertical-Shaft Rotary Converter—Section of Market Street Substation, Showing Apparatus.

the wood. From this point on to the absolutely dry condition the shrinkage in the area of cross section of the wood is directly proportional to the amount of moisture removed.

PIPING AND POWER STATION SYSTEMS—LXVII.

BY W. L. MORRIS, M. E.

Class V 5—Sundry Pressure or Speed Regulator Connections.

A satisfactory method of piping pump governors is shown in Figure 89. To insure smooth running, a sufficient volume of steam is required between governor and machine. (See Figure 93.) An engine driving a centrifugal pump or running at different constant speeds should have a slide weight governor similar to that shown in Figure 96. Governors that control pumps delivering against a uniform head are so unchangeable in the position of the valve that very satisfactory results can be secured by hand control. A by-pass should be placed around the governor on such a pump, then repairs can be made to the governor while the pump is under hand control.

It is advisable to furnish feed pump governors with a by-pass. Then if the governor is controlling the pumps, the feed valves may be opened or closed to regulate the feed to the boilers. If a pump is hand controlled, regulation requires that the steam throttle to pump be changed. This increases or decreases the delivery of the pump. Probably the most perfect control is obtained with a weight so hung on the pump governor lever that it may be adjusted by a screw and hand wheel. Then for regulation, instead of altering the feed valves, the output of pump can be altered.

A fire pump should be provided with a by-pass around the governor if there is any possibility of the governor being disarranged while in operation. In case of fire it would be far better to have a man stand at the throttle, working it by hand, than to risk a poor governor interfering with the water supply. The successful continuous operation of a fire pump should not be dependent upon any device that cannot be hand operated if necessary.

For every given speed of an engine driving an electric generator the governor opens the valves a given amount, making it impossible to secure the same speed with different amounts of valve opening. If a condenser is thrown on, it immediately relieves the engine of a large part of its load and to reduce the steam fed to the engine it is necessary for the engine to increase its speed until the port openings of valves correspond with the smaller amount of steam required. Engine governors also fail to "anticipate the on-coming variations."

The inertia governor has been in use for a considerable time on high-speed shaft governor engines. It is the most approved type and with it it is possible to secure higher speeds with a heavy load than with a light load. This is because the valve opening is controlled partly by the retardation of shaft rotation. Such retardation is wholly a result of load, not speed. There are a few types of Corliss inertia governors, but as they are operated by belts most of the small amount of acceleration or retardation is lost. High-speed engines have their inertia governors directly attached to the moving parts; the balance wheel is relatively light and subject to retardation and acceleration. Heavy Corliss engines are slow in this inertia movement and the force is liable to be lost in the governor belt. These corrections for variable loads, and for vacuum, should be refinements that could be thrown on and off at will and not make the regulation of the engine dependent upon them.

Figure 397 (V 5-1) shows a standard Corliss fly-ball governor with links for changing the pivot or fulcrum, A. By

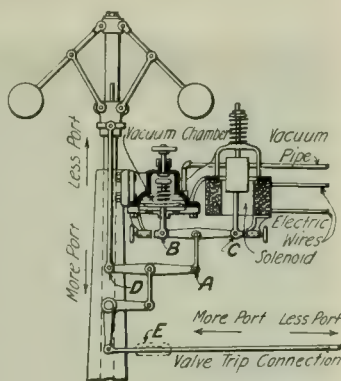


Figure 397 (V 5-1).

holding this fulcrum in one position the valve motion is operated wholly by the speed. This fulcrum, A, can be raised or lowered by either vacuum or the output (amperes) of the driven machine. The pin, B, lowers when the vacuum is off, the pin, C, lowers when the load increases and the pin, D, lowers as speed decreases, the lowering of any of these pins causing increased port openings, the lowering of all three causing ultimate port, and raising a minimum port, opening. The pin, B, may drop when vacuum goes off at the same time the pin, C, may raise when load drops, thus causing no movement of the pin, A. Then, again, the speed may raise the pin, D, but if pins, B and C, should be lowered at the same time, no change would take place in valve trip connection. Thus the three elements work in unison and the engine is governed by all three.

To partially overcome the defective regulation of a purely speed governor, it is customary to provide a hand device for increasing or decreasing the port openings in relation to a certain speed. This is effected by increasing or decreasing the relative position of valve trip connection by means of a turnbuckle, shown dotted at E. The arms at pins, B and C, are designed to lock either or both of these pins, thus throwing out of operation the vacuum controller, or load controller, or both, and leaving the engine on speed control alone. If the load variations cause too sudden changes in valve opening, then a dash pot can be used to eliminate this pulsating movement.

Class V 6—Sundry Lubricator Connections.

The old-style glass sight-tube gravity lubricator should not be ordered with new equipment because a mechanically driven force feed pump can be secured for a price that will enable it, in a short time, to effect sufficient saving in oil to pay for itself. The larger engine builders furnish good types of force feed pumps and all necessary connections. An oil pump invariably gets far more oil than it requires, and if two feeds are used they should both lead to the steam line. It would otherwise be quite difficult to cut down the stroke or oil discharge sufficiently if two were working. The same principle should be observed for small stoker and fan engines which get too much oil. Rather than use a 2-plunger pump it will be better to use in conjunction with a small single-plunger pump a plain gravity cup available for emergency cases. If a pump is compound then a larger oil pump can be used with it, having a dividing partition so that two kinds of oil may be fed. In practice, however, it has been found that little or no additional oil is required for low-pressure cylinder other than that which is carried through from the high-pressure end. By using a 2-compartment pump, each compartment having one plunger, both feeds may serve the high-pressure cylinder, or if one pump will serve the other may be held in reserve.

Class V 7—Sundry Trap Connections.

Steam traps are commonly looked upon as a nuisance, but there are situations which will permit of no other method of doing their work. If a plant is carefully laid out it is quite probable that traps will not be required for any of the steam lines. Steam machines will take through them considerable condensation and oftentimes a trap need not be used; but in this connection it must be remembered that for every pound of condensation sent through a steam machine there is a loss of one pound of steam in addition to the loss of condensation by using steam in this condition. If there is no other way of freeing a steam line of this entrainment, then a trap should be used, even if it is necessary to blow the drips to waste.

The intermediate receiver has virtually no other way of discharging its drips except through a trap and to unify the responsibility for a satisfactory engine installation it will be found advisable in ordering an engine to specify that the builder furnish the trap. A trap for receiver service should be of large capacity. The use of two valves seated simul-

taneously is questioned, because this is a form of construction that it is next to impossible to keep tight. The trap shown in Figure 336 is suitable for receiver service. Either of the two valves can be seated separately. To permit repairs it is necessary to have a by-pass with a valve and also valves in the trap inlet and outlet. In ordering a by-pass it is generally understood that these three valves are required whether the by-pass be for a trap, governor, reducing valve or any other flow-regulating device.

In addition to the by-pass all traps should have a blow-off connected to the trap discharge line. Figure 398 (V 7-1) shows a trap with a drip inlet, A, a drip discharge, B, a trap blow-off, C, and a by-pass valve, D. It will be noted that the three unions are located between the valves and the trap, permitting the trap to be removed at any time, even though there is pressure on the drip line. It will also be noted that all the connections drain into the waste and thus are safe against freezing if out of service.

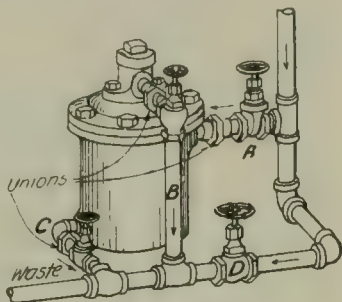


Figure 398 (V 7-1).

Class V 8—Sundry Plugged Openings and Air Vents.

The bottoms of water pump cylinders are invariably supplied with plugs, but these are generally made of cast iron. Brass should be used instead of iron because iron plugs are liable to rust in so they cannot be removed. If a plant is to be shut down and there is a possibility of water freezing it is absolutely necessary to drain the water out of all pipes and machines to prevent them from being damaged. All exhaust and steam branches not having permanent drains should be provided with plugged openings at each low point. A plugged opening should be provided in the feed main next to a pump and another at the extreme end of the feed line so that a gauge may be used if desired. Tapped openings should also be provided in a compressed air line, one close to the compressor and another at the extreme end of the line. The vacuum lines should also have plugged openings at the condenser and at the engine. These different plugged openings should be provided before the pipe lines are blown out, as considerable risk is run in drilling and tapping into lines that are liable to carry chips into cylinders or valves.

The gauge openings should be $\frac{1}{4}$ inch and closed with brass plugs. Openings for thermometers may be plugged also if there is no certainty of their immediate use. The openings in smoke flues, furnaces, etc., to obtain temperatures and draft readings should all be determined early in the work and their locations stated so that contractors may not overlook them. A pipe sleeve should be built in such walls. The outside of the walls will generally be found cool enough so that a wooden plug will stand the heat; if not, a washer with a small hole in it can be placed over a $\frac{1}{8}$ -inch spring cotter, the ends of the cotter being allowed to spring open and hold washer up against the end of the pipe sleeve.

To avoid rumbling in closed heaters and economizers it is necessary to discharge the air. A small blow-off should be provided for this purpose. This blow-off may be open to the atmosphere if desired, because it will be closed as soon as it has served its purpose in discharging the air. A valve $\frac{1}{4}$ inch or $\frac{3}{8}$ inch in size would be of ample size as a blow-off for almost any heater or economizer. It is the usual practice to use the blow-off at the extreme top of a heater for a scum blower as well as to discharge air. At the top of an economizer there would be placed only the relief valve, but an air vent also should be placed at the top of the upper economizer manifold. A careful operator desires neither

water hammering nor snapping in pipe lines and station apparatus. If he is in doubt as to the amount of pressure at the end of a line there should be means for his determining it.

There is too strong an inclination on the part of the employer, and to a large extent on the part of the designing engineer also, to limit power station facilities to those readily apparent as absolute essentials. Rather than reduce these facilities to the least possible amount it would be better to slightly overdo and afford the operator every means for doing his duty well, even though a few of these means provided are never used.

(Concluded.)

ELECTION OF OFFICERS, MANUFACTURERS' ASSOCIATION.

At a meeting of the executive committee of the American Street and Interurban Railway Manufacturers' Association, held in New York City on December 15, Joseph R. Ellicott, manager of the Westinghouse Traction Brake Company, New York, was unanimously elected president of the association for the ensuing year, succeeding James H. McGraw, president of the McGraw Publishing Company, New York. The other officers elected were as follows: Vice-president, Howard F. Martin, general manager of sales Pennsylvania Steel Company, Philadelphia, Pa.; treasurer, A. H. Sisson, general manager St. Louis Car Company, St. Louis, Mo.; secretary, George Keegan, assistant general manager Interborough Rapid Transit Company, New York.

The following members of the executive committee were present at the meeting: James H. McGraw, Howard F. Martin,

F. C. Randall, Joseph R. Ellicott, Otis Cutler, A. H. Sisson, K. D. Hequembourg and Charles C. Peirce.

The report of the treasurer, Joseph R. Ellicott, showed a satisfactory balance, with a membership in good standing of 293. The report of the treasurer was approved and a vote of thanks was extended to the members of the finance committee.

The report of A. L. Whipple, chairman of the entertainment committee, was accepted

and the members of the committee were tendered a vote of thanks for their efforts.

A committee, consisting of Messrs. McGraw, Martin and Peirce was appointed to draft resolutions on account of the death of William Wharton, Jr., who until October of this year was a member of the executive committee.

A motion was passed to secure the consent of the members by a letter ballot to a change in the by-laws providing for three vice-presidents, instead of one as at present.

The Atlantic City Hotel Men's Association was represented at the meeting and extended an invitation to the association to hold the annual convention next year at Atlantic City.

Since the installation of a frequency-changer at the North Beach power house, the United Railroads of San Francisco has added 65 cars to its service, making 450 cars now in operation; more than at any time since the fire. The company has recently overhauled 25 cars, which will be added as soon as arrangements for additional power are completed.



Joseph R. Ellicott.

News of the Week

American Railway Association.

At the meeting of the American Railway Association on October 30 last, a number of important changes in the articles of organization and by-laws were proposed. The amendments provide for the following changes:

Companies operating less than 100 miles of road, or having roads operated solely by electricity, or which are located elsewhere than in the United States, Mexico or Canada, to be admitted as associates, the executive committee to be given authority to determine the qualifications for taking membership or associate membership.

When an associate member shall increase its mileage operated so as to have more than 100 miles, it may on application be admitted to membership, and if it shall increase its mileage to 150 miles it shall then become ipso facto a member, subject to dues and assessments.

Transportation Affairs in New York.

The New York public service commission of the first district has issued an order to the receivers of the New York City Railway Company, providing for a hearing to be held on December 21 at which the company will be given an opportunity to show cause why each of its cars should not be given a thorough detailed inspection, by expert engineers, and be completely overhauled. It is provided that the cars be examined by inspectors in the employ of the commission, after the repair work is completed, and before the cars are put into service. The order is the result of a report made by A. W. McLimont, the commission's electrical engineer, who has been making an examination of the company's equipment and service. The report has not been made public.

Hearings will be held on December 23 on orders directed to the Interborough Rapid Transit Company to show cause why additional cars should not be operated in rush hours on the Second and Sixth avenue elevated lines. A provisional order for service improvements on the Forty-second Street Manhattanville & St. Nicholas Avenue Railroad will also be considered on December 23.

On December 16 the commission received from J. F. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit Company, a statement showing that the number of surface cars operated by the company had been increased during the year ending November 30, 1907, from 1,403 to 1,604. Of these 100 are new cars and 101 are rebuilt cars with increased seating capacity. The increase in cars during the year was 14.3 per cent and in seating capacity 16.8 per cent. On the elevated lines there are now 827 cars available for service. No additional cars have been put on during the year, but 100 have been ordered for early delivery. The car mileage during November of this year was 8 per cent greater than in 1906, while the number of passengers carried decreased 1 per cent.

H. P. Nichols, engineer in charge of the bureau of franchises, has reported that the Brooklyn Queens County & Suburban Railroad owes the city \$81,516.32 as payment for the 5 per cent tax on gross receipts with penalties for non-payment from 1902 to 1907 inclusive. Mr. Nichols recommends granting the company's application for a franchise for additional lines in Queens, but with a provision for payment to the city of a fixed sum each year and an increasing percentage of receipts during the life of the franchise.

On December 17 the commission adopted a final order to the Brooklyn Union Elevated Railroad requiring it to install 143 additional station signs at specified points along its lines. Additional stairways must also be constructed and improvements made at several stations.

A hearing was held on December 12 on a proposal to require the Interborough Rapid Transit Company to install automatic safety stops on the local tracks in the subway, as well as on the express tracks, at present. Frank Hedley, general manager, declared that this would necessitate reducing the service, as trains could not be run so close together as at present.

Cleveland Settlement Negotiations.

The appraisers selected to determine on a valuation of the property of the Cleveland Electric Railway, as a basis for a lease to the Municipal Traction Company, met in another conference before the Cleveland city council on Tuesday morning of this week. F. H. Goff and Mayor Johnson, the mediators selected by the Cleveland Electric and the city to effect a settlement of the franchise controversy, were also present. No final reports were received from any of the appraisers and

a detailed discussion of methods of determining the cost of track occupied much of the session. Robert Hoffman and C. H. Clark, appointed to estimate the track value, reported that they had failed to agree on the cost of excavation and tracklaying and on the amount of depreciation. Mr. Hoffman, representing the city, estimated the cost of tracklaying at \$800 per mile and the depreciation of the tracks at 47 per cent, while Mr. Clark, representing the company, estimated the tracklaying at \$2,112 and depreciation as 33 per cent. They were requested to bring in a report on the number of men and the time of labor required to do the work.

Presidents Andrews and du Pont are still figuring on the value of the power stations and report that they expect to agree on approximately \$1,000,000 for the overhead equipment.

The greatest difficulty appears to be found in calculating the value of the franchises. William Barclay Parsons of New York has been engaged to estimate the franchise value and another expert is to be appointed to represent the city. Mr. Johnson asked to be the other expert, but Mr. Goff would not agree. Before estimating the value of the franchises the dates of their expiration must be determined. The company's attorneys claim that none of the franchises expires until 1910, while the city claims that the Woodland, Lorain, Detroit and Madison avenue franchises expire next February. S. H. Tolles and City Solicitor Baker, appointed to determine the dates of expiration, have received copies of the claims of both the company and the city.

New York Central Electric Service to be Extended.—It is announced that, beginning on January 1, the New York Central & Hudson River Railroad will begin operating local trains from the Grand Central Station to Yonkers, a distance of 15 miles. At present the electrical operation extends only to High Bridge, about six miles.

First Street Railway Case Before Minnesota Commission.—The Minnesota railroad commission has accepted jurisdiction in the first case ever referred to it affecting electric railways. The case is a complaint in regard to the street car service brought by the city officials of South St. Paul. The complaint was made verbally, but they were requested to make their charges in writing and told that the matter would be taken up at once.

Cement Show.—The first annual cement show under the auspices of the Association of American Portland Cement Manufacturers, was held at Chicago, December 18, 19, 20 and 21, at the Coliseum. The show comprised exhibits of many prominent manufacturers of cements or cement-handling and construction devices. The entire floor of the Coliseum was filled with the booths of the various firms represented. In connection with this show the Northwestern Cement Products Association held a meeting on the first two days of the show.

Recent Accidents.—Fifteen persons are said to have been injured on December 11, when a car of the Alton Granite & St. Louis Traction Company became derailed on a curve at the foot of a grade and overturned. The rails were slippery on account of frost and the motorman was unable to hold the car in check.—An interurban car on the Shelbyville division of the Indianapolis & Cincinnati Traction Company ran into an open switch a half mile south of Acton on December 12, jumped the track and turned over, killing one man, seriously injuring another and slightly injuring several others.

Pay-As-You-Enter Cars for Jersey City.—It is announced that the Public Service Railway, of Newark, N. J., has placed an order with the Cincinnati Car Company for 150 pay-as-you-enter cars, for use in Jersey City. The cars are to be delivered beginning in January and to be placed in service in March. The cars will, in general, be similar to the cars now in use, which are 44 feet 2 inches long, with a front platform of 5 feet and a rear platform of 8 feet 6 inches, built for single-end operation. The rear platform will be divided by two railings, as in the Montreal cars, one separating the entrance and exit and one 2 feet 6 inches from the rear end, allowing space for smokers.

New Service on the Illinois Traction System.—It is announced that about January 1, 1908, or as soon as the Lincoln-Mackinaw line is completed, through service will be established from Bloomington to Springfield, Ill., 77 miles, and also from Peoria to Springfield. It is also announced that one of the company's sleeping cars, which now runs from Springfield to East St. Louis, will be placed in service between Peoria and East St. Louis, leaving Peoria at 8 p. m. and arriving at its destination at 4 a. m.—After January 1 the company will discontinue the sale of tickets on the cars and a ticket agent will be located at every stopping place so that passengers may purchase tickets before boarding the cars.

Freight Rights Granted in Massachusetts.—Freight rights long denied to the Old Colony Street Railway in West Bridge-

water and Fall River, Mass., important junction points, by the local governments in these places, have now been granted by the railroad commission of Massachusetts. The West Bridge-water grant makes possible direct freight routes between Brockton and Bridgewater, Middleboro, and New Bedford, in place of running the cars over a long detour through Taunton. Plans for the Fall River routes are not yet perfected, but they will eventually provide connections with Brockton, Taunton, New Bedford, Providence and the intervening towns, where the company already is operating its freight cars with much success.

A. H. Smith Acquitted of Charge of Manslaughter.—On December 18 Justice Kellogg of the New York supreme court instructed the jury to return a verdict of not guilty in the case of A. H. Smith, vice-president and general manager of the New York Central & Hudson River, who had been indicted for manslaughter in the second degree, on the theory that he had been criminally negligent in his management of the road, and that his negligence was responsible for the wreck at Woodlawn on February 16, 1907. After the state had presented its evidence the court directed the verdict of acquittal, holding that no proof of personal negligence had been shown, and that the defendant had performed his duties as general manager as well as could be expected.

Exhibition Committee National Electric Light Association.—The following have been appointed members of the exhibition committee of the National Electric Light Association: F. H. Gale, General Electric Company (Chairman); J. C. McQuiston, Westinghouse Companies; H. P. Heger, Allis-Chalmers Company; Rodman Gilder, Crocker-Wheeler Company; H. M. Post, Western Electric Company; C. P. Frey, Weston Electrical Instrument Company; Benjamin Wall, Metropolitan Engineering Company; James I. Ayer, The Simplex Electric Company; S. E. Doane, National Electric Lamp Association. At the Washington convention last June the manufacturers connected with the association offered to relieve the association of the responsibilities connected with the organization and maintenance of the exhibits at the annual conventions. The proposal was accepted and a nominating committee was appointed to select a committee to take charge of the exhibits. The foregoing names were selected and approved and the committee has been organized. The committee is subject to the executive committee of the association and will co-operate with the president and other officers.

Southwestern Electrical and Gas Association.—A meeting of the executive committee of the Southwestern Electrical and Gas Association was held at Dallas, Tex., on December 4, with President H. T. Edgar in the chair. A. E. Judge, treasurer, submitted a report showing the financial condition of the association on December 1, for the years 1904, 1905, 1906 and 1907. This report showed that the finances of the association are in a better condition than ever before in its history. It was decided that the members of the executive committee should confer with the general passenger agents of the different railroads of the state, with a view to obtaining reduced rates for the next convention of the association to be held in El Paso, Tex., in May, 1908; and until the question of rates was finally settled it was thought best not to set a date for the next meeting, but to defer action on this matter until the next meeting of the executive committee. It was the sentiment of all members present that the El Paso meeting would be the largest in the history of the association. The secretary was instructed to gather such information regarding taxes, both ad valorem and special; cost of street improvements; donations, etc., as would be of benefit to the association. This information is to be compiled and filed in the office of the secretary for the future use of the members of the association only.

Results of Concrete Tests.

Much valuable information with regard to the behavior of concrete under test conditions has been distributed as the result of tests carried on at the University of Illinois engineering experiment station at Urbana, Ill. The latest bulletin of tests is No. 14. The topics investigated include the effect of the quality of concrete upon the strength of beams, the effect of repetitive loading upon the action of beams, and the resistance of beams to diagonal tension failures. The results of the investigation of diagonal tension failures throw light upon the amount of the vertical shearing stress which may be allowed in reinforced concrete beams not having metallic web reinforcement. The resistance of beams to diagonal tension may be the controlling feature of relatively short beams, and, as such failures occur suddenly and without much warning, a knowledge of the resistance of the concrete is essential. The tests of concrete columns and reinforced concrete columns and of reinforced concrete T-beams for 1906 have already been published.

Construction News

FRANCHISES.

Green Lane, Pa.—A franchise has been granted by the town council to the Perkiomen Valley Traction Company to build a line from Green Lane to Collegeville, Pa.

Streator, Ill.—The city council and the Illinois Traction System have agreed upon a franchise for the operation of a line through the city, which will be a part of the proposed Chicago-St. Louis route. The company agrees to begin construction by March 1, 1908, and to build a bridge across the Illinois river, the cost of which will be divided between the city and the company.

Danville, Ill.—The Danville & Southern Railway Company has applied for a franchise to operate its proposed interurban line through Danville to the city limits on the Perryville road. As proposed the line will connect with the Terre Haute & Western Railway, recently completed from Terre Haute to Paris, thus affording a direct interurban route between Indiana and Illinois. It is stated that construction work probably will be started in the spring.

Minden, La.—H. A. Davis and J. B. Story have applied to the city council for a street railway franchise for the Minden Traction Company, in which a New York syndicate is also interested.

Monongahela, Pa.—The application of the Monongahela & Carroll Street Railway to build a street railway in Monongahela has been approved by the city council. The road will be continued to Bentleyville and later to Washington, and must be completed and in operation within three years. A bond for \$5,000 also must be deposited with the city within 30 days to insure the early beginning of construction work. The nominal capital stock is \$12,000. E. B. Hartman, Jr., W. D. McBryar, E. W. Marshall, W. S. Walsh and W. E. Walsh, all of Pittsburg, are interested.

Washington, D. C.—A bill has been introduced in the United States senate to authorize the Capital Traction Company, the Washington Railway & Electric Company and the City & Suburban Railway to extend their tracks to the new Union station.

RECENT INCORPORATIONS.

Chicago Joliet & Central Illinois Railway, Chicago, Ill.—Incorporated in Illinois to construct and operate an electric railway from Chicago in a southwesterly direction through the counties of Cook, Du Page, Will, Bureau, Peoria, Kendall, Grundy, La Salle, Livingston, Putnam, Marshall, McLean and Woodford, passing through Lyons, Downers Grove, Lockport, Joliet and other points in the central portion of the state. Incorporators: Josiah Burnham, Hugo De Loeb, George L. Turnbull, Gerald Turnbull and L. H. Strickler.

Improved Electric Railway, Jerseyville, Ill.—A certificate of incorporation has been filed by this company. Capital stock, \$200,000. Incorporators: S. H. Bowman, S. L. Hill, Dr. A. A. Shobe, William J. Herman and others.

Pueblo & Arkansas Electric Railway, Pueblo, Colo.—Incorporated in Colorado to build an electric interurban line connecting Pueblo and Rocky Ford, Colo., and the intermediate towns of Avondale, Vineland and Fowler in Otero county. The road as proposed will form part of an interurban system of electric lines, which will serve the entire Arkansas valley, including Pueblo, Otero and Fremont counties, with a possible southern terminus at Trinidad. Capital stock, \$300,000. Incorporators: E. B. Chapze, M. J. Verner, Lester Wolf, N. Douthitt, all of Kansas City, Mo., and M. G. Saunders, Pueblo, Colo.

TRACK AND ROADWAY.

Accomac Power & Traction Company, Onancock, Va.—This company is seeking to make financial arrangements for the construction of its proposed line from Onancock via Tasley and Accomac Court House to Battle Point, Va. S. F. Rogers, president.

Albia Interurban Railway, Albia, Ia.—This line has been completed between Albia and Hocking, Ia., about three miles, and cars were operated over it for the first time on December 14. The road was built by the Engineering Construction & Securities Company and work was started in March, 1907. It is now planned to extend it to Hiteman, six miles north and from there on to Buxton, 12 miles, in the same direction, early in the spring. John P. Reese, president; C. A. Ross, vice-president; Calvin Manning, secretary and treasurer; C. B. Judd, chief engineer.

Barboursville, Ky.—It is reported that plans are being made for building an electric railway from Barboursville to Manchester, Ky., 24 miles.

Beaver Falls, Pa.—Two electric railway companies have applied for charters to build electric lines in Beaver and Lawrence counties. One is the Beaver & Lawrence Electric Railway Company, which proposes to construct a road from a point on the boundary line between Beaver and Lawrence counties to Beaver Falls. The Beaver Falls & Koppel Electric Railway will be built from Beaver Falls to Koppel, about 10 miles. S. L. Tone, Pittsburg, Pa.; T. P. Simpson, C. W. Gibbs, W. J. Horgan and B. S. Johnson are interested in the projects.

Boston & Northern Street Railway, Boston, Mass.—A subcommittee of the Metropolitan park commission of Massachusetts is now at work preparing a tentative plan for a location for the Boston & Northern Street Railway from the company's present line at Main and South streets, in Stoneham, southward over a separate right of way through the state reservation to a point near Spot Pond. The Boston Elevated Railway has this fall built a considerable section of double track on a location previously granted by the park commission from the Sullivan square terminus of the elevated structure northward through the parkway and over a separate right of way to meet the proposed Boston & Northern location. There is said to be no question that the Northern will get its location in time, the only doubt being how to allow it to use state land in a manner conducive to successful operation without raising objections from the park authorities. The Boston Elevated will complete its line early in the spring, thus providing a direct route from the heart of the city to the lake and woodland reservation.

Burghaw Traction Company, Burlington, N. C.—Junius H. Hardin, secretary and general manager, states that this company, recently incorporated, proposes to build an electric railway connecting Graham, Burlington and Haw River, N. C., a distance of seven miles. The preliminary work is now in progress. Franchises have been secured for the use of the county roads and local franchises have been applied for. James W. Murray, president; John M. Cook, vice-president.

Carolina Valley Railway, High Point, N. C.—Official advice from C. S. Currier, chief engineer, states that the company has laid two miles of track since January, 1907. Extensions are in progress from Thomasville to High Point, 6 miles, and from High Point to Greensboro, 16 miles. An extension also is contemplated from High Point to Winston-Salem, 22 miles.

Chicago Lake Shore & South Bend Railway, South Bend, Ind.—This company, which is constructing a line from South Bend, Ind., to Kensington, Ill., has recorded a trust deed to secure a bond issue of \$6,000,000 for construction and equipment purposes. The Cleveland Trust Company is trustee. J. B. Hanna, president, South Bend.

Cincinnati Dayton & Ft. Wayne Railway, Dayton, O.—Samuel F. George, president, states that contracts probably will be let early next spring for building this line from Cincinnati and Dayton, O., to Ft. Wayne, Ind., 194 miles. Right of way has been secured and surveys have been made, it is stated.

El Oro, Mex.—The Westinghouse Electric & Manufacturing Company has been awarded a contract by the Compania Minera Las Dos Estrellas for the electrification of a broad-gauge steam road from the El Oro mines to the town of El Oro. The road is to be operated by electric locomotives, built by the Westinghouse company and the Baldwin Locomotive Works.

Fairmont & Mannington Railroad, Fairmont, W. Va.—An official report states that grading will be completed by January 1 on this line from Fairmont to Mannington, W. Va., 14 miles. About 3½ miles of track has been laid and the rails for the remainder have been distributed along the right of way. Eighty-pound rails are used. F. H. Bailey, general manager.

Frankfort Delphi & Northern Traction Company, Frankfort, Ind.—Announcement is made that practically all of the right of way has been secured and some grading work done on this proposed interurban electric line, which was incorporated last January. The road will be built from Frankfort, Ind., to Chicago, Ill., by way of Delphi, Monticello, Monon and Hammond, connecting at Frankfort with the Indianapolis & Northern Traction Company. The company recently has been reorganized with the following officers: Abe Strauss, president, Chicago; W. H. Cohee, vice-president and general manager; W. Cohee, treasurer, Frankfort, Ind.; Charles E. Hyman, secretary, Chicago, Ill.

Fredericksburg & Southern Railway, Fredericksburg, Va.—This company has applied for a charter to construct

and operate an electric railway from some point in Hanover county to Fredericksburg, Va., and for the operation of a line in Fredericksburg. W. C. Whitner, president; E. J. Smith, vice-president; Alvin T. Embrey, secretary and treasurer. C. W. Jones, A. P. Rowe, James T. Lowery, A. W. Embrey, with the officers named, are directors of the company.

Gainesville Whitesboro & Sherman Railway.—It is stated that work will be resumed on this road within a few weeks and that the line from Gainesville to Sherman, Tex., will be completed within a year. John King, vice-president, Gainesville, Tex.

Goshen, Ark.—A meeting was held here recently in the interest of the proposed electric railway from Fayetteville to Huntsville, by way of Goshen.

Grand Central Traction Company, Indianapolis, Ind.—Surveys and estimates have been completed for the construction of this line from Indianapolis to Evansville and Terre Haute, Ind., with a branch line also from Terre Haute to Bloomington, Ill. It is stated that the company will be in the market in the near future for all material necessary to build the line. W. Duncan, chief engineer, Traction Terminal building, Indianapolis, Ind.

Idaho & Nevada Southern Railway.—This company proposes to build an electric railway from Jerome to Wells, Nev., 127 miles. Surveys are said to have been completed for the entire distance and incorporation papers have been applied for. Interests identified with an extensive irrigation project near Twin Falls are said to be back of the new road, which will be incorporated for \$500,000. H. L. Hollister, Chicago, Ill., is president. I. B. Perrine, vice-president; R. M. McCullom, secretary and treasurer.

Kankakee, Ill.—Committees have been appointed to secure the right of way for an electric line from Kankakee to Champaign, Ill.

Keokuk & Columbus Junction Transit Company, Keokuk, Ia.—Theodore A. Craig, secretary of this proposed 75-mile interurban electric line, writes that preliminary surveys have been completed between Keokuk and Columbus Junction. The road will serve the towns of Charleston, New Boston, Donnellson, Franklin, West Point, Lowell, New London, Winfield, Columbus City and Columbus Junction. The officers are: J. E. Peterson, president, New London; D. B. Hamill, vice-president; Theodore A. Craig, secretary; Ira W. Wills, treasurer, all of Keokuk, Ia.

Lewiston Augusta & Waterville Street Railway, Lewiston, Me.—Cars were placed in regular operation over the Auburn & Mechanic Falls division of this company's line last week. The new line is 10 miles long and the run is made in 40 minutes. E. D. Reed, general manager, Lewiston, Me.

Little Rock & Pine Bluff Traction Company, Little Rock, Ark.—This company has let contracts for grading the line between Little Rock and Pine Bluff, Ark., to Perry & Linville of Lamar, Colo., and Sims Brothers of Virginia. J. J. Fiske, president.

Los Angeles & Owens Valley Railroad, Los Angeles, Cal.—S. P. Jewett, president of this proposed road, states that the line will be 325 miles long, serving the towns between Los Angeles and the head of Owens Valley. Surveys have been completed from Vincent to Round Valley, 242 miles. S. P. Jewett, president and chief engineer, Los Angeles; George Chaffey and George B. Reeve, vice-presidents; W. M. Rose, secretary; A. M. Chaffey, treasurer.

Manchester (N. H.) Traction Light & Power Company.—This company has recently completed and opened for traffic the Manchester & Derry Street Railway, an 8-mile line from Manchester to Derry, N. H.

Mattoon Shelbyville Pana & Hillsboro Railroad, Charleston, Ill.—We are officially advised that the contract for the construction of this 68-mile interurban line from Mattoon to Hillsboro, Ill., will be let in the spring. The road as surveyed will serve the following towns: Gap, Windsor, Shelbyville, Wilt, Tower Hill, Ohlman, Rosemond and Nokomis, with termini at Mattoon and Hillsboro. Right of way and franchises are now being secured. W. R. Patton, president; I. B. Craig, secretary, both of Charleston, Ill.

Milwaukee (Wis.) Electric Railway & Light Company.—This company, on December 13, opened for traffic an extension of its Mukwonago line from Mukwonago to East Troy, Wis., a distance of seven miles.

New York & Berkshire Street Railway.—It is reported that New York promoters have been in Boston recently for the purpose of reviving the expired charter of this company, which was projected in 1902 to build an electric railway from

Springfield, through Agawam, Westfield, Southwick, Blandford, Russell, Granville, Tolland, Sandisfield, Otis, Monterey, Great Barrington and Egremont to Mount Washington, Mass. It is proposed to make use of the old surveys and estimates so far as possible.

Pacific Electric Railway, Los Angeles, Cal.—Announcement is made that the Glendora extension of this line has been completed as far as Azusa, Cal., and cars are now being operated to that city. It is expected that by the first of the year the line will have been completed to Glendora, 27 miles distant from Los Angeles. A large concrete bridge over the San Gabriel river, over which the double tracks of the line are laid, is an interesting feature of the new extension.

Paducah Southern Railroad, Paducah, Ky.—Surveys have been started on this proposed electric road, which will connect Paducah and Mayfield, Ky., by way of Hickman, about 25 miles. Franchises have been secured for the use of the streets in Paducah.

Philadelphia Rapid Transit Company.—The directors have offered a bonus of \$125,000 to the Millard Construction Company provided the section of the subway between the Delaware river and the City Hall is completed by June 1. If the work is completed by July 1, the contractors will receive \$95,000, and if by August 1, they will receive \$76,000. It is planned to double the construction force and to work day and night in the effort to complete the subway as soon as possible.

St. Louis Terre Haute & Quincy Traction Company, Springfield, Ill.—This company has increased its capital stock from \$25,000 to \$50,000 and has elected officers as follows: President, Edward Yates, Pittsfield, Ill.; vice-president, H. C. Simon of Virden; secretary and treasurer, F. W. Knollenberg, Quincy, Ill.

St. Joseph (Mo.) Railway Light Heat & Power Company.—This company proposes to begin shortly the construction of an extension of the Union street line north from Krug park to the proposed "Industrial City," $1\frac{1}{2}$ miles. J. H. Van Brunt, vice-president and general manager.

Salina (Kan.) Street & Interurban Railway.—It is reported that this company will electrify its line in Salina, which is now operated by gasoline. S. E. Griffin, secretary and general manager.

San Francisco, Cal.—Rudolph Spreckels, James D. Phelan and others, who before the fire proposed to build an electric conduit railway system in San Francisco, have decided to dissolve the corporation.

Sangamon Valley Railway, Springfield, Ill.—It is reported that construction work is to be started at once on this company's proposed line from Rochester to Hillsboro, Ill. The section from Springfield to Rochester is nearly completed and cars have been operated out of Springfield for some time. J. E. Melick, president and chief engineer.

South Bethlehem & Saucon Street Railway, Bethlehem, Pa.—It is announced that eight miles of this company's line has been placed in operation between South Bethlehem and Colesville. The line later will be extended to Center Valley, where it will connect with the Philadelphia division of the Lehigh Valley Transit Company's lines. It is expected that work will be started on this extension in the spring. Charles P. Hoffman, president, South Bethlehem, Pa.

Quincy, Cal.—Citizens of this city are said to have subscribed \$13,000 toward the construction of an electric or steam railroad, $3\frac{1}{2}$ miles long, to be built between Quincy and the Hartwell ranch on the Western Pacific Railway.

United Railways Company of St. Louis.—The operation of cars over the Kirkwood bridge spanning the Missouri Pacific Railroad on the Meramec Highlands division of the United company's road, will be resumed within a very few days. Since last summer the structure has been condemned by the city authorities of Kirkwood and passengers have been compelled to walk across. The bridge has been refloored and the tracks have been relaid.

Visalia Electric Railroad, Visalia, Cal.—It is stated that this company, which is building a single-phase railway system from Visalia to Lemon Cove, Cal., expects to have its cars in operation by the first of the year. The steel poles which will be used for the overhead construction in Visalia have arrived and will be placed in the near future. Work also has been started on a substation and a car house at Exeter. J. H. Crossett, Exeter, Cal., is superintendent and engineer.

Washington Baltimore & Annapolis Electric Railway, Baltimore, Md.—The last section of the track work necessary to complete the loop in Annapolis, Md., was finished by

this company on December 12. The remainder of the time available by the terms of the franchise will be consumed in repaving and repairing street pavements. All work must be finished by the first of the year or the company will forfeit a bond of \$5,000.

Washington & Elberton Construction Company.—This company has applied for a 20-year charter in Georgia to construct a proposed electric railway from Washington to Elberton, Ga., and later to Hartwell. Capital stock, \$75,000. The petitioners are: M. M. Elkan, J. H. Blackwell, W. H. Hudson, V. E. Hudgens and others.

POWER HOUSES AND SUBSTATIONS.

Jacksonville (Fla.) Electric Company.—This company is proceeding with improvements at its power plant, including the installation of an 800-kilowatt railway generator direct connected to a horizontal cross-compound engine, with a rating at normal load of 1,200 indicated horsepower; a 520-horsepower water tube boiler; a barometric condenser, having an hourly capacity of 40,000 pounds steam, with auxiliaries, consisting of engine-driven circulating pump and rotative dry vacuum pump; new feed pump; intake well and large suction and discharge pipes leading to and from river; complete water-softening plant for handling all feedwater used in boilers; water measuring device, with low-service pumps; new switchboard and feeder cables; air compressor and lubricating system; coal runway and apparatus for greater facility in unloading and handling fuel and a self-supporting steel smokestack, measuring 9 feet 9 inches internal diameter by 175 feet high from ground, to replace former structure. A new boiler feed pump and a portion of the condensing apparatus have been installed; the new smokestack has been completed and is now in use. It is expected that the improvements will be completed about the latter part of January. The Stone & Webster Engineering Corporation, 84 State street, Boston, Mass., has prepared plans and specifications and is in charge of the installation.

Lehigh Valley Transit Company, Allentown, Pa.—This company has recently completed new rotary converter substations at Slatington, Siegersville, Catasauqua, Hecktown, Bethlehem, Coopersburg, Sellersville and Lansdale, Pa., and the company's power system has been reorganized so that the old steam power houses belonging to the subsidiary companies will be abandoned. These are located at Hecktown, Bethlehem, Slatington, Quakertown, Souderton and Ambler, Pa. The central power station at Allentown now has a capacity of about 10,000 horsepower and generates current at 13,000 volts, which is transformed at the substations to 500 volts direct current for operation. An especially interesting feature of the company's power system as at present constituted is the transmission line from Allentown to Chestnut Hill, a distance of 51 miles, in which the current loss is said to be less than 10 per cent.

Port Arthur (Ont.) Electric Street Railway.—The city council has authorized the purchase of a 250-horsepower generator for the municipal street railway. T. H. McCauley, general manager.

Sioux City (Ia.) Traction Company.—This company has begun work on the construction of a new coal bunker and cinder hopper for its power house on Water street, Sioux City.

Toledo Fostoria & Findlay Railway, Fostoria, O.—This company has recently completed a new substation at Pemberville, O., and a 400-kilowatt rotary converter has been installed. Power will be furnished from the power house of the Lake Shore Electric Railway at Fremont, O., at 16,500 volts and will be reduced to 600 volts for operation.

United Railways & Electric Company, Baltimore, Md.—A permit has been secured for the erection of a 5-story reinforced concrete and brick fireproof structure to be erected inside the Pratt street power house. The structure will be 28 by 84 feet and will cost about \$30,000. The first floor will be used for cable vault, second and third floors for switch rooms, fourth for controlling gallery, and fifth for offices. L. B. Stillwell, engineer, 1314 Continental building, prepared the plans, and the Noel Construction Company, German and Calvert streets, will erect the building.

Virginia Passenger & Power Company, Richmond, Va.—The receivers of this company, Richmond, Va., under authority of the federal court, are preparing to spend \$250,000 for improvements in the power station and for building a new substation, to increase the available power and reduce electrolytic action in Richmond. The new capacity of the power plant will be 12,000 horsepower. A new 3,250-kilowatt unit, the largest in the state, is provided for the Twelfth street plant. The substation will be on Broad street, between Shaffer and Harrison streets.

Personal Mention

Mr. R. F. Henkle has resigned as president of the Illinois Central Electric Railway, Canton, Ill.

Mr. E. M. Bowman has resigned as traveling motorman and supervisor of the Chicago & Southern Traction Company, Chicago, Ill.

Mr. W. B. Colver has resigned as president of the Low Fare Railway and secretary of the Municipal Traction Company of Cleveland, O.

Mr. William V. Kessler, formerly chief dispatcher of the Pittsburg & Butler Street Railway, Pittsburg, Pa., has been appointed superintendent, succeeding Mr. C. L. Wilcoxon, resigned.

Mr. C. A. Address, heretofore assistant superintendent of transportation of the Bay City Traction & Electric Company, Bay City, Mich., has resigned to accept a similar position at Canton, O.

Mr. R. W. Harris, who for the past few years has been general manager and purchasing agent of the Illinois Light & Traction Company, Streator, Ill., has been appointed general superintendent of the Joplin & Pittsburg Railway, Pittsburg, Kan.; effective on January 1.

We are advised that the announcement of the appointment of Mr. J. W. Richardson as general manager of the Kansas City-Western Railway, Leavenworth, Kan., as published in the Electric Railway Review of December 14, was incorrect. Mr. Richardson is general superintendent, having held that position for 2½ years.

Mr. George Garrett has been appointed superintendent of the Lansing city lines of the Michigan United Railways, Lansing, Mich., succeeding Mr. Harry Inwood, resigned. Mr. Garrett has not yet assumed his duties and the position is being filled temporarily by Mr. Robert J. Munroe, secretary to Vice-President James R. Elliott.

Mr. N. A. Thompson, who has been connected with the passenger and freight department of the Columbus Delaware & Marion Railway, with headquarters at Columbus, O., has resigned, effective on December 1. He formerly was soliciting passenger and freight agent of the Indiana Columbus & Eastern Traction Company and more recently was freight agent for the company at Columbus.

Mr. William Jennings has resigned as mechanical and electrical superintendent of the Los Angeles Interurban Railway and the Pacific Electric Railway of Los Angeles, Cal., as previously mentioned in the Electric Railway Review. Since Mr. Jennings' resignation the mechanical department has been reorganized and Mr. Fred F. Small, heretofore chief draftsman, has been appointed mechanical engineer, having charge of all matters pertaining to the mechanical department and including the steam side of the power plant. Mr. F. H. Anderson, chief electrician, has been appointed electrical engineer.

Mr. William E. Rolston, heretofore superintendent of the Buffalo & Lake Erie Traction Company's Dunkirk & Fredonia division, has resigned, effective at once. He was formerly connected with the Canton-Akron Consolidated Railway. For the past year he has been connected with the Buffalo & Lake Erie company in charge of the construction work on the local lines, the operation of cars and the supervision of power house improvements. He has accepted a position in the motive department of the Cleveland Southwestern & Columbus Railway Company. Mr. William Swertsager has been appointed acting superintendent to succeed Mr. Rolston at Fredonia.

Mr. M. D. Kilbride has been appointed superintendent of the Rochester & Eastern Rapid Railway, with headquarters at Canandaigua, N. Y., effective on December 1, succeeding Mr. W. R. W. Griffin, who has been appointed general superintendent of the Rochester Railway at Rochester, N. Y. Mr. Kilbride entered the service of the Lake Shore Electric Railway at Beach Park in 1902, as cashier of its Cleveland division, resigning in March, 1904, to become connected with the Rochester & Eastern Rapid Railway. In November of that year he was appointed chief train dispatcher and later chief assistant to the superintendent, where he has remained until his present appointment as successor to Mr. Griffin.

Mr. W. R. W. Griffin, heretofore superintendent of the Rochester & Eastern Rapid Railway, Canandaigua, N. Y., has been appointed general superintendent of the Rochester Railway and controlled lines, succeeding the late E. J. Wilcoxon. Mr.

Griffin is about 40 years of age and has been engaged in mining and electrical engineering work for the past 20 years. He became connected with the Rochester & Eastern company during the period of its construction from Rochester to Geneva, N. Y., five and one-half years ago, and since the opening of the road four years ago has had practically the entire supervision of its operation. Mr. Griffin is an associate member of the American Institute of Electrical Engineers and is president of the Rochester Engineers' Society. As announced elsewhere he will be succeeded as superintendent of the Rochester & Eastern Rapid Railway by Mr. M. D. Kilbride.

Obituary.

Frank B. Matthews, who resigned as chief engineer of the Lake Shore Electric Railway, Norwalk, O., in March of this year, committed suicide at Michigan City, Ind., on December 16. Since his resignation from the Lake Shore Electric Mr. Matthews had been connected with the Chicago Lake Shore & South Bend Railway, in charge of the construction of the power house at Michigan City and several substations.

Sir William Thomson, Lord Kelvin, the celebrated British mathematician and physicist, died at his home in London on December 17. While his fame rests chiefly on his work as a physicist, Lord Kelvin was active as an inventor and an engineer and made important contributions to the sciences of mathematics, mechanics, thermodynamics, electricity, magnetism, geology and navigation. He invented the mirror galvanometer, the siphon-recorder and various forms of apparatus used in navigation and for the measurement of electric currents. It was in great part due to his skill in solving the many intricate problems involved in submarine telegraphy that the trans-oceanic cables were successful. He was born in Belfast, Ireland, on June 26, 1824. At the age of 11 he entered the University of Glasgow and subsequently attended St. Peter's College, Cambridge, where he graduated in 1845. At the age of 22 he was appointed professor of natural history at the University of Glasgow and held the chair until 1899. He was a prolific writer on almost every subject connected with the science of physics and besides being the author of a large number of papers was collaborator with Prof. P. G. Tait of "An Elementary Treatise on Natural Philosophy." He was knighted in 1866, and was elevated to the peerage with the title of Lord Kelvin in 1892. He was the first boldly to enunciate the doctrine that the earth is rigid and practically solid to the center, and took a prominent part in the formulation of the theory of the conservation of energy.

CONSUMPTION OF TIES IN 1906.

Circular No. 124 of the forest service, United States department of agriculture, furnishes some interesting information and statistics with regard to the purchase and consumption of ties, from which the following extracts have been taken:

The purchases of cross-ties by steam and street railroads of the United States during the year 1906 amounted to 102,834,042, valued at \$48,819,124, an average of 47 cents per tie. This value represents the cost to the purchaser at the point of purchase. In many, perhaps most, cases this point of purchase is the point of production, near the road's right of way; but in others, and this is particularly true of sawed pine ties, long shipments are involved and the point of purchase is a local distributing market, distant from the source of supply. The average value of 47 cents, therefore, probably represents a higher rate than that received by the producer. The steam railroads purchased 93,477,625 ties, or about nine-tenths of the whole number.

Of the ties purchased by street railroads 6,294,579 were hewed ties, with a total value of \$3,022,511 and an average value per tie of 48 cents, while 3,061,838 sawed ties were purchased, with a total value of \$1,576,081, and an average value per tie of 52 cents.

In the total consumption of ties for the country oak and southern pine stand highest in both total and average value; the average value of each is 51 cents. Chestnut ranks next, followed by cedar. Hemlock, at 28 cents, is the cheapest tie reported.

About one-third of the ties used by street railroads are sawed, but not quite one-fourth of those used by steam roads. The greater proportion of sawed ties used by street lines is probably due to the fact that much of the trackage within city limits is on paved streets, where sawed ties are more satisfactory on account of their regular shape.

The street railroads used 640,999 treated ties, of which 516,319 were purchased already prepared and 124,680 were treated at their own plants.

Financial News

Calumet Electric Street Railway, Chicago.—The property of this company will be consolidated with the property of the South Chicago City Railway, in accordance with an agreement between officials of the two corporations. The plan of amalgamation as announced provides that a single fare of five cents shall be given over the various lines now operated by the two companies. Under the plan the Calumet Electric road will build extensions in One Hundred and Third and One Hundred and Fifteenth streets and to Riverdale. The Calumet road has been in the hands of a receiver since April 30, 1897. It operates now 75 miles of track, extending from Sixty-third street, Chicago, to the Indiana state line at Roby, Ind. The outstanding bonds, which mature on November 1, 1909, amount to \$3,000,000. The outstanding stock amounts to \$500,000 and receivers' certificates aggregating \$675,000 have been issued. The South Chicago City Railway operates 37 miles of track and does not extend beyond the limits of the city of Chicago. This company has \$1,804,000 bonds outstanding and \$1,844,800 stock. It is controlled by the interests which control the Hammond Whiting & East Chicago Railway.

Chicago Union Traction Company.—It is expected that Judge Grosscup will render a decision on December 23 regarding the foreclosure proceedings against the Chicago Union Traction Company, and that he will have an order entered giving the Chicago Railways Company control of the property of the Union Traction company. The differences with the Guaranty Trust Company of New York have been settled, it is announced, by the withdrawal of the demand of that company for a settlement of its claim in cash.

Louisville (Ky.) Traction Company.—On account of extraordinary expenditures during the last year and the present financial situation the directors have voted to omit the quarterly dividend ordinarily payable on the \$11,880,000 of common stock on January 1.

Maryland Electric Railways, Baltimore, Md.—A semi-annual dividend of 1 per cent has been declared, payable on January 2. The initial dividend on the stock, 1½ per cent, was declared a year ago. In July, 1907, a dividend of 2 per cent was paid.

New Orleans Railway & Light Company.—On account of large expenditures for improvements, the directors have determined to omit the dividends which would ordinarily be paid on January 15 on the \$10,000,000 of preferred stock. From January, 1906, to July, 1907, quarterly dividends were paid at the rate of 5 per cent per annum; but in October last only five-eighths of 1 per cent was disbursed.

Third Avenue Railroad, New York.—A statement by the receivers of the New York City Railway and the Metropolitan Street Railway of earnings of the Third Avenue Railroad shows the following approximate results of operations of that property for the fiscal year ended June 30, 1907: Gross earnings, \$2,098,706; maintenance of way, \$101,677; maintenance of power and plant, \$12,906; maintenance of other buildings, \$8,076; maintenance of equipment, \$158,409; operation of cars, \$503,117; operation of power plant, \$116,588; injuries and damages, \$299,368; general expenses, \$79,485; total operating expenses, \$1,279,626; net earnings, \$819,080; other income, \$526,642; total income, \$1,345,722; taxes, including franchise taxes, \$83,027; interest on first mortgage bonds, \$250,000; balance available for special franchise tax and interest on refunding mortgage bonds, \$1,012,695. The receivers ask for instructions regarding the operation of the property. The gross earnings of the Third Avenue road for each of the last 11 years, ending June 30, and the number of revenue and transfer passengers carried each year follow:

	Gross earnings.	Revenue passengers.	Transfer passengers.	Total passengers.
1907.....	\$2,098,706	42,852,087	16,344,087	59,196,174
1906.....	2,259,037	46,100,008	15,133,661	61,233,669
1905.....	2,251,057	45,192,679	14,582,140	59,774,819
1904.....	2,217,417	45,060,477	14,396,532	59,457,009
1903.....	2,212,653	44,448,427	9,175,267	53,623,694
1902.....	2,275,176	45,667,141	10,134,967	55,802,108
1901.....	2,222,489	44,401,310	12,628,158	57,029,468
1900.....	2,139,834	39,816,024	9,256,500	49,072,524
1899.....	2,176,910	42,804,302	6,069,074	48,873,376
1898.....	2,519,361	50,137,219	7,019,659	57,156,878
1897.....	2,590,474	51,809,480	9,918,435	61,727,915

The gross earnings in the last fiscal year were less than for any other year given. This is attributed by the receivers principally to the increase in the percentage of transfer passengers.—Stockholders of the Third Avenue Railroad have

formed the following protective committee to conserve their interests: William N. Kremer, Edward M. Burghard, representing George Ehret, George S. Coe, Thomas Hitchcock and Charles Remsen. Edward M. Shepard is counsel for the committee and John M. Perry is secretary.

New York City Railway.—Justice Greenbaum of the New York state supreme court has granted an order restraining the state receivers from taking possession of the properties of the New York City Railway and the Metropolitan Street Railway, pending appeals to the appellate division of the court. Justice Greenbaum authorized the receivers appointed by the state court to begin suit in the United States circuit court to test the right of the federal receivers to continue to hold the properties.—Minority shareholders of the Metropolitan Street Railway are urged by a committee to deposit their stock with the Manhattan Trust Company of New York or the Fidelity Trust Company of Philadelphia under the terms of a protective agreement dated December 10, 1907. The committee consists of John I. Waterbury, chairman, New York; Edmund C. Converse, New York; and Harry S. Hopper, Philadelphia; with Simpson, Thatcher & Bartlett of New York as counsel.

ELECTRIC RAILWAY EARNINGS.

Chicago & Milwaukee Electric Railroad.

	1907.	1906.
November—		
Gross earnings	\$87,982.46	\$81,143.09
Operating expenses	38,355.82	39,904.68
Net earnings	49,626.64	41,238.41
January 1 to November 30—	1907.	1906.
Gross earnings	\$972,712.26	\$803,591.33
Operating expenses	406,026.50	333,284.93
Net earnings	566,685.76	470,306.40

Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.

	1907.	1906.
October—		
Gross earnings	\$114,883.27	\$93,358.58
Operating expenses	63,871.95	55,653.13
Net earnings	51,011.32	37,705.45
January 1 to October 31—	1907.	1906.
Gross earnings	\$1,052,505.05	\$898,284.39
Operating expenses	620,883.73	548,406.83
Net earnings	431,621.32	349,877.56

Lexington & Interurban Railways Company, Lexington, Ky.

	1907.	1906.
October—		
Gross earnings	\$52,537.97	\$46,663.17
Operating expenses	31,458.54	28,640.49
Net earnings	21,079.43	18,022.68
January 1 to October 31—	1907.	1906.
Gross earnings	\$473,321.01	\$441,431.65
Operating expenses	297,765.87	288,376.80
Net earnings	175,555.14	153,054.85

Norfolk & Portsmouth Traction Company, Norfolk, Va.

	1907.	1906.
October—		
Gross earnings	\$258,515.15	\$142,151.97
Operating expenses	158,954.46	92,451.43
Net earnings	99,560.69	49,700.54
January 1 to October 31—	1907.	1906.
Gross earnings	\$2,235,812.10	\$1,417,905.53
Operating expenses	1,359,622.48	926,282.45
Net earnings	876,189.62	491,623.08

United Railways of St. Louis.

	1907.	1906.
November—		
Gross earnings and other income.....	\$871,075	\$846,191
Expenses, taxes and depreciation.....	579,509	511,088
Net earnings	291,566	335,103
Charges	231,314	231,918
Net income	60,252	103,185
January 1 to November 30—	1907.	1906.
Gross earnings and other income.....	\$9,958,735	\$9,412,763
Expenses, taxes and depreciation.....	6,485,975	5,855,676
Net earnings	3,472,760	3,557,087
Charges	2,546,529	2,550,050
Net income	926,231	1,007,037

Dividends Declared.

Toronto Railway, quarterly, 1½ per cent.
 United Traction & Electric Company, Providence, quarterly, 1¼ per cent.
 United Traction Company, Pittsburg, preferred, 2½ per cent.
 Cincinnati (O.) Street Railway, quarterly, 1½ per cent.
 Maryland Electric Railways, Baltimore, Md., 1 per cent.
 Little Rock (Ark.) Railway & Electric Company, preferred, 3 per cent; common, 2 per cent.
 Knoxville (Tenn.) Railway & Light Company, preferred, 1½ per cent; common, 1 per cent.

Manufactures and Supplies

ROLLING STOCK.

Grand Rapids Railway, Grand Rapids, Mich., is figuring on the purchase of six double-truck cars.

Van Brunt Street & Erie Basin Railroad, Brooklyn, N. Y., is asking prices on five single-truck open cars.

Northwestern Pacific Railroad, San Francisco, Cal., has purchased eight double-truck cars from the St. Louis Car Company.

Sangamon Valley Railway, Springfield, Ill., has placed an order with the St. Louis Car Company for one double-truck interurban car, 40 feet long.

Choctaw Railway & Lighting Company, McAlester, Okla., will build one double-truck freight car, 35 feet long, in its own shops. Taylor trucks and Baltimore ball-bearing center plates will be used.

Milford & Uxbridge Street Railway, Milford, Mass., which was reported in the Electric Railway Review of July 6 to be in the market for two closed car bodies, has placed an order with J. M. Jones' Sons for two 31-foot double-truck cars for interurban use. These cars are to be equipped with Westinghouse motors and Taylor trucks.

Lewiston Augusta & Waterville Street Railway, Lewiston, Me., advises that it will soon place an order with The J. G. Brill Company for eight semi-convertible double-truck cars for interurban service. The previous order which this road had given the Brill company for 12 cars, reported in the Electric Railway Review of September 28, was canceled some time ago.

SHOPS AND BUILDINGS.

Boise & Interurban Railway, Boise, Idaho.—Property on the corner of Seventh and Bannock streets has been purchased, on which a 4-story passenger and freight station will be erected.

Louisville & Eastern Railroad, Louisville, Ky.—This company has secured an indefinite lease, with option of purchasing, on property adjoining its station at 517 West Green street. The present building will be torn down and a handsome addition to the station will be built.

TRADE NOTES.

Wisconsin Blower Company, Milwaukee, Wis., has been organized with a capital stock of \$20,000 by William E. Cordts, William C. Kussmaul and Ida C. Kussmaul.

Charles N. Wilson announces his voluntary resignation as president, general manager and director of the American Engineering Company, Indianapolis, Ind.

G. W. Gennet, Jr., has resigned as western sales agent of the Atha Steel Casting Company, Newark, N. J., and after January 1 will be connected with the St. Louis, Mo., office of Robert W. Hunt & Co., Chicago.

Manning, Maxwell & Moore, Incorporated, New York, at a meeting of the directors held on December 16, declared the regular quarterly dividend of 1½ per cent on the capital stock, payable on December 31 to stockholders of record on that date.

Wisconsin Engine Company, Corliss, Wis., on November 25 was awarded the contract for a 20,000,000-gallon vertical triple expansion crank and flywheel pumping engine for the Atlanta (Ga.) waterworks. The guaranteed duty is 170,000,000 foot-pounds per pound of coal.

Curtain Supply Company, Chicago, announces the appointment of Stanley W. Midgley, formerly with the National Car Coupler Company, as western representative, with headquarters in Chicago. Mr. Midgley succeeds R. F. Hayes, who has gone to New York to take charge of the eastern office, as reported in the Electric Railway Review of November 30.

J. G. White & Co., Incorporated, New York, has just finished the closing of the new dam for the La Crosse Water Power Company on the Black river at Hatfield, Wis. This is a concrete structure, 50 feet in height at the center and 400 feet long. The concrete work was commenced early last August and it has taken barely four months to place the 24,000 yards of concrete. The power house, which is now under construction, is located two miles below the dam, and will, upon completion, have installed in it machinery of 16,000 horsepower capacity, which will supply current to over 90 miles of transmission lines in La Crosse and Winona. The pressure will be 45,000 volts.

George C. Morse has been appointed general eastern sales agent for the United States Asbestos Company of Manheim, Pa., with headquarters at Taunton, Mass. This company is putting on the market a line of asbestos insulating tapes in many widths and 0.015 inch in thickness. These are particularly adapted for use in the winding of armatures and winding coils.

Westinghouse Air Brake Company, Pittsburg, Pa., has declared the regular quarterly dividend of 2½ per cent, and an extra dividend of 2½ per cent, both payable January 31, 1908. The directors also acted on the resolution of the stockholders, passed December 3, and noted in The Railway Age of December 14, increasing the capital stock from \$11,000,000 to \$14,000,000. Out of this increase a 25 per cent stock dividend was authorized.

F. T. Sloan, for a number of years connected with the insurance department of the United States Steel Corporation, and for the past four years insurance engineer of the Brooklyn Rapid Transit Company, has associated himself with S. F. Bowser & Co., Ft. Wayne, Ind., as special representative. During his connection with the Brooklyn Rapid Transit Company Mr. Sloan spent most of his time on the installation of fire-fighting apparatus and systems, fire alarm stations, sprinkling devices, etc., as well as the organization of fire brigades. That this work has proven thorough and effective is apparent from the fact that during Mr. Sloan's incumbency the insurance claimed has been relatively small. He will assume his new duties January 1, with headquarters at Ft. Wayne.

Rail Joint Company, New York, reports that from present indications the outlook for business in the coming year is good and that the company is hopeful of continuing its large output in 1908. The company makes the following statement showing the growth and scope of its business: The Rail Joint Company is the exclusive maker of base-supporting rail joints and is the largest producer of rail joints in the United States. The application of its product to both steam and electric railroad use is growing in popularity all over the world. During 1907 the output of the company was in excess of any previous year. All the various types manufactured by this company for standard and special rail sections, also the step or compromise and insulating rail joints, have the greatest amount of contact bearing surface and that fact eliminates the destructive features which are commonly known in weaker appliances. The application to T and girder rails for steam and electric railroad use has become general. The general aggressive policy of the company has been fruitful of highly creditable results, as in the development of its business it has reached out and broadened until its products are known in all railroad centers. It has had in view the acquainting of those interested with the fact that its product is representative of the furthest point of progress that has been made to date in the rail joint industry, a fact which is well exemplified by the increasing business that the company now enjoys. In the contract of the Panama Railroad the government engineers approved of the Continuous type for the entire work, and the best engineers in the United States, also in Japan and other foreign countries, have done likewise.

ADVERTISING LITERATURE.

Allis-Chalmers Company, Milwaukee, Wis.—Bulletin No. 1425 is entitled "Perforated Metals" and the illustrations therein represent a few of the many varieties they make.

Eugene Munsell & Co., 68 Church Street, New York, N. Y.—A handsome booklet, descriptive of the Pennsylvania tunnels and terminals in New York City, is being distributed with the compliments of this company.

Sprague Electric Company, New York, N. Y.—A newly issued catalogue is devoted to Greenfield flexible steel conduit and flexible steel-armored conductors. It tells what they are, how, where and why they are used, and where they are obtained.

Universal Portland Cement Company.—Bulletin No. 43, for December, 1907, is an 8-page pamphlet, 6 by 9 inches, illustrating and briefly describing a number of buildings and other structures of concrete, including the new car barns of the Chicago City Railway and the reinforced concrete bridge on the Vandalia near Indianapolis.

John F. Allen, 370-372 Gerard Avenue, New York, N. Y.—A recently issued catalogue of 36 pages illustrates and describes a line of portable pneumatic, percussion and compression riveting machines for structural, bridge and railway work, boiler, tank and stack construction. A number of riveting records and strong letters of testimonial are included.

General Electric Company, Schenectady, N. Y.—A leaflet in colors has for its subject, "Standard Symbols for Wiring

Plans," as adopted and recommended by the National Electrical Contractors' Association and the American Institute of Architects.

Philip Carey Company, Cincinnati, O.—A descriptive catalogue of Carey's magnesia coverings has recently been issued by this company's insulation department. It is well printed, finely illustrated and contains a considerable amount of valuable information.

Indianapolis Switch & Frog Company, Springfield, O.—A handsome and elaborate track material catalogue of 84 pages, inclosed in a gold-stamped red linen cover, has just been issued. A large variety of special track work, both steam and electric, is fully illustrated.

Cling-Surface Company, Buffalo, N. Y.—An 88-page linen-bound book, entitled "The Treatment of Belts and Ropes for Service and Profit," is being distributed. It contains a large amount of practical information and advice on belt management. The use of a number of illustrations adds to the value of the work.

General Electric Company, Schenectady, N. Y.—In Bulletin No. 4554, just issued, type P3 voltmeters, wattmeters and ammeters are described and their details illustrated. Catalogue numbers, capacities and list prices are given in the bulletin and full-sized sample scales of the various instruments reproduced.

Zug Iron & Steel Company, Pittsburg, Pa.—A recently issued leaflet bears the title, "Bar Iron—'Refined' and Otherwise." The importance is suggested of a better and more definite knowledge of the character of the bar iron entering into the construction of locomotives and cars. It is pointed out that many of the trade terms as used today are meaningless, and, therefore, the buyer must learn for himself the exact value of these terms.

JEFFERSON UNIONS.

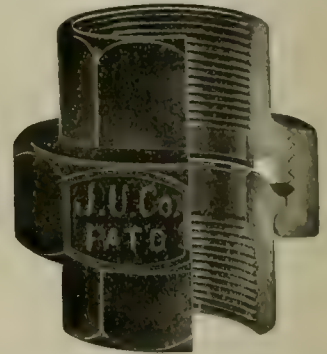
Jefferson unions are adapted for use on an oil, steam, water or air pipe line. They are made of malleable iron with a thoroughly ground bronze metal seat. The almost entire use of iron gives the union great strength and the use of two

from the difference in expansion and contraction of the two metals.

The runway through the union is clear and there are no depressions where liquids may settle when the union is used in connection with horizontal piping. The Jefferson unions are thoroughly inspected and are made by the Jefferson Union Company of Lexington, Mass., which devotes its entire factory and attention to the production of unions and flanges. The steady increase in the use of Jefferson unions and a growing demand have necessitated an increase in the plant. The additions have just been completed and new machinery added. The capacity of the power plant has also been increased.



Jefferson Union.



Jefferson Union—Half Section.

Automatic machinery has been added where possible, and special tools have been acquired in addition to the already excellent equipment of the plant. The company now has over 6,000 square feet of floor space.

Paris Extension of Terre Haute Lines.

To the Editors:

We have noted in your December 14 issue, article on page 924, "Paris Extension of Terre Haute Lines," and your statement, paragraph headed "Overhead Construction." "The wire is supported throughout with Ohio Brass Company overhead fittings." We shall have to take exception to this, inasmuch as we furnished all the overhead material for this Paris extension, brackets, hangers, crossarms, pins, and, in fact, everything. The insulation employed is the Anderson-Aetna insulation, although the body of the hangers are Ohio Brass. We are aware that Ohio Brass material is used exclusively on other lines of the Terre Haute system, but this is not the case with the Paris extension.

We would appreciate it if you would see that this statement is corrected in your next issue.

THE W. R. GARTON CO.,

M. Harwood,

Assistant to President.

Chicago, December 19, 1907.



Jefferson Union—Plant of the Jefferson Union Company.

different metals at the point of contact prevents corrosion. The Jefferson union is octagonal in shape and has always been made in that form. The pipe ends are both made of malleable iron and are long enough so that a wrench can be applied to advantage. The pipe ends are tapped with pipe taps, instead of with plug taps, as is the practice with some makes of unions. The use of the pipe tap gives a tapering opening for the pipe to which it is attached, conforming as nearly as possible to the shape of the pipe.

The bronze metal seat is made of drawn brass tubing carefully ground. It is seated in the malleable pipe end and in such a manner that no matter how far or how tight the pipe end is screwed the seat cannot be dislodged. The seat is sufficiently large to insure a tight joint, yet the percentage of bronze is so small as to do away with any danger of leakage

mission to the legislature at the opening of the session, January 1. This section will contain the board's recommendations and its findings with reference to the special topics and questions referred to it by the last legislature. The maps of railway systems in the commonwealth, with appendix, tables of returns and text of the board's orders, are now in the hands of the printers, and will probably be ready in time to allow the presentation of the complete report as early as January 20.

The new school for instruction of trainmen which has been instituted under the auspices of the Utica & Mohawk Valley Railway Company at the Utica & Mohawk Valley Railway Employees' Association rooms promises to be very successful.

Advance sheets of the annual report of the Massachusetts railroad commission are expected from the printer in time for sub-

Electric Railway Review

PUBLISHED EVERY SATURDAY BY THE WILSON COMPANY, CHICAGO

Entered at the Postoffice, Chicago, Ill., as Second-class Matter.

Subscription in advance, including special daily editions published from time to time in places other than Chicago, postage free: United States or Mexico, \$2; Canada, \$3.50; Postal Union Countries, \$5; Single Copy, 10 cents.

CHICAGO: 160 Harrison Street

NEW YORK: 150 Nassau Street

CLEVELAND, O.: 1529 Williamson Building

VOL. XVIII, No. 26

CHICAGO, DECEMBER 28, 1907

WHOLE No. 244

TABLE OF CONTENTS.

Editorial:		The Advantages of Solid Forged and Rolled Car Wheels (Illustrated)	991
—Friendship of the Public	973	Progress of Rehabilitation Work in Chicago	992
—The Straphanger Abroad	973	The Recent Panic	992
—Axles and Fillets	973	Recent Electric Railway Legal Decisions. By J. L. Rosenberger, LL. B.	993
—When an Increase in Fares is Desirable	974	News of the Week:	
—Rail Corrugation—A New Theory	975	—Introduction of Accounting System Postponed in New York State	995
Reports Required of Ohio Interurban Roads	975	—Transportation Affairs in New York	995
Communications	976	—The Cleveland Negotiations	995
Engineering Association Committees	976	—Strike Threatened in Philadelphia	995
Parlor Car Service—Inland Empire System. By Charles E. Flag (Illustrated)	977	Construction News:	
Car Building and Standard Cars—Tri-City Railway. By James F. Lardner (Illustrated)	980	—Franchises	997
A Special Sand Box. By John A. Buggy (Illustrated)	981	—Recent Incorporations	997
Employment of Trainmen on Northwestern Elevated Railroad, Chicago (Illustrated)	981	—Track and Roadway	997
The New Fare System	982	—Power Houses and Substations	999
Some Results Due to Improvement in Boiler and Furnace Design. By A. Bement (Illustrated)	983	Personal Mention	999
New Locomotives for the Illinois Traction System (Illustrated)	984	Financial News:	
Car Elevator—Hudson & Manhattan Tunnels (Illustrated)	986	—Electric Railway Earnings	1000
New York Subway Service Increased	987	Manufactures and Supplies:	
Six Months of the Public Utilities Commission	987	—Rolling Stock	1001
Large Concrete Bridge on Lima & Toledo Line (Illustrated)	988	—Shops and Buildings	1001
The Interpole Railway Motor—A Graphic Explanation. By Norman G. Meade (Illustrated)	989	—Trade Notes	1002
		—Advertising Literature	1002
		Tinning the Slots of Commutator Segments (Illustrated)	1002

The cultivation of a friendly feeling on the part of the public is a necessary element in the successful management of urban electric railways. If properly treated patrons who make complaints of service will promote a fair-minded attitude toward public service corporations. Complaints of the service should never be ignored or handled carelessly. Where complaints are of sufficient importance it will be advisable to detail an executive official of the company, or an employe of authority and character, to make a careful investigation into the causes. If complaints are justified companies should be in possession of all the facts in order that, so far as possible, they may make such changes in their methods as will lessen the probability of repetition. If complaints are not just a diplomatic representative may frankly show a complaining passenger the reasons why certain methods are followed. If complaints do not seem to justify personal calls, courteous letters should be sent in response, which, although following routine forms, may be typewritten and addressed personally to patrons.

A dispatch from Berlin to the New York Times of December 14 says: "Another American importation, after long years of opposition, has fairly fought its way into Germany—the straphanger for street car passengers who cannot find seats. This familiar trans-Atlantic institution will be introduced for the first time on the new lines of the Berlin municipal street railway system, which has proudly announced that its cars will be of the 'latest up-to-date American pattern, including cross seats, reversible according to the direction the car is traveling, and with space at the rear and front where passengers may stand and hold on to straps.' Hitherto nobody has been allowed to jam his way inside a German street car after the seats have been occupied. The law fixes the exact number of six as the limit for those who may stand on the front or the rear platforms, but any conductor who allows a passenger to stand inside is subject to

police fines." The custom of restricting the number of passengers to be carried by street cars and other public conveyances is prevalent in several of the larger European cities. During a recent visit to New York, Sir Clifton Robinson, managing director of the London United Electric Tramways Company, said to an interviewer that "while the people of New York are seeking to do away with straphanging, the masses in London, who are now beginning to realize the value of time, are trying to introduce it." The foregoing examples of the European attitude not only illustrate the great demand of the American public for comfort in travel, but also go to show that what is commonly regarded as an unmixed evil in this country may be considered to have beneficial aspects when considered from a different standpoint.

So small a detail as the fillet on an axle would hardly seem worthy of special attention. It is, however, an important detail—more important than frequently recognized. Experience with electric railway motor axles ranging in size from 3¾ to 7½ inches in the motor fits has shown that the design is not correct unless the fillets are turned with an ample radius and without sharp corners at changes in axle diameter. The standardization committee of the Engineering association, in recommending dimensions and designs for axles, set an excellent example with regard to the use of fillets. At each change in diameter on the various standard axles there is a fillet to be turned with a round-nosed tool, the radius of the fillet being in each instance as large as the controlling dimensions would accommodate. The severe service to which electric motor car axles are put and the limited space available for increasing their dimensions require that every effort should be made to increase their strength by carefulness in design, as well as by the use of high-grade materials in construction. To quote from a recent article in the Tramway and Railway World: "When an axle breaks it is often attributed to faulty or unsuitable material. Yet in most instances if the fracture is examined there is nothing to prove

that a flaw existed in the original axle, and if chemical and mechanical tests are made of the material it appears to come up to the usual requirements. It is a curious fact that on some tramways a broken axle seldom occurs, while on others, using similar axles obtained from the same makers, the breakages are very frequent. There are also cases where immunity from axle troubles for several years has been followed by continuous failures." The complexity of stresses in railway motor axles is so great that the practice of designing them theoretically is not closely followed. The most general practice is to make an axle which experience has shown to be of a suitable size when operating under conditions similar to those that the new axle must meet. This practice has brought about a wide dissimilarity in axle design, which it is hoped and confidently expected that the efforts of the Engineering association and its standardization committee will be able to unify.

WHEN AN INCREASE IN FARES IS DESIRABLE.

There can be no doubt that existing rates of fares on street railways are inadequate in many cases. Although this fact is recognized by many who are intimately informed concerning the finances of electric railways, few company officials have expressed it publicly because of the apprehension of outbreaks of public hostility. J. L. Richards, president of the Newton (Mass.) Street Railway and other roads in New England, made an address recently at Waltham, Mass., in which he discussed the question of fares with unusual directness. An abstract of the remarks of Mr. Richards was published in the *Electric Railway Review* of December 14, 1907, page 929. His statements present accurately the situation as it really affects many companies and should receive widespread attention from executive officials responsible for the successful and proper financial management of electric railways.

That portion of Mr. Richards' remarks which offered the operation of the Newton & Boston Street Railway and also of six miles of track between Lexington and Woburn, Mass., for a period of years, to any who would continue to operate the property bears on the subject under discussion. Speaking for the Newton & Boston railway. Mr. Richards said, in substance: "We would be very glad to turn the property over for five years to any of the citizens who think the franchise has so much value, and we will not charge them anything for the investment in the railroad, overhead line and equipment, provided that they will operate the property and keep it in as good repair as it now is." This is a sound indication that the operation of the road is not profitable; but it may indicate the belief of the owners, that the increase in population in five years will be sufficient to cause an improvement in traffic that will overcome the present unsatisfactory state of earnings. If that proves to be the case, the owners of the property may eventually regain what they have lost; but in the meanwhile the public and the employees essential to operation are receiving the only substantial benefits accruing from the large investment which is at risk. The Newton & Boston road has recently advanced fares; but in its reports of earnings there is ample justification for this step. Salient facts in the history of the property in a 10-year period are:

Year ended September 30—	Car-Mile Results—Cents.	
	Floating Debt.	Total Operating Receipts. Expenses.
1897	\$ 11,500	19.5 11.5
1898	35,500	17.1 13.0
1899	78,000	16.3 13.4
1900	138,399	15.1 13.1
1901	117,500	15.7 22.4
1902	179,331	14.4 16.0
1903	285,010	15.0 22.0
1904	302,393	16.1 16.0
1905	331,947	16.9 13.7
1906	361,040	13.9 12.8

During three years of this unsatisfactory period, gross earnings were not large enough to meet operating expenses. In the first three years of the period dividends were paid, but in only one of those years did the property earn the full dividend disbursed. In the year ended September 30, 1897, there was a balance of \$4,065 after provision for the dividends; in the ensuing year the total dividends paid exceeded by \$524 the balance available for distribution from the operations of the year; but in the 12 months ended September 30, 1899, the net divisible income was \$891 and the payment of dividends aggregating \$7,500 used all the accumulated surplus and resulted in a balance sheet deficit of \$636. Since that year the deficit from operations has increased rapidly; no dividends have been paid, while beginning with the year ended September 30, 1900, the earnings, after provision for operating expenses, have not met taxes, fixed charges and interest on floating debt. The balance-sheet deficit has increased from \$636 on September 30, 1899, to \$208,631 on September 30, 1906.

As might be judged from the disproportionate car-mile earnings and expenses and from the frequent sharp variations in these unit results, the fluctuations in traffic have been large. The number of passengers carried increased from 678,836 in the year ended September 30, 1897, to 1,855,290 in the year ended September 30, 1900, a lease of the Newtonville & Watertown Street Railway having been made by the Newton & Boston Company in 1897; in 1901 the number of passengers decreased to 1,638,882, and there has been a steady reduction from the year 1902-03 until the fiscal year 1904-05, when 1,273,025 passengers were carried; in the ensuing year 1,387,143 passengers were carried, or less than the total seven years before.

It may be said that this is not a typical experience, even that it is not a typical experience in New England, where the normal increase in traffic would be expected to average much less than in newer western communities, where development is more rapid. Nevertheless, these striking figures afford ample justification for changes in fares; whether the instance seems exaggerated or not, it points to a series of unfortunate statements of earnings which after many years resulted in advances in fares.

Continual declines in earnings, with an increasing disproportion between revenues and expenses and charges, presage one of two developments, either (1) bankruptcy involving the scaling down of capitalization with consequent loss to security-holders, to a point which will restore a safe margin between profits and expenses and interest on capital obligations, or (2) increase in profits through speedy improvement in the density of traffic or through advances in fares.

Mr. Richards directs attention to the necessity imposed upon companies securing new franchises of widening city streets at such heavy cost that the fixed charges upon the expenditures have become burdens which few companies are in a position to bear. In the opinion of Mr. Richards, one of two things must happen: "Either many street railway companies in the comparatively near future will go into the hands of receivers, or they will change the unit of fare, unpleasant as that may be to the management of the railroads and to the communities served."

Franchises to urban railways may be for limited periods or indeterminate terms. If the franchises are limited they should provide for such rates of fare as will make possible not only adequate provision for operating expenses (including depreciation), taxes and fixed charges and dividends, but also for a constant provision from earnings of sums which will provide on a scientific basis for amortization of the investment; if franchises are for indeterminate terms the companies should be subject to the control, not of municipalities, but of state boards, memberships in which should be jealously saved for wise men determined to serve the best interests of the public and corporations and to promote the development of street

railways and conserve their capital investments against depletion by the harassments of unnecessary and ill-advised competition.

RAIL CORRUGATION—A NEW THEORY.

A promising suggestion affording a new line for the investigation of the rail corrugation problem has just been advanced by Andrew Forbes in the December issue of the *Tramway and Railway World* (London). In outlining the reasons on which he bases his arguments the writer calls attention to the practice of applying the brakes while current is being fed to the motors. This practice is entirely too general.

A condition which may lead to the warping of rails and the setting up of preliminary vibrations in them is the uneven expansion and contraction due to variations in temperature. This may frequently come about when the tracks in a city street have been exposed to the sunlight during the middle of the day and are then quickly thrown into the shadow of the tops of high buildings. If the rails of tracks thus exposed to sun and shadow had rigid joints and any considerable length of the track was thrown in shadow, the structure would necessarily be placed in a state of tension. A result of this action would be the loosening of the rail from the pavement and its attachments, even though the movement were so slight as to be impossible of measurement.

There are other reasons which lead to the belief that many rails looked upon as being absolutely firm still have sufficient freedom to admit of internal vibration being set up in them. This is evident when one remembers that the vibration caused by a car passing along the street can frequently be felt within a nearby building. These vibratory actions may have an important bearing on the question of rail corrugation.

The question may be asked: Why has corrugation given so much trouble only since the advent of electric traction? In answer it should be remembered that with this method of propulsion the speeds and weights of equipments handled over street tracks have greatly increased; also, the rapid acceleration required for the faster schedules has demanded a more elastic support for the car body. With a view to minimizing by the use of springs, the shocks to passengers this elasticity between the rigid portion of the running gear and the car body is constrained in movement not only in a perpendicular direction, but also in a direction parallel to the track. Between the wheels and the body of the car a considerable amount of longitudinal displacement may take place. It is this longitudinal freedom that Mr. Forbes believes to be a primary cause of rail corrugation.

In ordinary street operation skidding or the rubbing of the wheel on the rail is quite frequently observed. This may be caused by the too sudden application of power, too heavy application of the brakes or by the slipping of one wheel when rounding a curve. A relation exists between track vibrations, skidding and car spring suspension.

For the purpose of demonstration consider the effect when the brakes are applied too suddenly. So long as there is true rolling and the distance traveled by the car during the time of one revolution of a wheel is equal to the circumference of the wheel the downward force, neglecting the friction which exists between the wheel and the rail, acts as a vertical resultant at the point of tangency between the wheel and the rail. This vertical loading on the rail equals in amount the dead load which the wheel carries. With the application of the brakes there is introduced a frictional resistance between the rail and the wheel acting in the opposite direction to that in which the car may be moving. Acting against this frictional resistance is the momentum of the body of the car. As outlined, however, the body of the car is not rigidly connected with the wheel and there may take place a longitudinal movement. Thus the momentum of the car at the time of braking tends to move the body ahead with relation to the wheel, while the

friction between the rail and the wheel tends to keep the wheels and the rigidly connected part of the running gear from advancing.

During the time that the car body may be thus swinging ahead on the springs, with respect to the wheels, the wheel itself, due to the frictional resistance with the track, is momentarily arrested until sufficient of the momentum of the car body has been stored up in the springs to overcome the frictional resistance with the track with the wheel at rest. The body of the car, of course, in the meantime, would be continuing its movement forward. As soon as the momentum of the car body has been stored in the springs in an amount sufficient to overcome the frictional resistance with the track the wheel will move forward with a jerk, because the frictional resistance decreases as soon as the wheel moves and because the force stored up in the springs is more than sufficient to propel the car forward after it has once begun to move. When this excess force has been thus expanded the wheel will again bite the rail and the lunging action be repeated.

This alternate biting of the rail and rolling along it must cause a succession of shocks to the track structure varying in periodicity with the mass of the car and the characteristics of its spring supports.

We have seen that with the car rolling freely the load impressed by the wheel on the rail is vertical in direction. When the brakes are applied this vertical load acts in conjunction with a horizontal factor brought about by the lunging of the car as explained, so that each time the wheel bites the rail the load impressed by that wheel on the rail acts in amount and direction equal to the resultant of these vertical and horizontal components. Thus, with each bite which the wheel takes on the head of the rail the direction of the loading on the rail varies and there occurs the equivalent of a hammer-like action, which in time tends to displace the upper layers of the steel and result in corrugation.

REPORTS REQUIRED OF OHIO INTERURBAN ROADS.

A circular letter, issued to electric interurban railways by H. D. Manington, secretary of the Ohio railroad commission, calls attention to the form of annual report which will be required for the fiscal year ending June 30, 1908, and also directs notice to the necessity of reporting promptly all fatalities occurring on electric roads. An abstract of the circular follows:

The commission has prepared a form of annual report for electric interurban railways of Ohio and is sending it to you at this time that you may familiarize yourself with it and so adjust your system of accounts as to be able to furnish promptly and accurately the information called for in the blank. Your accounts should be immediately adjusted that this may be done.

The reports of these lines for the present year were for the fiscal year ending April 30, 1907. The next annual report, and future reports, will be for the fiscal year ending June 30, and are required to be in the hands of the commission by September 15.

Some of the electric lines have disregarded the requirements of the statute to report promptly all fatalities occurring on their lines. It is required of all electric lines to report any fatality from whatsoever cause. The statute requires telegraphic report, but the commission will not insist upon this, but will permit reports to be made by mail, if made promptly and fully. The commission therefore directs that as soon as an accident occurs involving the loss of life, or where a fatality follows soon after as a result of such accident, you make an immediate report of the same, giving the name, age, sex, residence and occupation (when known) of the person killed; how he came by his death, if known; and also whether a passenger, traveler on highway, employe or trespasser. If passenger, whether on passenger train or not; if traveling on highway, whether in vehicle or on foot; if employe, character of employment; if trespasser, whether on track or on train. If the accident was the result of a collision, wreck or other mishap to the car or train, this fact, together with a brief statement of how such mishap occurred, should also be included.

Communications

THE SINGLE-END TYPE PAY-AS-YOU-ENTER CAR.

To the Editors:

The pay-as-you-enter cars have been in successful use in Montreal for a long time, but seemingly no one considered it wise to experiment with them in the United States until after the Montreal equipments had been exhibited at the Columbus convention in 1906. Even since that interesting exhibit it has required considerable courage and extensive investigation before the new method of fare collection could safely be adopted for metropolitan conditions in the United States in general and Chicago in particular.

Before beginning the operation of the new type of cars in Chicago a most thorough preparation in the operating organization was necessary. Satisfactory results have since been obtained. After investigation of the operation in Chicago the roads of several other large cities have expressed themselves as favorable to the new fare collection plan, and several have announced that the pay-as-you-enter type of cars would be introduced. It is noted, however, that the details both of the equipments and the operating conditions are to be quite dissimilar.

On learning the various ideas which it is expected will be placed in operation, one questions why there should be such a variation in the methods. In answering this question it should be remembered that the cars wherever installed will be used with a view to increasing the economy of operation; and as their use has shown them to be paying investments in more ways than one, they may be compared to a newly discovered gold mine to which crowds will rush without much regard for the hardships that may be incurred. Similarly, hardships must undoubtedly be undergone, unless thorough preliminary preparation is made before the adoption of any new type of rolling stock.

I express only my own opinion when I say that while the pay-as-you-enter car in its present form is a great success in Chicago, the Chicago car does not fully answer the purpose as well as a car would if it were built to run one way only. Such a car would necessarily be turned on a "Y" or a loop at the ends of the lines, as in Montreal. I know that one constantly meets the old, wornout objection to single-end cars, viz: They cannot be "backed-up." I do not, however, think that this objection has any weight because in the crowded city districts the occasion is very infrequent when it becomes necessary to turn cars or back them except at terminals. On streets carrying the traffic of Broadway, New York City, or Wabash avenue, Chicago, such backing is never done, except at times of fires or unusual obstructions. And even when there is a fire a hose bridge is generally used or the cars are switched to another route of which there are, and always should be, plenty in large cities. How much would the single-end cars in Detroit or Cincinnati bother the managements for like reasons in such emergencies? I should say very little, and it is not expected that conditions in other cities would vary greatly.

The pay-as-you-enter car will be even a greater success than it has shown itself in Chicago when the single-end idea is adopted and the expensive double-ended car is a thing of the past.

There is still in use in electric railway rolling-stock construction an old-fashioned horsecar or omnibus idea. This is the monitor deck. The only excuse for continuing its use is that it has always been used and therefore should continue to be good practice. It has been stated that the monitor deck presents a good appearance and that the public would object if it were done away with. This is hardly true.

By abolishing the monitor deck a stronger roof construction is made possible. A car top without a monitor deck affords more room for roof ventilation without interfering

in the least with the appearance or the side ventilation. Such a type of roof construction is also much stronger and lighter. Some managers have been so bold as to do away with the monitors on open cars, yet no one, except experts, has noted the difference. With regard to the comfort to the public, it is not thought that any objection would be made to abolishing the monitor if the practice should become general for electric railway cars. Will not some one start the ball rolling?

New York, December 24, 1907.

T. J. NICHOLL.

ENGINEERING ASSOCIATION COMMITTEES.

Fred G. Simmons, president of the Engineering association, has appointed the following committees to promote the research and investigation work of the association during the coming year:

Standardization.

W. H. Evans, master mechanic International Railway, Buffalo, N. Y.

H. A. Benedict, electrical engineer United Traction Company, Albany, N. Y.

R. C. Taylor, superintendent motive power Indiana Union Traction Company, Anderson, Ind.

H. H. Adams, superintendent of shops United Railways & Electric Company, Baltimore, Md.

M. O'Brien, master mechanic United Railways Company of St. Louis.

J. M. Larned, engineer maintenance of way Pittsburg Railways Company, Pittsburg, Pa.

H. W. Blake, editor Street Railway Journal, New York City.

C. B. Fairchild, Jr., editor Electric Traction Weekly, Cleveland, O.

L. E. Gould, editor Electric Railway Review, Chicago, Ill.

Control.

E. W. Olds, superintendent rolling stock The Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

G. J. Smith, master mechanic Kansas City Railway & Light Company, Kansas City, Mo.

P. N. Jones, electrical and mechanical engineer Pittsburg Railways, Pittsburg, Pa.

J. S. Pevear, Twin City Rapid Transit Company, Minneapolis, Minn.

H. Donovan, master mechanic Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md.

Maintenance and Inspection of Electrical Equipment.

L. L. Smith, master mechanic Chicago & Milwaukee Electric Railroad, Highwood, Ill.

W. D. Wright, master mechanic The Rhode Island Company, Providence, R. I.

E. T. Munger, master mechanic Metropolitan West Side Elevated Railway, Chicago, Ill.

C. C. Long, electrician United Traction Company, Reading, Pa.

L. W. Jacques, master mechanic Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.

Way Matters.

Charles H. Clark, engineer of way International Railway, Buffalo, N. Y.

Thomas K. Bell, chief engineer Wilkesbarre & Wyoming Valley Traction Company, Philadelphia, Pa.

C. A. Alderman, J. G. White & Co., New York City.

E. O. Ackerman, engineer of way Columbus Railway & Light Company, Columbus, O.

G. L. Wilson, engineer and roadmaster Twin City Rapid Transit Company, Minneapolis, Minn.

C. B. Voynow, assistant engineer Philadelphia Rapid Transit Company, Philadelphia, Pa.

Martin Schrieber, engineer maintenance of way Public Service Corporation of New Jersey, Newark, N. J.

Car Wiring.

George W. Palmer, Jr., Boston, Mass.

C. B. King, manager London Street Railway, London, Ont.

L. P. Crecelius, Public Service Corporation of New Jersey, Newark, N. J.

Hugh Hazleton, consulting engineer, New York City.

S. M. Coffin, master mechanic Mobile Light & Railway Company, Mobile, Ala.

PARLOR CAR SERVICE—INLAND EMPIRE SYSTEM.

BY CHARLES E. FLAGG, ADVERTISING AGENT.

The "prize" train of the Inland Empire System is the "Shoshone Flyer," which is run as a four-car train during the greater part of the year, except in the winter, when but three



Inland Empire Parlor Car Service—Terminal Station and General Office at Spokane.

cars are needed in each train. The "Shoshone Flyer" leaves the Spokane terminal every morning, at 9 o'clock for Coeur d'Alene, Idaho, and makes the run of 34 miles in one hour flat. It connects there at the electric dock with the Red Collar Line steamer Idaho, which crosses Lake Coeur d'Alene, 22 miles to Harrison, connecting there with the Oregon Railroad & Navigation train for Wallace, Wardner, and the Coeur d'Alene mining district. The "Shoshone Flyer" is made up of two motor coaches, each with motors of 400 horsepower total capacity, and a trail coach and the parlor car. Several views of passenger equipments are presented. A considerable amount of the Inland Empire rolling stock was built by The J. G. Brill Company.

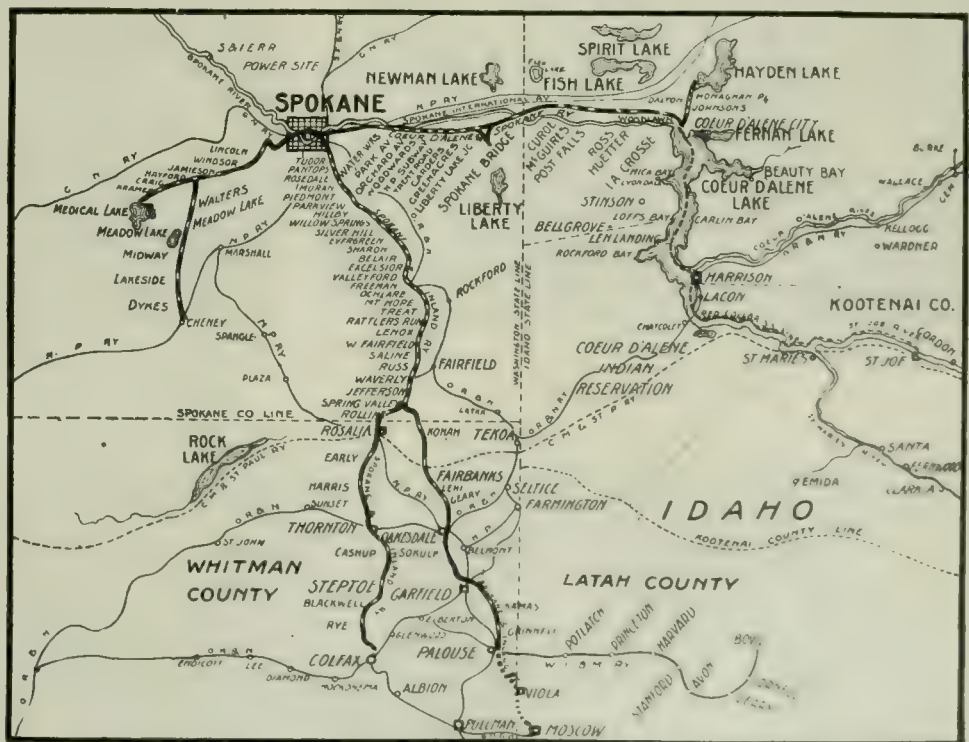
The parlor car trains are run in either direction between Spokane and Coeur d'Alene and Hayden Lake four times daily with parlor car attached. At the present time only two trains in either direction have parlor cars attached.

Parlor car service was inaugurated on the Coeur d'Alene division June 29, 1907, and has proved a remarkable success. The earnings of the parlor coaches during the month of July were fully twice original estimates. The parlor coaches have a seating capacity of 30, besides room for a dozen or more camp stools on the observation platform. Seats are reserved at Spokane and Coeur d'Alene terminals only and an additional

charge of 25 cents between any two stations on the line is made.

On the Coeur d'Alene division (see map) we are now running nine trains daily in either direction. With the exception of the "Shoshone Flyer" all of these trains stop at all stations upon flag. These regular trains make the run to Coeur d'Alene in 1 hour and 20 minutes, 34 miles. The run from Coeur d'Alene to Hayden Lake, 8 miles, is made in 18 minutes. During the summer months our Coeur d'Alene division train schedule included 12 trains daily in either direction. We have a theater train which leaves the Spokane terminal at 11:20 p. m. Although this train is now paying well, it took a year or more to develop the traffic for such a train.

On the Spokane & Inland division, operated by single-phase current, which runs south from Spokane 76 miles to Colfax and Palouse, are run nine 2-car trains daily; three trains in either direction between Spokane and Colfax, three trains in either direction between Spokane and Palouse and three local trains between Spokane and Freeman, which town is about 20 miles from Spokane. The running time of the trains between Spokane and Colfax, and Spokane and Palouse, either distance being 76 miles, is three hours. The running time of local trains between Spokane and Freeman is one hour. At 11:30 p. m. a theater train was added on this division on December 21, running Saturdays only, making all stations.



Inland Empire Parlor Car Service—Territory Served by the Inland Empire System.

On the Coeur d'Alene division the electric trains compete directly with the Northern Pacific Railway, which runs into Coeur d'Alene, and with the Oregon Railroad & Navigation,



Inland Empire Parlor Car Service—Combination Car for Head of Train.



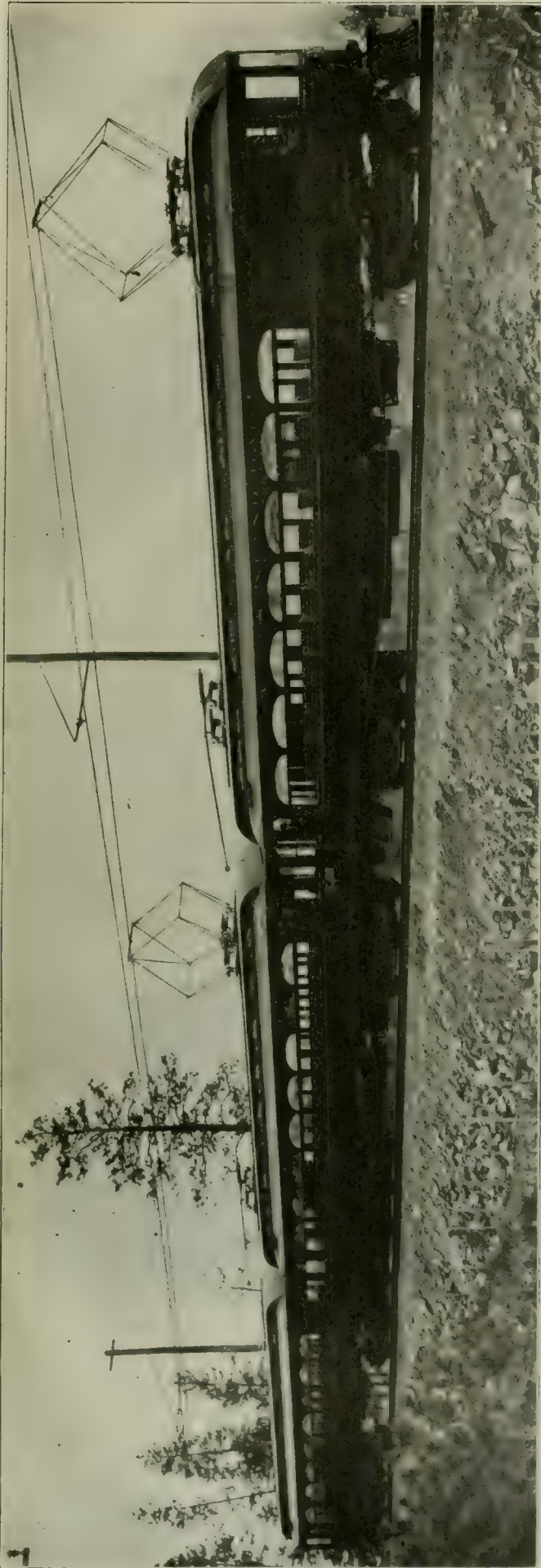
Inland Empire Parlor Car Service—Observation Parlor Car on Shoshone Flyer.



Inland Empire Parlor Car Service—Interior of Passenger Coach.



Inland Empire Parlor Car Service—Observation Car for Rear of Train.



Inland Empire Parlor Car Service—Three-Car Train on Spokane & Inland Single-Phase Division.

which goes to Wallace, Wardner and the Coeur d'Alene mining districts. The distance via Coeur d'Alene over the electric line and by Red Collar steamer to Harrison is much shorter than by the Oregon Railroad & Navigation, which makes a long detour to the south. The Oregon Railroad & Navigation train for Wallace and Wardner leaves Spokane at 8:30 every morning, while the "Shoshone Flyer" leaves the Spokane terminal at 9 o'clock. The majority of passenger traffic for the Coeur d'Alene is carried over the electric line, as it has proved in this instance, the same as in all others, that people prefer to travel the "clean, comfortable way."

The Spokane & Inland division competes directly with the Northern Pacific Railway and the Oregon Railroad & Navigation, both in freight and passenger traffic for the Palouse valley towns. Here, also, the electric service has made deep inroads in the passenger traffic formerly handled by the steam lines. Recent estimates from agents at Palouse points give



Inland Empire Parlor Car Service—Observation Platform at Rear of Train.

the electric line 90 per cent of the passenger business handled.

As to fares; the round-trip rate to Coeur d'Alene is \$1.00, one way 60 cents. This rate has been in effect since the electric line opened and was, of course, met by the Northern Pacific Railway. On the Spokane & Inland division the rate is approximately $2\frac{1}{2}$ cents a mile, as against 3 cents on the steam lines.

Preparing in advance of the completion of the electric power plant now under construction on the Wenatchee river, the Great Northern Railway has placed an order with the General Electric Company for four 100-ton electric locomotives, which will be used to pull trains through the Cascade tunnel. They will be of the three-phase motor type. Since the opening of the Cascade tunnel in December, 1900, the Great Northern operating officials have been convinced that, because of trouble from the gases generated by the steam engines, the company must ultimately use electric power. There is a grade of 2.2 per cent through the tunnel, and several lives have been lost by suffocation from gases.

CAR BUILDING AND STANDARD CARS—TRI-CITY RAILWAY.

BY JAMES F. LARDNER, GENERAL MANAGER.

The car shops of the Tri-City Railway Company are located in Rock Island, in about the center of the railway system of the tri-cities of Davenport, Ia., and Rock Island and Moline, Ill. The wood machine shop, erecting shop, blacksmith shop and storeroom are contained in a 1-story frame building, about 100 by 110 feet, and the painting department is located in the adjoining car house, covering a space of about

heated with "Under the Seat" Consolidated electric heaters. The interior finish of each car is of paneled mahogany, with wide double doors at each end. There are inclosed paneled vestibules, with folding doors on the left-hand side, and one platform step at each end, 42 inches long and 11½ inches wide. The car is lighted with nine 16-candlepower lights inside, one light in each vestibule and two lights in the sign boxes at either end of car. The inside lights are placed on the side moldings, above the car windows. Pantasote car curtains are used on side windows, with Burrowes fixtures, and same quality of curtains used on doors and bulkhead windows, to provide dark vestibules for the motorman. Brill "Dumpit" sand boxes, Dedenda gongs and Peacock brakes complete the equipment. The cars are mounted on Peckham single trucks with 8-foot wheel base, equipped with two GE-80 motors.

The framing of the car is of standard yellow pine sills, with ash posts and rafters. The roof is of the monitor deck pattern, with veneer headlinings. The exterior finish of the car is ½-inch poplar wainscoting, with ¾-inch back space, making double siding. Dashes are made of No. 16 cold rolled steel, instead of carrying wainscoting around car ends.

The painting of the car is done in the Willey system throughout. The interior finish is in natural wood, varnished three coats, and the exterior of the car is painted

standard car body yellow, with white trimmings, and finished with three coats of finishing varnish.

The Tri-City Railway Company has built its own cars for the last four years, and in December, 1905, turned out the last of a lot of 40 double-truck cross-seat cars, 42 feet in length over all, and with a seating capacity for 44 passengers. These cars are substantial and easy riding, and are very popular with the public and satisfactory to the company.

100 by 100 feet. The company has employed regularly on car building work about 50 skilled mechanics and 10 helpers or laborers. The shops of the company handle all the repairs of the equipment of the road, and in addition to car building operations repair work in the past has been handled in the company's shops for smaller street railway and interurban systems within a radius of 100 miles of Rock Island, and car bodies damaged in collisions were shipped to the company's shops in Rock Island for rebuilding and repairs. The car shops and car building work are under the immediate supervision of John D. Fish, master mechanic of the company.

The Tri-City Railway Company recently turned out of its Rock Island shops the last of the 20 new single-truck, drop-sash, cross-seat cars, which it built during the current year. These cars are of the company's own special design, and are a model of efficiency and durability. They are roomy, comfortable and attractive in appearance, and a creditable addition to the company's equipment.

The dimensions of these cars are as follows: Length over all, 32 feet 4 inches; length of car body, between corner posts, 21 feet 7 inches; length of vestibule platforms, 4 feet 9 inches; width of car over all, 8 feet 6 inches; height of car from track, 11 feet.

The height of this car is special, and is made necessary by the clearance height of the Davenport-Rock Island bridge, connecting the company's system in Iowa, with its lines in Illinois.

The new cars are equipped each with eight Hale & Kilburn 35-inch rattan-covered "walk over" seats and four longitudinal rattan seats 60 inches long, in the corners, making the total seating capacity 32 passengers to the car. The cars are

They are mounted on Brill G. 27 double trucks and equipped with four GE-52 motors. Various other cars, such as work cars, line cars and excursion cars of the "sight seeing" variety, have in the past few years been built in the shops of the company.

The Amarillo (Tex.) Street Railway has completed track-laying on its 11-mile street railway system and it is announced that the line will be opened for traffic on January 9. Work is rapidly being completed on the power house.



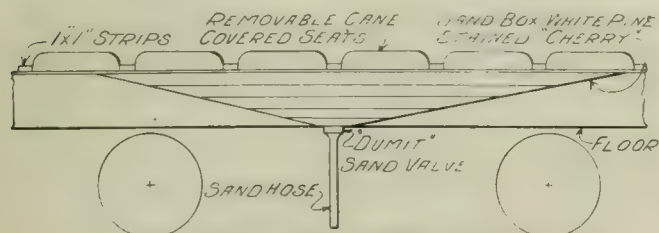
Tri-City Cars—Standard 4-Wheel Equipment.



Tri-City Cars—Standard Double-Truck Equipment.

EMPLOYMENT OF TRAINMEN ON NORTHWESTERN ELEVATED RAILROAD, CHICAGO.

The Delaware County & Philadelphia Electric Railway is approximately 15 miles in length, and traverses several very steep hills. There are quite a number of curves along the route. Our cars are mounted on a type of truck known as Brill's No. 21—E. On cars of this type, it is customary to load the sand boxes in the corners of the cars, and to have the sand pipes run therefrom down to within a few inches of the rail. This type of construction is all very good for a straight track, but it is obvious that on a curve, the sand coming down the pipe will not strike the rail at all, but will be deposited on the ground adjacent to the curve, and at a



Directors of the San Paulo (Brazil) Tramway Light & Power Company have declared a quarterly dividend of 2¼ per cent thus increasing the annual rate to 9 per cent per annum. In 1905, 1906 and 1907 eight per cent was paid annually. In 1903 dividends aggregated 5¼ per cent and in 1902 a total of 3¾ per cent was disbursed on the stock.

Every applicant for employment is required to fill out a blank stating, among other facts, whether he was ever employed on any steam road or city passenger railroad, and giving three references as to character. Every trainman and switchman must start as an extra guard. He must be not less than 21 and not over 35 years of age and must pass a physical examination by the company's physician. After acceptance by the company, the man is placed on the extra list of guards and thereafter takes his turn in regular order for an opportunity to secure a run for a full day. Every vacancy in the regular runs caused by sickness or absence from other cause is filled from the extra list. After a man enters the service he has equal chances in rotation with others on the extra list to secure employment for a full day or for more than the ordinary rush-hour trips, the man at the top of the list being given the first vacancy each day. After one full day's work each man is placed at the bottom of the list, to await his regular turn for another full day's work; but as the list is watched carefully, and each name is moved faithfully from the bottom toward the top, it is not long before each

[illegible]

From the time application is made for employment a careful record is preserved in envelopes in the office of the superintendent of transportation of all matters which develop concerning the applicant who becomes an employee. When he

is first accepted a letter is given to him from the superintendent of transportation, addressed to the dispatcher, directing the latter to place the "bearer on with conductor for instruction as guard. When he is competent to do this work, you will please have conductor O. K. this letter and return by bearer. This letter must be returned to this office not later than 10 days from this date, whether bearer has completed his instructions or not."

After passing through this step the man is given a letter to the day inspector, or night inspector, directing him to instruct the bearer in "all the duties pertaining to the position of guard. Ride with him over the road, and when he is competent to do this work, you will please O. K. this letter and return same to this office." After being accepted by the inspector the applicant is required to certify that he has been instructed and examined "in all the duties pertaining to the position of guard on the Northwestern Elevated Railroad and that I have read and am now familiar with all the bulletins, book of rules and regulations, and all other instructions issued to date." When this signed statement has been filed an order is issued by the superintendent of transportation to the dispatcher setting forth that the bearer has been appointed to the position of guard, is now fully qualified and is reporting for duty. The order also states which employe the guard follows in regular classification on the extra list.

Learning Duties of Motorman.

A regular conductor, switchman or guard is given but one opportunity to learn the duties of motorman in order that he may secure a regular position as motorman when a vacancy occurs. When he is offered the opportunity he is required to sign a statement to the superintendent of transportation stating either that he accepts or declines. The formal statement of acceptance states that the applicant desires to learn the duties of motorman. If the offer to learn the duties of motorman is declined the company requires that the declination be placed in writing for purposes of record, as the opportunity is not offered a second time to a man who has once declined it.

Before application is made to learn the work of motorman a second physical examination more rigid than the first must be passed. After the applicant has passed the second examination at the hands of the physician of the company, he is given a permit to ride in the cabs of three motormen selected by the superintendent of transportation and receive instructions pertaining to their duties. When these three motormen believe that the student is qualified to fill the position of motorman they are required to signify their approval of him by letter. If a student is not approved by the three motormen he is not permitted to take a position as motorman.

After approval by the three motormen the applicant must be examined and certified to by the traveling motorman on the questions of air brakes and motive power equipment, signals, timecards and right of way. A letter certifying that instructions have been given both in the instruction room and on the road in all the duties pertaining to the position of motorman must be given to the superintendent of transportation. On the same form which contains this signed statement the employe must sign a statement that he has "received the instructions pertaining to the position of motorman on this road as indicated above," and that he has read all the rules, regulations and bulletins covering the same which have been issued to date.

The next step required is the most severe examination which is exacted of a prospective motorman. The employe appears before C. B. McNamee, superintendent of transportation, and E. F. Schaff, supervisor of motive power, who question him concerning general duties, the equipment and the air brakes. The employe is required to name from memory every target and cross-over, with the number of targets on each semaphore and what they indicate, from each terminal to and around the union loop in the central business district and back to the terminals. He is required to show full knowl-

edge of the principles governing the air brakes and must prove that he knows how to handle the brakes effectively; he must know how to cut out the air brake equipment or any part of the electrical equipment that may become defective. If this examination is passed successfully the employe is placed on the extra list of motormen, which assures him frequent opportunities of serving as motorman until such time as he secures a regular run as motorman, when he gives up his regular work as trainman or switchman.

Extra Lists Govern Sunday Employment.

Regular employes on the Northwestern Elevated Railroad are assured 10 hours' work per day, six days in the week. On Sundays all the places are filled from the extra lists.

Penalties for Violations of Rules.

For violation of a rule the usual penalty exacted is loss of a regular run for a certain number of days; during that period the employe has equal chances with new employes on the extra lists. A penalty is exacted from guards and conductors for such infractions as failure to stand on platform while passing stations, giving signals before opening or closing car gates, late report for duty, etc. If the rear guard neglects to have tail lights on the train he is given 10 days' suspension, which means the loss of all employment in that period; a second offense of this character calls for dismissal.

Time Slips for Trainmen.

Each motorman, conductor and guard is required to fill out and hand to the dispatcher at the end of each day's work a slip from books furnished showing the time made during the day. Each conductor is required also to give the time of the guard or guards on his train. The motorman's slip, which is published, illustrates also the form of the guard's slip. The conductor's slip contains sufficient lines for the report of the time of the conductor and the guard.

THE NEW FARE SYSTEM.

The troubles of the conductor under the old system, and the easy method of fare collection on the "pay-as-you-enter" car, are thus recorded in the Union Leader, Chicago, December 21, 1907:

In days of old, when men were bold, and passengers beat their fare,
Conductors were handed a lemon and given the icy glare;
But now we're told that men so bold must pay as they enter the car,
And the day of beating conductors is away off ever so far.

"What! pay you twice!" the Wise One said, with an injured innocent air.
"No, pay me once," answered "Connie"; "and be quick or I'll pull your hair."
So the Wise One dug and looked glum of mug,
While the "Connie" passed a frown.

"I've paid you fare," said the Maiden; "I'll report you for asking again."
"I beg your pardon," the "Connie" replied; "it's so hard to remember the same."
And the Maiden fair, with the icy glare,
Proceeded to jot him down.

"I think I paid," said the Absent-Mind; "No, I didn't; I just got on."
And the look of surprise on the Absent-Mind spread a smile o'er the face of the "Con."
He thought of the troubles he used to have to beard the lion in his lair,
In bygone days when the passenger said, "I think I have paid my fare."

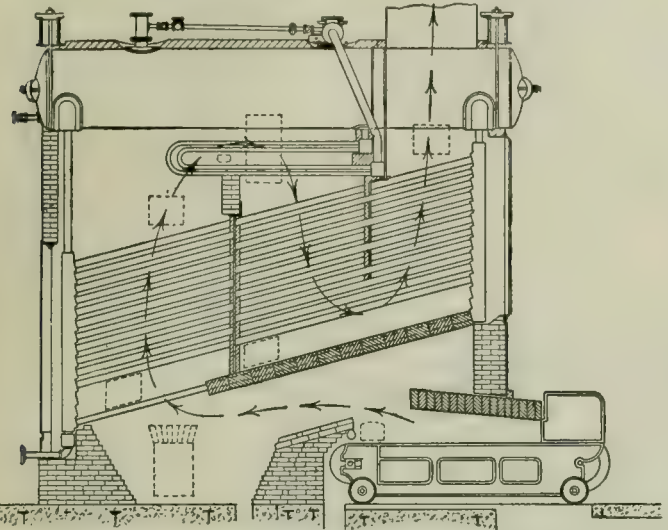
Now "Shorty's" chances are just as good as the fellow's that's built like a pole;
He don't have to squirm for the register cord and stand on the tip of his sole;
He can chuckle and laugh to his heart's content and absorb the platform heat,
For now his arms reach out—not up—and he rings the "clock" with his feet.

SOME RESULTS DUE TO IMPROVEMENT IN BOILER AND FURNACE DESIGN.*

BY A. BEMENT.

It is now about six years since W. L. Abbott applied a tile furnace roof to Heine water tube boilers equipped with chain grate stokers in the Harrison street power station of the Commonwealth Edison Company in Chicago, thereby producing what may be designated as a smokeproof furnace, to which the appearance of the four chimneys serving these boilers has since testified.

While the application of this tile roof to Heine and similar boilers has been quite general, its use in connection with the



Boiler Furnace Improvement—Figure 1, Setting with Tile Furnace Roof.

Babcock & Wilcox type has developed slowly, and it is only recently that marked progress has been made, although the advantage to be derived from such improvement was recognized in Chicago some five years ago, and its adoption recommended at that time. There are now available, however, some excellent data bearing on the subject, which it is the purpose of this paper to present.

About two years ago the Cedar Rapids & Iowa City Railway & Light Company, through W. J. Greene, manager of its lighting department, contracted with the Stirling Consolidated Boiler Company for an improved boiler after the author's design. It has now been in operation one year with very satisfactory results. It is known as No. 10 in the plant where it is in use, and will be hereinafter referred to by that number.

Figure 1 shows a boiler built to a second order for the same company by the Babcock & Wilcox Company. By considering the superheater absent, this figure serves to show boiler No. 10 exactly as it is and was when tested, and with the superheater regarded as a part of it, illustrates what this apparatus and future boilers will be.

Some standard for comparison is required to which the tests of boiler No. 10 are applicable and may be referred, therefore comparison is made with boilers in the Fisk street electric generating station of the Commonwealth Edison Company in Chicago. Figure 2 shows a setting of this character. These Fisk street boilers are selected because they are also served by chain grate stokers, and represent the very best and latest examples of apparatus designed by the builder, and are fired with bituminous coal.

The comparison between the Fisk street boilers and this improved No. 10 is shown by heat balance, Table No. 1.

Table No. 1—Distribution of Heat from Coal Burned.

	Improved boiler No. 10. Per cent.	Boilers at Fisk street station. Per cent.
Usefully employed in making steam.....	79.80	68.32
Lost in hot gases	18.34	19.96
Lost by radiation and unaccounted for.....	1.86	.....
Lost by radiation .....	.....	1.86
Loss unaccounted for .....	.....	9.86
Total	100.00	100.00

*Abstract of paper presented before the Western Society of Engineers, Chicago, December 18, 1907.

The results as to horsepower capacity produced by the boilers are equally as favorable to boiler No. 10 as that of efficiency, as set forth in Table No. 2.

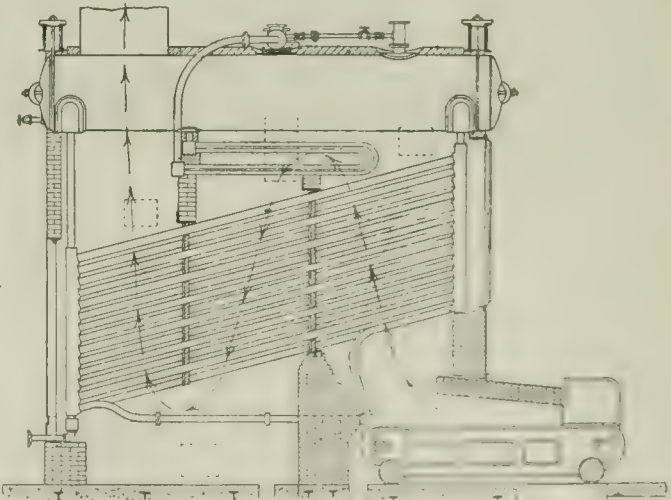
Table No. 2—Comparative Capacity.

	Improved boiler No. 10.	Boilers at Fisk street station.
Builders' horsepower rating	400	500
Heating surface in boiler, sq. ft.....	4,000	5,200
Heating surface in superheater, sq. ft....	0.00	960
Heating surface, total sq. ft.....	4,000	6,160
Grate area in sq. ft.....	72	90
Height of chimney in feet.....	130	250
Draft over fire, in inches of water.....	0.262	0.713
Horsepower developed	615.1	845.8
Correct relative horsepower rating, on basis of 12 per cent of work being done by superheater for Fisk street boilers	400	560
Square feet of heating surface per horse- power, developed on basis of 4,000 and 5,600 sq. ft.	6.50	6.62
Ratio of correct horsepower ratings....	1.00	1.37
Ratio of horsepower developed.....	1.00	1.37
Ratio of drafts at fire.....	1.00	2.72
Ratio of grate surfaces	1.00	1.25
Ratios of sq. ft. of heating surface re- quired per horsepower developed... ..	1.00	1.01
Ratios of horsepower developed with equal draft for both boilers.....	1.25	1.00
Ratio of capacities developed per sq. ft. of heating surface with equal draft for both boilers	1.75	1.00

The fact that the rate of working is almost exactly the same per unit of surface, notwithstanding that the Fisk street boilers have the advantage of a stronger draft above the fire by 272 per cent, is significant, showing the influence of the tile roof furnace on the rate at which the coal will burn, something which the author has observed many times before.

One significant feature of the tests is the smallness of the combined item of heat lost by radiation and unaccounted for, which is 1.66, 1.86 and 1.26 per cent for three tests, respectively; not only is it uniform, but very low in amount for each, much less than in any other tests with western bituminous coal wherein an accurate determination of heating power of the coal was made, and with which the author is familiar. This tends to show that combustion was complete, as further evidenced by the appearance of the chimney.

One of the things which has caused many people to hesitate in the adoption of the setting shown by Figure 1, is a



Boiler Furnace Improvement—Figure 2, Setting at Fisk Street Station.

fear that discharging the heat from the furnace on the back or lower end of the boiler would result in a "reversal" in the circulation of the water. No such indication, however, has been observed in this boiler No. 10, or with several others fitted with tile roof furnaces.

The Illinois Traction system has issued an attractive souvenir in the form of a calendar for 1908, which contains a colored map of the company's lines and an illustration of one of the "Corn Belt Limited" cars.

NEW LOCOMOTIVES FOR THE ILLINOIS TRACTION SYSTEM.

Six electric locomotives of the type illustrated are now being delivered to the Illinois Traction Company from the shops of the Danville Car Company, Danville, Ill. The new equipments are built on steel underframes, 32 feet long over end sills, and 8 feet 5 inches wide over side sills. The underframing comprises two center, two intermediate and two side sills, all of 10-inch I-beams, weighing 25 pounds per foot. The end sills are 10-inch I-beams, well braced to longitudinal sills by 7-inch I-beams, weighing 15 pounds per foot. The sills are connected to all longitudinal beams with 1-inch heavy angles. All the underframing is tied together with tie rods having nuts on the outside of the I-beams, and running through 1¼-inch pipe—between the I-beams—to enable the replacing of the tie rods without disturbing the concrete and scrap iron filling which is placed between the sills to increase the weight of the locomotives.

This filling of concrete and iron is placed under the entire

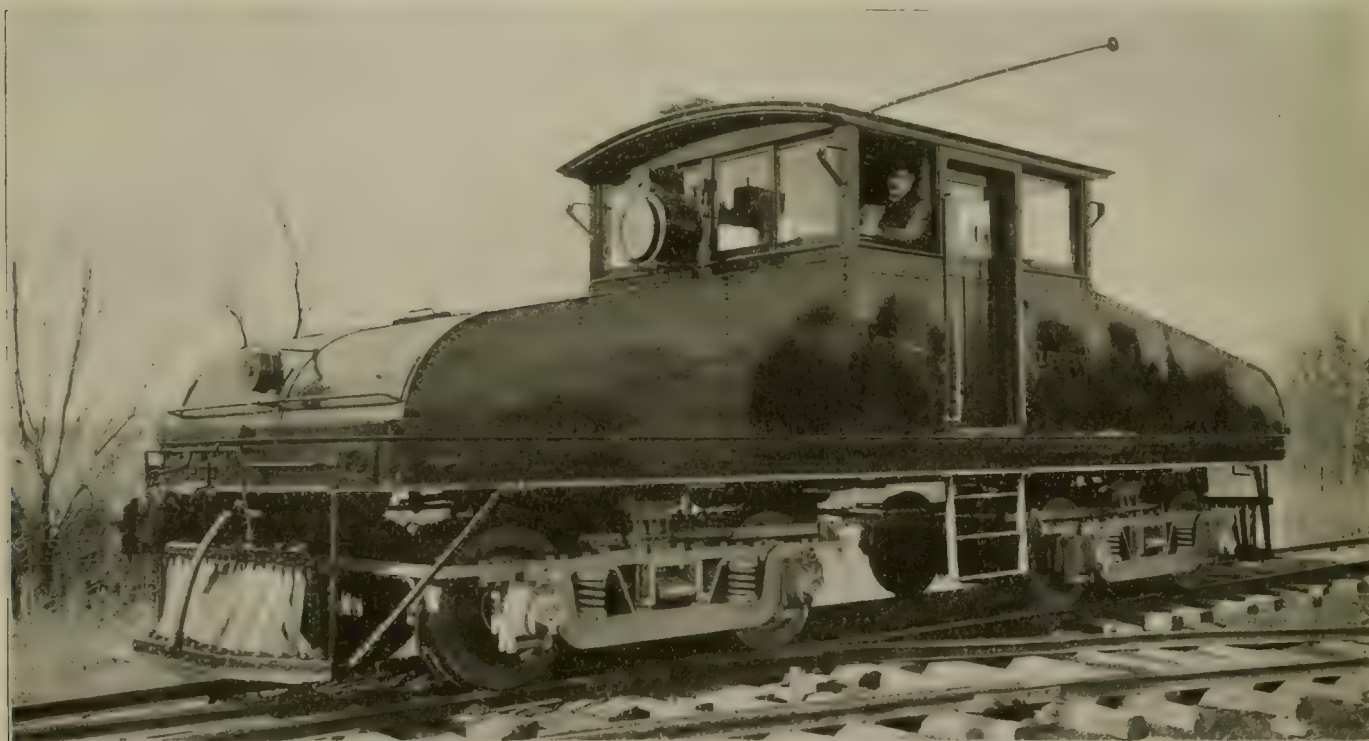
with hydraulic pipe. The foot board is made of structural steel angle, with an oak tread.

Each locomotive is equipped with four GE-73 direct-current 500-volt railway motors and the Sprague-General Electric type M control. The maximum drawbar pull which one of these locomotives will exert up to the slipping point of the wheels is about 15,000 pounds, with about 50 per cent overload on the motors. Each locomotive has sufficient power to start a 500-ton train on a level track, or a 200-ton train on a 2 per cent grade, and it is capable of hauling a 300-ton train at a maximum speed of 15 miles an hour on level track, with 500 volts pressure on the trolley wire.

The motors are the box frame type, which type gives a maximum capacity in a minimum space and permits of using large bearings with a superior method of lubrication, resulting in a very long life of bearings.

The motor axle bearings are 5½ inches in diameter and the motors are provided with 73-tooth gears and 17-tooth pinions.

The control equipment is the standard Sprague-General



Illinois Traction Locomotives—Three-Quarter View.

framing and between all I-beams except the two center beams which carry the conduits for the electrical equipment. Before the concrete was placed sections of 4 and 6 inch wrought-iron pipe were placed to make vertical opening for carrying the electric wires to the controllers. Heavy push-pole pockets are placed at each corner of the underframing and heavy grab irons at each corner and also at the ends.

The body bolsters are 10 by 1 inch trussed plates, well secured to I-beams.

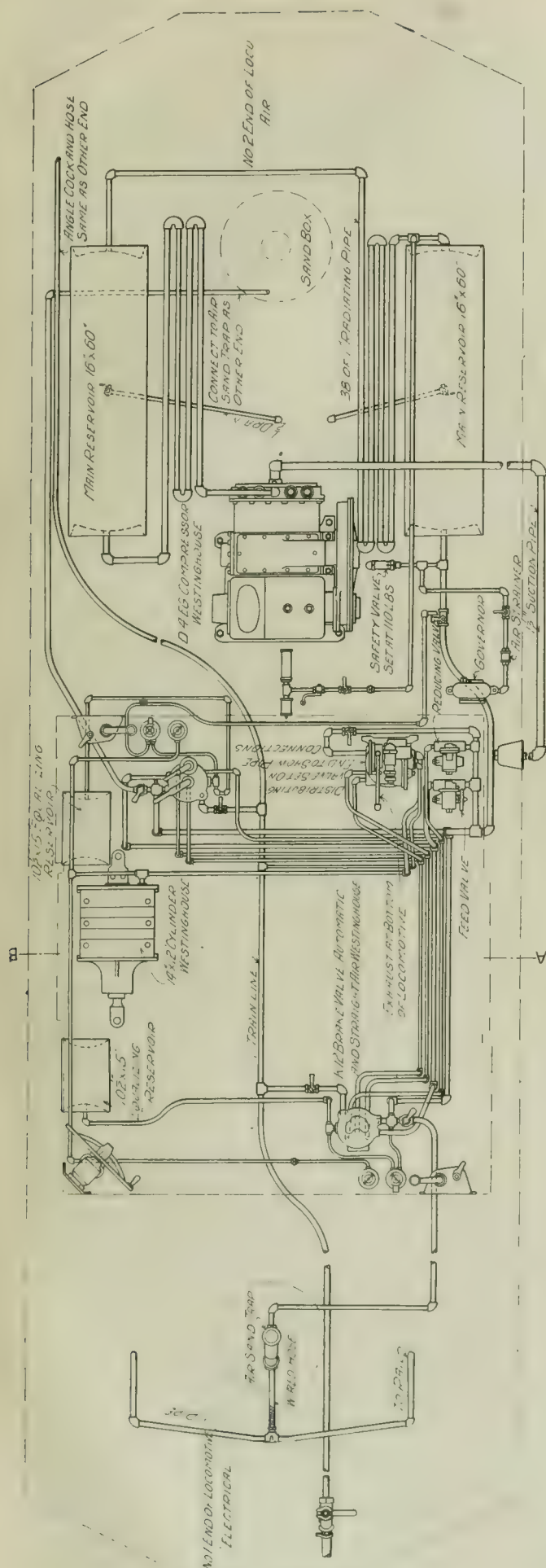
The body, except the cab, is made of ½-inch steel plate, substantially fastened to the bottom by heavy angles. The cab is located in the center and is 9 feet long and the full width of the car, constructed of oak and ash. It has a sliding door on each side, 2 feet 6 inches wide, with a large stationary glass at the top.

The trucks are the Illinois Traction Company's standard 4-wheel swing motion M. C. B. type, with 6-foot 5-inch wheel base, 34-inch steel-tired wheels and 4½-inch journals. Cast-steel bolsters are provided with coil springs for end play, half elliptical bolster springs and coil equalizing springs.

The pilots are made of angle iron, well braced to the body

Electric multiple control, which was originally designed for operating cars in trains, but is now generally used for individual equipments of large capacity and is particularly well adapted to locomotive work. There are two master controllers in each cab, so placed as to facilitate double-end operation. Two or more locomotives can be coupled together and operated as one unit by one engineer, which permits of handling heavy trains. All the electrical equipment is located in one end of the locomotive. The contactors are hung on maple blocks, doing away with the contactor boxes. The locomotives are equipped with Wagenhals arc headlights and Consolidated No. 203-S type heaters. Ten incandescent lights illuminate each locomotive; five are located in the cab, three in the electrical compartment and two in the air brake compartment.

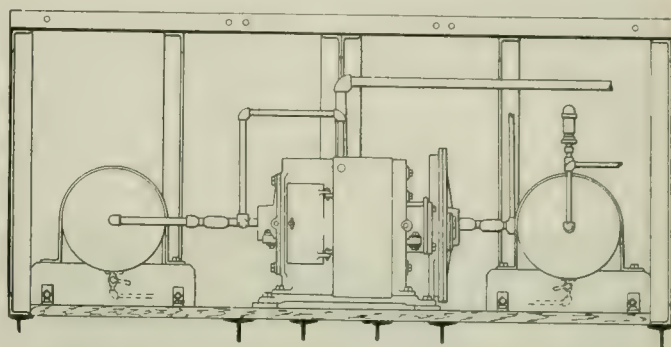
The brake equipment is the latest type of Westinghouse automatic air brake, schedule EL. This brake will operate the brakes used on the various steam road cars throughout the country. It permits of the use of straight air on the locomotive without interfering with the automatic action of the brakes on the locomotive or train. The straight air feature is especially useful for switching, and for releasing the engine



Illinois Traction Locomotives—Plan of Braking Installation.

brakes while still holding the train brakes applied. It also permits the brakes on the train to be released without danger of slack running out suddenly and breaking the train in two. It also permits holding the train or locomotive on grades, while the automatic brakes in the train are recharging. It reduces the work of the compressor when switching about terminals and stations.

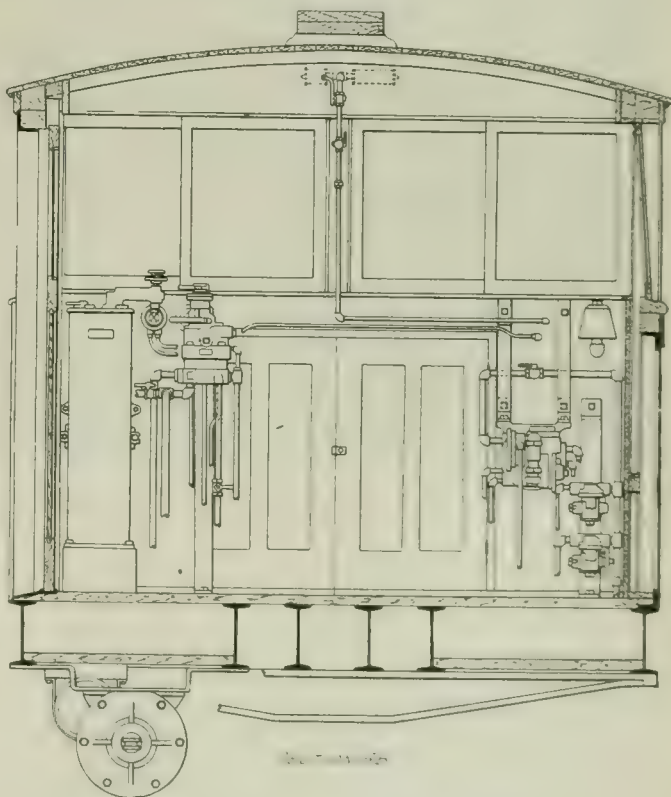
With this equipment the locomotive brakes can be gradu-



Illinois Traction Locomotives—Section at End Door.

ated on or off, either in the automatic or in the independent application, making it quite easy to secure smooth, accurate stops. It gives high pressure in emergency applications, which pressure is automatically controlled by a safety valve to prevent wheel sliding.

There are gauges placed in the cab which register brake pipe, main reservoir and brake cylinder pressures, thus giving



Illinois Traction Locomotives—Sectional Elevation Through Cab.

the engineer a complete knowledge of the operation of the brake. An auxiliary hand brake with vertical disc wheel is provided in one corner of the cab.

One sand box is located in each end of the locomotive. These boxes are made of No. 14 sheet steel and are equipped with air sand traps.

The draft gear consists of M. C. B. automatic couplers with

5 by 1¼ inch yokes; twin draft springs, 6¼ inches in diameter by 8 inches, with double coils. The followers are 1½ inches thick. The draft rigging is designed to take short city curves and also is adapted for regular railroad service.

CAR ELEVATOR—HUDSON & MANHATTAN TUNNELS.

An interesting elevator installation has recently been completed at the Hoboken terminal of the Hudson & Manhattan Railway Company tunnels under the Hudson river. This elevator is for the purpose of placing in and removing from the tunnels and subway the electrically equipped passenger cars which will operate in these tunnels. The elevator shaft is located in the yard of the Hudson Companies which adjoins the Hoboken terminal of the Lackawanna railroad.

The passenger cars which will operate in the tunnels are



Elevator for Transferring Cars Between Hudson & Manhattan Tunnels and Surface Tracks.

48 feet long over all by 9 feet wide, and weigh empty 64,000 pounds, loaded with passengers 85,000 pounds. To raise and lower these cars into and out of the tunnel there has been installed an elevator of 100,000 pounds lifting capacity, with a platform 50 feet long and 12 feet wide, weighing 32,000 pounds.

To provide for this elevator there was first constructed a wellway, having reinforced concrete walls from the tunnel level to the surface. Upon the side walls of this structure are placed six steel columns supporting a steel girder framing directly over the hoistway, and upon these girders is placed the machine operating the elevator platform.

This machine consists of two drum shafts each 50 feet long, one placed near each side of the wellway. These drum shafts are at the center of their length driven by a system of four balanced worm gears, arranged so that the load on all four worm gears is equal under all conditions of platform load. All thrust loads are balanced by the worm shafts which have right and left hand worms operating the worm gears. These worms and gears run in oil baths in tight casings. The entire

system of drum shafts, worm gears and worm shafts is driven by one 100-horsepower motor placed at the center of one side of the elevator machine.

The elevator platform is constructed with two longitudinal steel girders, one under each rail, with suitable steel framing to support the suspension sheaves whereby the platform is suspended from and operated by the elevator machine. The floor of the platform, which is 600 square feet in area, is covered with diamond pattern steel floor plates. At the sides of the elevator platform, connecting with the machine above, are 32¼-inch diameter steel cables, which pass under suspension sheaves below the steel plate floor of the elevator and return to anchorages in the steel overhead structure. By this arrangement one-half the load is suspended directly by the overhead structure, and one-half is suspended from the drums of the elevator machine.

In addition to the 32 machine cables the platform is suspended by eight counterweight cables, making a total suspension of the elevator platform and load by 40¾-inch diameter steel cables, having a total combined strength of 1,552,000 pounds. The counterweights weigh 63,800, total. The machine and cables are so arranged that the elevator platform cannot incline from a horizontal position, wherever the load may be placed upon the elevator platform.

Iron frame grates are provided which close when the elevator platform is not at the landings.

The elevator is controlled electrically by a pilot switch operated by a hand shipping cable, and the elevator may at the will of the operator be run at speeds of 10 to 20 feet travel per minute, the platform stopping automatically at the track levels. The rise of the elevator from the tunnel track to the surface track is about thirty feet.

The elevator platform will be equipped with the third rail conductor which will be alive only when the platform is at the track levels, and the tunnel cars may be run by their own motors on, off or across the elevator platform. Provision has been made to hold the elevator platform securely in position while the cars are run upon it.

Repair Service.

In addition to the usual service of this elevator in handling cars into and out of the tunnels, it is arranged to be utilized for quickly changing one or both of the motor trucks under a car body. For this purpose the elevator platform travels three feet above the surface tracks, and when in this position blocks are thrown in place under the car body, the truck connections are released and as the elevator platform descends the car body remains supported upon the blocks while the trucks descend on the elevator platform. New trucks may in a similar manner be placed under the car body. This operation permits the quick interchange of car bodies and trucks when either may require repairs.

This elevator is now in uninterrupted operation handling rails, ballast and other tunnel equipment material. It provides the only means of access of the cars into and out of the tunnel. The construction of the elevator is fireproof throughout. While the elevator was installed for a lifting capacity of 50 tons, it has handled loads of 65 tons. It is believed to be the largest elevator in size and lifting capacity that has been constructed. It was built and installed by the Geo. T. McLauthlin Company, elevator builders, No. 120 Fulton street, Boston, Mass., under designs and patents of Martin B. McLauthlin. This company has installed a considerable number of railroad car elevators in New York city and elsewhere.

The pay car of the Illinois Traction System started from Danville on Friday, December 20, and made a trip over the entire system, paying off all employees before Christmas day. A pay car has heretofore been used on some of the company's lines, but its use on the entire system is a new departure.

NEW YORK SUBWAY SERVICE INCREASED.

Recent improvements in the methods of handling the traffic in the New York subway during rush hours have made possible a large increase in the number of express trains operated, according to a statement issued on December 22 by Theodore P. Shonts, president of the Interborough-Metropolitan Company. On December 16 a total of 687,682 passengers was carried, which makes a new record for the subway. The increase has been made possible by the employment of a large squad of special policemen to regulate the entering and leaving of trains by passengers at express stations, and by the adoption of a new starting system as recommended by Bion J. Arnold of Chicago in a report to the public service commission on November 26, which was published in abstract in the *Electric Railway Review* of December 7, 1907. Mr. Shonts said:

Last winter it was impossible to operate more than about 23 express trains an hour as an average. This winter, before the subway squad was put on, the number of trains that could be run had been increased to 26 or 27 an hour. Since the introduction of the special officers and the installation of the new starting arrangement at the Grand Central station it has been possible to give an average of 30 expresses an hour during the height of the rush, and it is expected that this number will be still further increased when the people who regularly use the subway have become more familiar with the new rules.

Starting System.

At the Grand Central station there is a dispatcher for uptown trains, and another for downtown trains. Each one has a stopwatch with which he registers the length of stop of all trains. On a sheet before him he records the schedule time of the trains, the actual time of arrival and the length of stop. His instructions are to limit the stop to 45 seconds or less, unless it is necessary to prolong it to allow people to get off. His elevated station gives him a clear view of the whole length of the train and when he sounds the starting gong the special officers close the doors and the train proceeds promptly. It is sometimes necessary to prolong the stop beyond the limit of 45 seconds when there is an unusually large number of people getting off or when it is necessary to extend the loading time to prevent the platform from becoming overcrowded, but to compensate for these delays it is often possible to get a train away in less than 45 seconds.

With an average stop of 45 seconds, a 2-minute headway, or 30 trains an hour, can be maintained, and this is what is aimed at. It sometimes happens that all of the people who want to board a train are unable to do so, though no great number is ever thus delayed, but even these individual delays are disappearing as the passengers learn to distribute themselves along the full length of the train instead of piling up around the center cars. Frequently, on the front and rear cars of a train, all of the people who want to get off, and all who want to get on have done so, while on the center cars people are still getting off, and a crowd is waiting to get on.

The starters seize every opportunity to get a train away in less than the prescribed time, and often do so, when the rush lets up for a few minutes. The length of stop has been cut to 30 seconds, but it frequently has been extended to a minute and 10 seconds. However, an average of 45 seconds is now being maintained.

Between 5:30 and 6:30 o'clock on one of the heaviest evenings of the week, exactly 30 expresses were sent away from Grand Central station. In the hour between 5:40 and 6:40 o'clock, 33 trains were put through. The record so far is 17 trains in 30 minutes, which was accomplished during the evening rush a few days ago, but the conditions at that time were unusually favorable to rapid train movement.

687,682 Passengers in a Day.

The results, which have been made possible only by the presence and authority of the special policemen, have been accomplished in the face of the heaviest travel the subway has ever known. On December 9 the subway carried 673,102 passengers, which was 8,000 more than had ever used it in one day before. Just one week later this new record was broken with a total of 687,682 passengers. When the subway was built its extreme capacity was estimated by experts to be 500,000 passengers a day, and it was thought that before that figure was reached, another subway would be in operation.

The effect of the new arrangement has been to so even up the loads by increasing the travel on the local trains that there is less congestion at Ninety-sixth street. Persons bound

from downtown to local stations between Forty-second and Seventy-second streets have found that they lose time by changing at Grand Central. The local trains, which are also governed by the dispatchers at Grand Central, are operated in the rush hours on a headway of one minute and forty seconds, which is the limit of operation through Ninety-sixth street.

With the operation of the Brooklyn extension, which will begin early in January and through which there will be a better distribution of the load, and with the better education of the passengers it is expected that an average of 33 express trains an hour can be operated through the rush periods. The subway police have proved so successful in handling the crowds with a minimum discomfort and in expediting the movement of trains that their number has been increased from 25 to 42.

SIX MONTHS OF THE PUBLIC UTILITIES COMMISSION.

(FROM THE COMMERCIAL AND FINANCIAL CHRONICLE, NEW YORK.)

The board of estimate has temporarily suspended, because of the city's financial condition, all additional steps toward public improvements. This is not for the first time, and it may be assumed, in view of the imperative need of public improvements in which transportation figures most prominently, that the work is only temporarily halted. But the announcement is more striking because, just at the same time, the public utilities commission sent to the board an estimate of probable expenses for 1908, amounting to \$1,095,000, to come from the city, besides \$150,000 from the state, the \$850,000 for salaries alone being more than the entire cost of the superseded rapid transit commission.

The commission is now finishing its first half year, and it is evident from the public comment that it has failed to meet expectations. But is the fact at all surprising? Was it not inevitable that failure and disappointment must result? Miracles were expected, and miracles could not be realized. Certain things are not as might be desired, and perhaps not as they should be; railroad and other corporate matters had not been handled in a perfect manner; therefore everything was turned over, with unlimited powers, to five men, and then miracles were expected.

Their failures in performance must be measured against the impossibilities laid upon them. They began by apportioning the world, so to speak, among themselves, and there was so much of it that no member could feel overlooked. For instance, one member took up the subject of the crush at the bridge (which one complaining citizen had asked to have ended within 48 hours), and he climbed to a point of vantage and looked at it during the rush hour; the trouble remains unchanged, however.

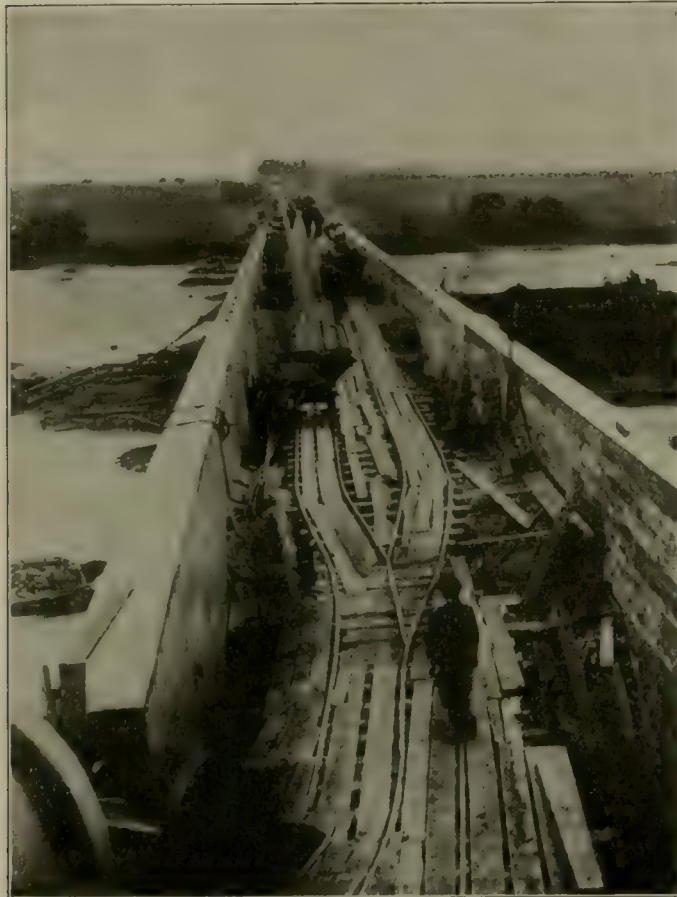
It would be hard to point out what has been accomplished, and the shortness of the time is not accepted as a plea in mitigation, for large and speedy reliefs in many directions were expected. What strikes us just now is the municipal poverty which halts sorely needed improvements, and, on the other hand, an abortive regulating scheme which is unlimited in its burden of cost. Observe how everything else has its bounds. No man who has any affairs of his own and is allowed to remain in charge of them puts out checks signed in blank. Men do not sign contracts involving unlimited obligation; nay, they do not sign anything without reading it. If a man orders something—a suit of clothes, for instance—without stipulation as to price, he cannot be required to pay more than reasonable market value. Expenses of litigation are quite elastic, yet even there a man cannot be required, in absence of contract, to pay whatever may be demanded. Even receiverships, which are certainly bad enough, have some limit upon their cost. Men are less strict about public affairs than about their own; yet the state constitution forbids creation of any permanent "debt" without submission to the popular vote. But while expenditure without limit is carefully avoided everywhere else, by this amazing law the people of this city are committed to an outlay without limit. Salaries are fixed, but all else is left as open as language could make it.

The estimate now presented to the proper board is not limiting. The city disburser is required to pay the bills, whatever those may be, and to issue and sell revenue bonds for providing the money. Whether the legislature can delegate powers in such a loose manner, not to mention such power over private property as seems equivalent to taking it without compensation, is a question which the courts may yet reach; we feel sure that the public, gradually wonted to see new steps in aggressiveness alleged to be for the common good, does not realize that all safeguards upon expenditure have been abandoned. Let it be said, in excuse, that the expense could not be limited because it could not be foreseen; is it not generally deemed a conclusive objection to a given scheme that the cost cannot be foreseen? If a limit could be set in this case, its

absence is a condemnation; if no limit could be, because of the indefinite nature of the scheme, is not that condemned thereby in advance?

LARGE CONCRETE BRIDGE ON LIMA & TOLEDO LINE.

The accompanying engravings present three views of the large reinforced concrete arch bridge over the Maumee river



Lima & Toledo Bridge—Top View During Construction.

near Waterville, O., now under construction by the Lima & Toledo Traction Company. This company, a part of the Ohio

extension of the line to Toledo.

From shore to shore the new bridge is 1,220 feet in length and comprises 12 arch spans, varying in length from 75 feet for the shore spans to 90 feet for the two center spans. Each span is supported by massive piers resting on foundations blasted from the solid rock of the river bed. The level of the track will be 43 feet above that of low water.

The concrete portion of the bridge is in the form of a hollow shell which will be filled with a cushion of earth varying in depth from 30 feet at the piers to 21 inches above the crowns of the arch barrels. It is estimated that 10,000 cubic yards of concrete and 8,000 tons of earth will be required. At the crowns of the arches the concrete in the bed of the bridge is two feet thick. The reinforcement consists of 33 1-inch steel rods stretched across the arch drums parallel with the line of the bridge, joined to perpendicular rods extending upward from the pier foundations, and to a series of transverse rods extending across the bed of the bridge. The concrete used is a mixture of crushed limestone, sand and cement in proportions of 5:3:1.

To guard against the severe ice jams, which are prevalent in the Maumee river, heavy ice-breakers of reinforced concrete will extend some distance above the bridge. These will be hexagonal in shape, about 12 feet long by 5 feet wide.

The bridge was designed on the Luten system and is being built by the National Bridge Company of Indianapolis, Ind., under the supervision of J. M. Walker, chief engineer of the Lima & Toledo Traction Company. Construction on the bridge was started last March and it is expected to be completed in the spring of 1908.

The business of the Portland Railway Light & Power Company has increased to such an extent that it has been found necessary to secure additional office rooms outside of the headquarters building at First and Alder streets. The Terminal block, at First and Pine streets, where the company will erect a union station, will house a number of officials now quartered in the First and Alder streets building, and ultimately will become headquarters for all branches of the corporation. Some of the engineers, the advertising, park and other departments will take offices in the Terminal block not later than January 1.

A German publication states that about 5,000 electro-technical patents were taken out in various countries in 1906. The United States is credited with 2,050, the United Kingdom



Lima & Toledo Bridge—Three-Quarter View During Construction.

Electric Railway, is now operating from Lima as far north as Deshlar, O., and has completed much of the grading for an

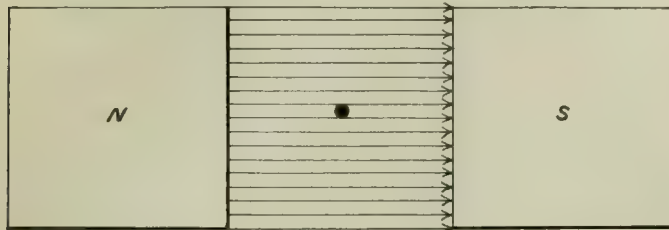
and colonies with 750, Germany 700, France 400, Austria 200, Italy 180, Hungary 130, and Switzerland with 120.

THE INTERPOLE RAILWAY MOTOR—A GRAPHIC EXPLANATION.

BY NORMAN G. MEADE.

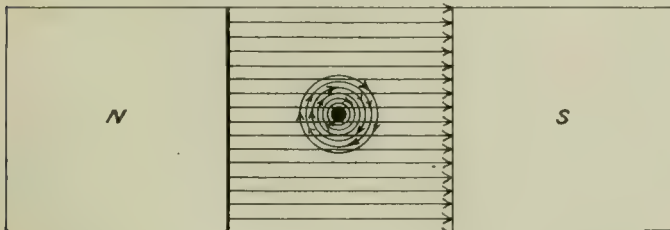
To clearly comprehend the theory and performance of the interpole railway motor, a brief review of the action and general principles of an ordinary direct current motor will be helpful. It is necessary to consider carefully the various forces that effect the behavior under different conditions of operation.

First consider the force acting on a conductor which is carrying a current across a magnetic field. Let the arrows,



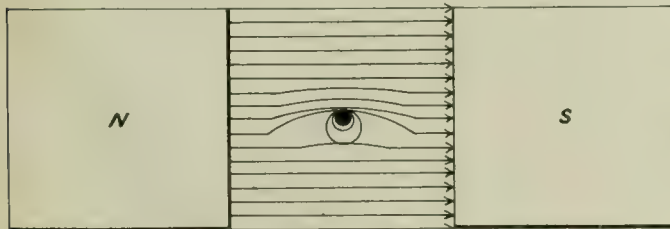
Interpole Motors—Figure 1.

Figure 1, represent magnetic lines of force flowing between the pole faces of the magnet N S and let the small circle represent the cross section of a conductor perpendicular to the plane of the lines. So long as no current flows through the



Interpole Motors—Figure 2.

conductor the magnetic field is not disturbed. Assume that a current is passed through the conductor so that it flows away from the observer; then a magnetic flux will be set up about it as shown by the circles in Figure 2. This flux tends to



Interpole Motors—Figure 3.

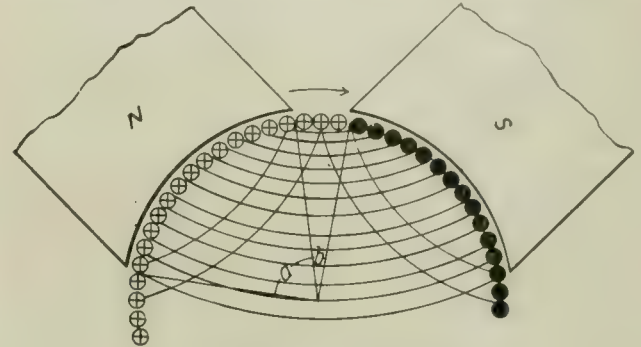
oppose the original lines below the conductor and make them more dense above the conductor as shown in Figure 3 and the wire is forced downward.

This action is essentially the same as takes place in an electric motor. The armature conductors are forced across the field by the reaction of the armature current, performing mechanical work.

In the ordinary direct current motor the brushes have to be given a backward lead to obtain a field for sparkless commutation. This sets up two components in the armature, the back ampere-turns and the cross ampere-turns. The back ampere-turns, included in the angle, b, Figure 4, directly oppose the field flux, and the cross ampere-turns, included in the angle, a, act at right angles causing a distortion of the

field flux. This phenomenon is known as armature reaction and is proportional to the current in the armature.

To consider more fully the effects of armature reaction refer to Figure 5, which is a diagrammatic representation of an armature winding. It will be seen that the current enters the positive brush (only one of which is shown) divides at a, b and c, and leaves at the negative brushes. It is also apparent that as each coil passes under a brush it is short circuited as shown at a, and when leaving the brush the current flows through the coil in a direction opposite to that when the coil is approaching the brushes. The backward lead of the brushes brings the short-circuited coils under the influence of the field so that an electromotive force is generated in them

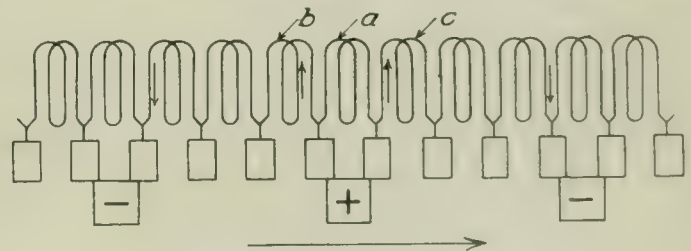


Interpole Motors—Figure 4.

in the same direction that the impressed electromotive force will assume when the coils pass the brushes. If no current were generated in the short-circuited coils their inductive resistance would cause the current to arc from the toe of the brush to the segment passing from under it, resulting in serious sparking. This condition would be still more exaggerated if the brushes were given a forward lead, as an electromotive force would be generated in the short-circuited coils that would directly oppose the impressed electromotive force as the coil passed from under the brush.

In railway motors the brushes, of course, are stationary, the design being such that armature reaction is compensated for to a greater or less degree under ordinary conditions of operation, but it is plain, as the armature reaction increases with the armature current, that a point will be reached in periods of overload at which excessive sparking will occur.

In Figure 6 the lines of force set up by the armature con-



Interpole Motors—Figure 5.

ductors of an ordinary multipolar motor are shown by the dotted lines. The black circles about the periphery of the armature represent conductors in which the current is supposed to be flowing away from the observer and the circles, having a cross within, conductors with the current flowing toward the observer. In Figure 7, N S N S represent the north and south poles respectively of a motor. The theoretical path of the field flux without armature current is from a and c to b and d. A and A' represent the theoretically neutral lines. Let f-o represent the field flux and e-o the flux set up by the cross ampere-turns of the armature acting at right angles to it. Considering the two opposing fluxes as forces they resolve themselves into a parallelogram f o e f', with the resultant diagonal a' c' which represents the new

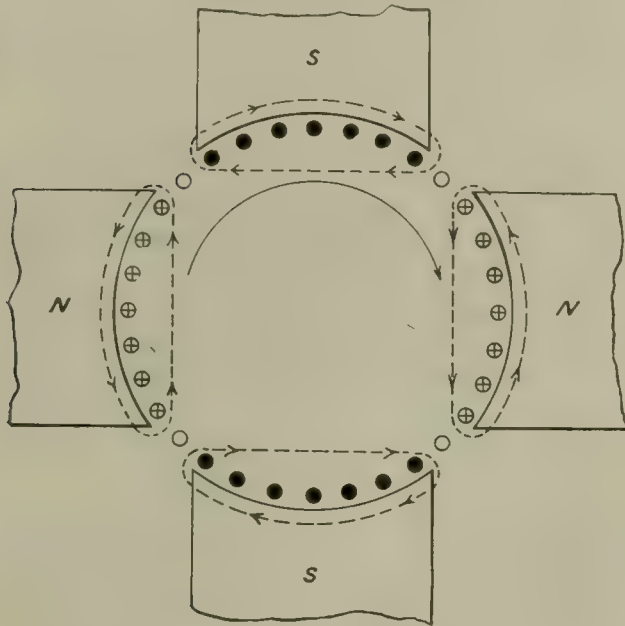
path of the field flux, the line b-d being shifted a corresponding distance to b' and d'. The neutral lines are correspondingly shifted through the angles B and B' to A'' and A'''. The curved arrow represents the direction of rotation of the armature.

This phenomenon is changed by the introduction of the interpoles with connections as shown in Figure 8.

By referring to Figure 9, the action of these interpoles

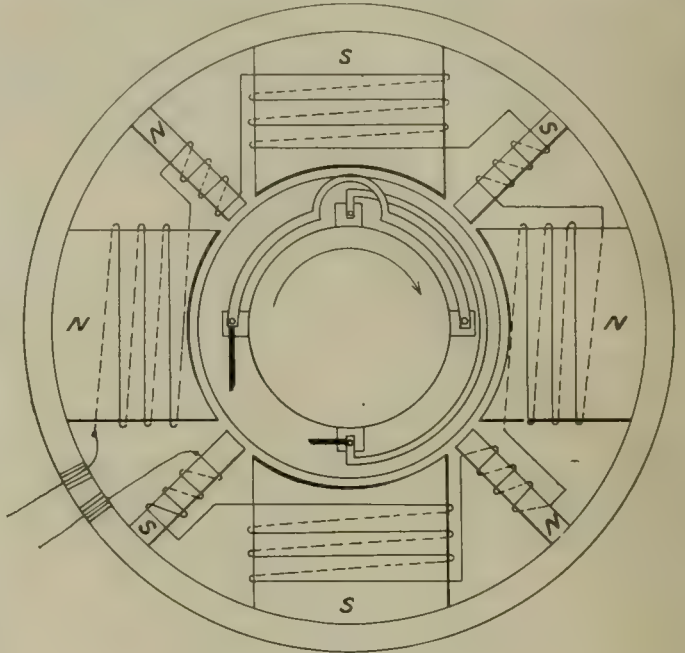
second parallelogram g o f' g' and the diagonal a c which corresponds to a' c' is shifted back to its original position, thus assuring sparkless commutation in a motor having interpoles built with proper regard for the main poles.

During the week before Christmas the Omaha & Council Bluffs Street Railway of Omaha, Neb., inserted in the Omaha daily papers a series of six advertisements, in display type,



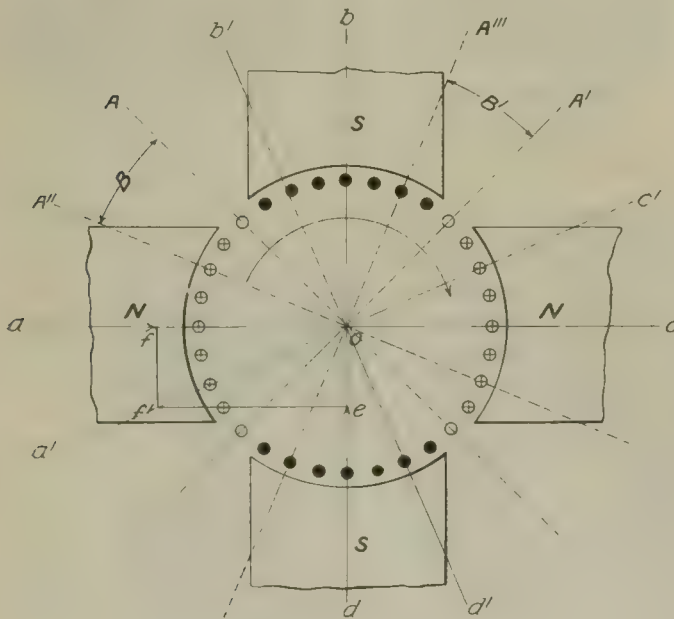
Interpole Motors—Figure 6.

will be apparent. As in Figure 7, N S N S represent the north and south poles, a c-b d the path of the field flux and A and A' the theoretically neutral lines. The parallelogram



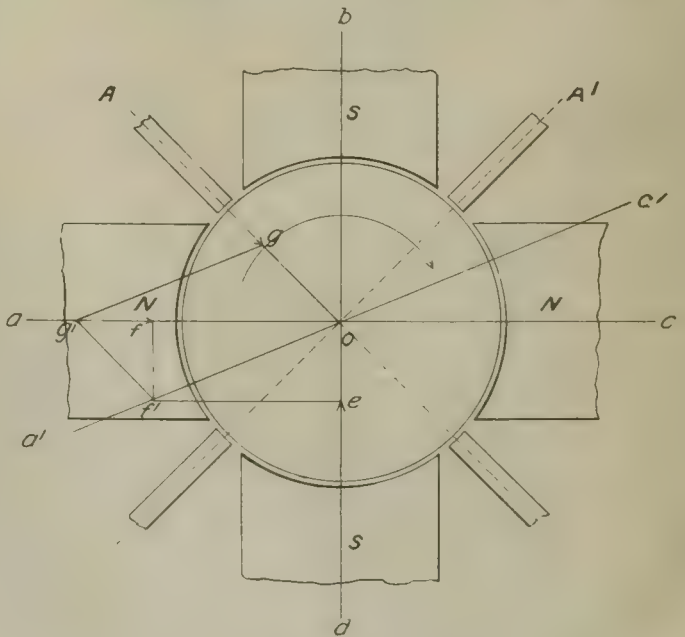
Interpole Motors—Figure 8.

urging its patrons to do their Christmas shopping during the mornings hours in order to finish before the ordinary evening rush-hour traffic began and thus avoid much of the increased



Interpole Motors—Figure 7.

f o e f' and the resultant diagonal a' c' as before represent the effects of armature reaction. There is now another force to consider, however, representing the flux set up by the interpole as shown by g-o. This factor increases proportionately with the current the same as armature reaction and opposes the flux set up by the cross ampere-turns, resulting in a



Interpole Motors—Figure 9.

congestion usually incident to the season. Three of these advertisements were inserted in the morning papers and three in the evening papers. This company believes in newspaper advertising, and inserts occasional advertisements in the papers calling attention to the proper and improper methods of boarding and alighting from cars.

THE ADVANTAGES OF SOLID FORGED AND ROLLED CAR WHEELS.*

The investigations of the physical and chemical properties of car wheels outlined in the preceding chapters show what is being done in the manufacture of car wheels and steel

MILEAGE OF CAST IRON WHEEL
MILEAGE OF SCHOEN FORGED AND ROLLED STEEL WHEEL
COST PER 1000 MILES OF CAST IRON WHEELS DURING LIFE OF ONE SCHOEN STEEL WHEEL
COST PER 1000 MILES OF ONE SCHOEN STEEL WHEEL
SAFETY OF CAST IRON WHEEL BASED UPON ITS ELASTIC LIMIT
SAFETY OF SCHOEN STEEL WHEEL BASED UPON ITS ELASTIC LIMIT

CHART OF COMPARATIVE VALUES OF THE SCHOEN FORGED AND ROLLED STEEL WHEEL, AND THE CAST IRON WHEEL FOR LARGE CAPACITY FREIGHT CARS AND COACHES.

The Advantages of Solid Forged and Rolled Car Wheels.

tires and the requirements which must be met in service. Acting upon the accepted theory that steel must have a maximum amount of work put upon it to insure its integrity and efficiency, consideration of cast-steel wheels has been ignored. It has been shown that the metal in the Schoen solid forged and rolled steel wheel is in all respects equal to, if not better than, the metal in standard brands of steel tires and wheels as regards physical properties. It would naturally be expected then that these wheels should compare favorably in wearing qualities and strength in actual service. This expectation has been completely fulfilled by the wheels which have been running under tenders, freight and passenger cars, and street and interurban electric cars. The Schoen solid forged and rolled steel wheel has been found to give materially greater mileage for the same limit of wear than steel-tired wheels under exactly the same conditions.

As a fair example of what has been done with these wheels in heavy passenger car service the following record is given of a test made on wheels placed under postal car No. 6545, running on the Pennsylvania Railroad between New York and St. Louis: The car weighed 154,000 pounds, carried on two 6-wheel trucks, giving a weight per wheel of 12,833 pounds. The wheels under this car ran 184,539 miles with a wear ranging from 0.348 inch to 0.378 inch, or an average of 0.365 inch. The mileage per $\frac{1}{16}$ inch of wear was 25,618. The tread was maintained at all times in smooth condition and the wear on all of the wheels was remarkably uniform and even.

Twelve pairs of wheels from the same lot were placed under one truck each of four postal cars on various runs. The average mileage of these wheels up to the time of first turning was 109,018, with a minimum of 87,375 miles and a maximum of 141,170 miles. The pair of wheels giving this maximum mileage were worn 0.3185 inch and 0.2785 inch, respectively. An average wear of 0.2597 inch in 109,018 miles was obtained from all 12 pairs, which is at the rate of 419,703 miles per inch, or 26,231 miles per $\frac{1}{16}$ inch of wear. If the amount of metal removed by turning is added to the actual wear these figures are reduced to 234,202 miles per inch and 14,638 miles per $\frac{1}{16}$ inch of wear. The causes of removal of these wheels were three pairs for worn treads, three pairs for cut journals, one pair for a loose wheel, one pair for a thin flange and three pairs for hollow and built-out flanges. At the time this record was taken the remaining pair of wheels had not been removed.

In electric traction work, where the service is much more severe than on steam roads, because of the greater number of stops and the bad condition of the rails, and because of the fact that the majority of the wheels are motor driven, the mileage is less, but is still sufficiently high to show a decided advantage for the solid forged and rolled steel wheel over the cast-iron wheel. The records of the Brooklyn Rapid Transit Company show that from these wheels there was obtained a mileage per $\frac{1}{16}$ inch of wear of 6,500 miles under electric freight cars running on the surface lines, and from 8,520 miles to 9,750 miles under motor passenger cars. This is at the rate of about 0.0961 inch and 0.0641 inch, respectively, per 10,000 miles run, with the wheels still remaining in such good condition that turning was unnecessary. Still better results were obtained with these wheels under elevated motor cars of the same company. The records show wear at the rate of $\frac{1}{16}$ inch per 10,850 miles run, or a reduction of 0.0575 inch per 10,000 miles. The flange and tread were still in good condition after having been

worn down $\frac{3}{8}$ inch and more. The accompanying tables and diagrams illustrate in a striking manner the remarkable service obtained by these wheels on this road and substantiate all of the claims made for them for electric railway work.

From the data here presented it will be a simple matter to compare the value of the solid forged and rolled steel wheel with the value of the cast-iron wheel in similar service. Dividing the life of the steel wheel by the life of the cast-iron wheel gives the number of cast-iron wheels required for an equivalent mileage. The cost of renewals of the cast-iron wheels must be added to the first cost and credit allowed for the scrap value of the old wheels removed.

There are other items of cost, however, which, although difficult to accurately estimate, are, nevertheless, important. It must be remembered that each car has an earning capacity which is lost whenever the car is in the shop for renewals or repairs, and this should be credited to the steel wheel, which involves no such loss. Again, if the number of shoppings for wheels defects can be materially reduced the same volume of traffic can be handled with fewer cars, thus saving investment in rolling stock, and, what is almost as important in large cities, saving in expensive storage space. These advantages, tangible and intangible, have been so thoroughly demonstrated to street railway officers by the experience of a few roads which early began to use solid steel wheels that there is a large and growing demand for them in every class of electric service. For interurban roads especially, where the speeds are frequently as high as those obtained on steam railroads, solid steel wheels have been generally adopted for reasons of safety. The solid steel wheel offers all of the advantages of wear claimed for the steel-tired wheel at a much smaller cost, and in addition greater safety, because of the impossibility of parts coming loose. When compared with steel-tired or built-up wheels, in which the parts are shrunk on or bolted in place, and therefore liable to become slipped under the combined effect of expansion due to brakeshoe heating and the torque of the motor, the advantages of a solid steel wheel for traction purposes become immediately apparent.

The solid forged and rolled steel wheel was originally developed to meet the severe requirements of service under high capacity freight cars, and it is in this field that it has the widest possibilities of application. That there is a demand for these wheels is shown by the fact that more than 150,000 are now in use, 55,000 of them in service under 100,000 pounds capacity cars, and the number is steadily increasing.

It is difficult to make an estimate of the mileage cost of freight car wheels because of the incomplete records usually kept. From the best statistics available, however, it appears that the mileage obtained from cast-iron wheels under 100,000 pounds capacity cars is between 25,000 miles and 30,000 miles. From the tests made of Schoen solid forged and rolled steel wheels under postal cars on the Pennsylvania Railroad it was found that there was obtained an average mileage of 14,638 per $\frac{1}{16}$ inch, including wear and turning. Under heavy tenders, the mileage averaged 7,000 per $\frac{1}{16}$ inch of wear and turning. The average of these two figures, 10,800 miles per $\frac{1}{16}$ inch of wear and turning, may be taken as the probable average service which can be obtained from these wheels under high capacity freight cars. The wheels furnished to the Pennsylvania Railroad for freight cars have a rim 2 inches thick, with limit groove for wear cut $\frac{3}{4}$ inch in from the inner edge. This gives a wearing thickness of $1\frac{1}{4}$ inches available for service. At 10,800 miles per $\frac{1}{16}$ inch of wear, the total mileage which can be obtained from these wheels is $20 \times 10,800 = 216,000$ miles, as against 30,000 miles for cast-iron wheels, or a little more than seven times the life.

If the first cost of a cast-iron wheel is taken at \$10 and its scrap value at \$5.00, then the cost of cast-iron wheels to give a life equivalent to the life of one Schoen solid forged and rolled steel wheel would be:

Seven cast-iron wheels at \$10 each.....	\$70
Seven scrap wheels (credit) at \$5.00 each.....	35
Actual cost of cast-iron wheels.....	\$35

The original cost of the solid forged and rolled steel wheel may be taken at \$20 and its scrap value at the end of its life at \$5.00. Its total cost, therefore, would be \$15, as against \$35 for the equivalent number of cast-iron wheels required to give the same mileage. It is assumed that the cost of turning the solid steel wheel the required number of times during its life would equal the cost of removing and replacing the cast-iron wheels on the axle.

The accompanying diagram shows graphically the comparative mileage, cost and strength of the ordinary cast-iron wheel and the Schoen solid forged and rolled steel wheel. The first two lines show the comparative mileage, the next two show the comparative cost per 1,000 miles run, and the last two lines show the comparative safety of the two wheels, based on the

*A chapter from "The Car Wheel," by George L. Fowler. Published by the Schoen Steel Wheel Company. Copyrighted.

elastic limits of the metal of which they are made. The mileage is as 7 to 1 in favor of the steel wheel, and the cost per 1,000 miles is as 2 to 1 in its favor. The elastic limit of cast iron as shown on the chart is that given by Unwin: 10,500 pounds in tension and 21,500 pounds in compression, with a mean of 16,000 pounds. The elastic limit of the steel wheel is taken at 107,457 pounds, a ratio of 6.7 to 1 in favor of the steel wheel. If the actual breaking strength of the flanges had been used in proportioning the relative lengths of these lines their ratio would have been as 8.6 to 1 in favor of the steel wheel, as against the old M. C. B. standard cast-iron wheel, and 5.3 to 1 in favor of the steel wheel, as against the new reinforced flange cast-iron wheel. It is evident, therefore, that the ratio of 6.7 to 1, as given on the chart, is conservative.

Cast-iron wheels under high capacity cars are a known source of danger, and on most mountain roads a careful inspection of every wheel is made when a freight train stops at the foot of a long grade. This costs time and money, and even then the inspection is not always successful in detecting incipient failures, which develop later with disastrous results. The loss of earning capacity of cars standing idle awaiting shopping for wheel defects is important in times of congestion of traffic. It is a fact that many roads are prevented from realizing the full benefit of large overload carrying capacity simply because the cast-iron wheels are not considered safe to carry such loads.

In the foregoing pages many and important advantages of the Schoen solid forged and rolled steel wheel have been demonstrated. Careful examinations of the metal of which the wheel is made have shown it to possess better physical properties than the best steel tires and wheels on the market. Experience in service, with wheels under freight and passenger cars, locomotive tenders and electric cars, proves that the wearing quality is superior to the best of its competitors. The investigation of the lateral thrust of the wheel against the rail gives conclusive evidence that the cast-iron wheel, even when made of the best material and with the flange reinforced as in the latest designs, is not safe under high capacity cars at any but the lowest speeds. Finally, it has been shown that the solid forged and rolled steel wheel can be applied under freight cars in place of cast-iron wheels with an actual saving of \$7.00 per 100,000 miles run, or \$56 per 100,000 car-miles. In considering the question of car wheels for any service, therefore, from the standpoint of safety, mileage or cost, the solid forged and rolled steel wheel stands in front of all others.

PROGRESS OF REHABILITATION WORK IN CHICAGO.

The track rehabilitation work which is being conducted in Chicago has been carried about as far as will be possible during the season in 1907 when construction of this character can be carried on to advantage. Reports to the board of supervising engineers, Chicago traction, show that up to December 1, 1907, a total of 19.74 miles of new track on the properties of the Chicago Union Traction Company had been completed. On the lines of the Chicago City Railway, 25.48 miles were completed. The figures given are miles of single track.

Under the ordinances passed by the Chicago city council additions and betterments made since the inventory of the properties on June 30, 1906, are proper charges to the capital accounts of the companies concerned. The additions to capital on account of substations for the Chicago City Railway cover the cost of the substation buildings and machinery at Twentieth and Dearborn streets and at Sixty-third street and Wentworth avenue. These buildings are practically completed. The new substation building and machinery at Forty-second street and Wabash avenue, which is now in course of construction by the Chicago City Railway, is also an addition to plant under the terms of the ordinance. Other improvements to the property comprise the office buildings and car house at Seventy-seventh street and Vincennes avenue and the new car house at Thirty-eighth street and Cottage Grove avenue, and special improvements at the Seventy-seventh street shops.

The laying of underground conduit has progressed steadily and a total of 580,068 duct feet had been laid by the Chicago City Railway to December 1. Improvements are being made in the overhead and underground feeder systems.

The work of remodeling cars is progressing, and when the new cars which have been ordered so far have been re-

ceived, the Chicago City Railway will have purchased from June 30, 1906, to the present time a total of 400 new cars.

THE RECENT PANIC.

Walter H. Cottingham, vice-president and general manager of the Sherwin-Williams Company, paint manufacturer, Cleveland, O., has shown what that concern thinks of present business conditions and future prospects in the following extract from a bulletin recently issued to the 250 representatives of the Sherwin-Williams Company:

America is a great and an extraordinary country. Whatever she does, she does in a big way. No other country has ever done as many big and extraordinary things as she has. When she goes in for a panic it's a good one; not a little flurry, not a little storm, but a good stiff hurricane—one worthy of her vastness and her gigantic force.

Big storms, while extremely severe at the time, don't last long. They usually leave some wreckage behind, it's true, but the worst is soon over. The clouds quickly pass and the sun shines for all once more, and we feel better for it and appreciate more fully the daily blessings we enjoy.

The great financial hurricane that has swept across the land is over. It will take a little time to clear away the debris, but not long, for the wreckage has not been great, and the warm sun of prosperity will soon repair what damage has been done.

Let me repeat, America is a great country, and always does big and extraordinary things—this is the proof of her genius; and just as the panic stunned us all with its fearful suddenness and frightful severity, I believe, now that it has passed, we will have an exhibition of the country's great stability and recuperative powers that will astonish the world as much as the panic did.

It is idle to say there was no reason for the financial disturbance that has dislocated the trade of the country. It is senseless to blame any one man or any one thing for it. The truth of the matter is the country has been overtrading, by reason of too rapid expansion. The growth of business has been out of proportion to the increase in currency. There has been more business than money. The funds were not sufficient to go around, and the only way to make the money go around was to reduce the need of it, and that had to come through liquidation. Liquidation revealed the weak spots; then the crash came; confidence was shattered, and the universal mistrust that followed led to hoarding. Money, which lubricates the wheels of commerce, having dried up, the wheels had to stop.

We have had two months of liquidation, and values are now down to a point where people are willing to take hold again. Money is slowly seeking its proper functions once more, and only requires to be encouraged to come forth in volumes. The great restorative is confidence, and confidence can only be created by the exercise of sane and safe business methods. The big financial men of the country know this, and I believe all business will now be done on a sounder basis than ever before.

Remember, this has been a money panic, not a hard-times panic. We have suffered not from want of business, but from too much business. We have seen that too great prosperity can wreck trade, as it often does an individual; and he is a thoughtless business man who fails to learn the lesson.

I can say for our company we believe the worst is over. We believe there will be a steady progress toward complete recovery. Our belief is based on the fact that values are again down to reasonable figures and that there is now more money in the country than ever before. Our vast crops, the most valuable in the history of the country, are being marketed at high prices; our exports are growing in greater proportion to imports; and the balance of foreign trade is greatly in our favor. Confidence is rapidly being restored. The country is not only as sound as ever it was, but sounder.

There can be no better proof of great stability of the nation than the splendid way in which it has come through the terrific storm that has swept over it. The genius of the American business men has been equal to the strain, and it will be equal to the task of recovering from its effects.

It's up to every patriotic, enterprising business man and concern to do their part in restoring confidence by taking up once more in an active and intelligent manner the work that has been temporarily interrupted. This done, conditions will soon become normal, and that prosperity which we have long been accustomed to and which is the fair reward of energy and ability in a wonderfully productive land, will soon become general again and stir us to new and greater achievements. This company is going to do its part.

RECENT ELECTRIC RAILWAY LEGAL DECISIONS.

BY J. L. ROSENBERGER, LL. B., OF THE CHICAGO BAR.

Might be Duty to Stop Car to Give Chance to Get Automobile Off Tracks.

Garfield v. Hartford & Springfield Street Railway Company, 67 Atlantic Reporter, 890.—The supreme court of errors of Connecticut says that reasonable care on the part of the defendant might have required a motorman to stop his car until there had been a reasonable opportunity to get an automobile off the tracks in safety.

Use of Dummy Engine in Building Street Railway Not Covered by Fire Law.

Fay v. Boston & Worcester Street Railway Company, 82 Northeastern Reporter, 7.—The supreme judicial court of Massachusetts says that the use of a dummy engine in building a street railway does not create a liability under Section 270 of Chapter 111 of the revised laws of Massachusetts, which creates an absolute liability, on the part of railroad corporations, for damages to property by fire communicated by their locomotive engines.

Starting Car Without Warning and Running into Vehicle.

McGurgan v. New York City Railway Company, 106 New York Supplement, 201.—The supreme court of New York, appellate division, second department, distinguishes in this case between collisions where the car was under way and known to the party injured to be in motion, and one where the car was started up without any warning. It says that it cannot be pretended that to run a car into a vehicle in broad daylight at the intersection of streets, without sounding a warning or giving a signal of any kind, is the exercise of care. The plaintiff was not bound to assume that the car would be started up at his peril. The driver of his vehicle could not be looking all the time at the car, standing east of the crossing on the westbound track. Some attention was due to the horse which he was driving, and care was also required to see that the eastbound track was free while crossing it. A non-suit was wrong.

Inexperience of Motorman Notice of Incompetency for Bad Weather.

South Covington & Cincinnati Street Railway Company v. Brown, 104 Southwestern Reporter, 703.—The court of appeals of Kentucky says that a motorman who had first served as an apprentice for three weeks under the care of one of the company's experienced motormen and after that had for several weeks acted as motorman on special occasions, was sent out on a dark and foggy morning when the track was wet and slippery. But the court thinks that the inexperience of the motorman, shown by the short time he had been learning the business, was sufficient to put the employer on notice that he should not be placed in charge of a car on such a morning. The responsibility of the company for the incompetency of its employe was precisely the same, whether it actually knew the fact, or, being ignorant, could have discovered it by ordinary diligence, yet failed so to do.

Liability for Assault by Police Officer Employed at Park.

Hirst v. Fitchburg & Leominster Street Railway Company, 82 Northeastern Reporter, 10.—The supreme judicial court of Massachusetts holds that a company, which operated a skating rink at a park where a police officer was on duty, would not be liable for an assault committed by him, even though it was committed upon its premises, if he was acting as a police officer to restore and preserve peace and order, as his duty as a police officer required him to do. But the court thinks that the jury would be warranted in finding that he committed the

assault as a servant of the defendant, and not as a police officer, when the evidence showed that he was employed and paid by the company, sent by it to the rink to collect tickets, and he testified that the manager of the rink gave him instructions regarding letting in disorderly persons and putting people out, and that in quelling the disorder where the alleged assault was committed he felt that it was his duty under his appointment and "under the managers of the rink to go in and see what they were doing."

Company Not Liable in Case of Intoxicated Person Expelled from Car Falling from Bridge.

Keeshan v. Elgin Aurora & Southern Traction Company, 82 Northeastern Reporter, 360.—The supreme court of Illinois holds that no cause of action was stated by the allegations that a man taken into a car in an intoxicated condition and then expelled, in the night time, when it was cold and snowing, and that, endeavoring to make his way home, he fell off a bridge into the water, in consequence of which he subsequently died. It says that if putting the man off at the time and place alleged was a wrongful act on account of the condition of the weather, no natural connection was shown between that act and the consequences which resulted from his attempting to walk to his home, in his intoxicated condition, across the company's bridge. His falling from the bridge was due to his intoxication, and voluntary intoxication will not excuse a person from exercising such care as may reasonably be expected from one who is sober.

Injuries Caused by Cars Leaving Tracks.

Chicago Union Traction Company v. Giese, 82 Northeastern Reporter, 232.—The supreme court of Illinois says that experience and observation teach us that with proper care street cars will remain on the tracks. If this were not true municipalities would not license them to use public streets. If, with proper construction and management, street cars cannot be kept upon their tracks, then the safety of the public would require that they be done away with altogether. It is a matter of common knowledge, however, that it is possible, by the exercise of ordinary care, to so construct and operate these conveyances that they will not leave the tracks, and when they do so, and inflict injury upon another who is lawfully in the street and free from contributory negligence, the court thinks that no hardship is imposed upon these corporations to hold that such an injury is within the maxim "*Res ipsa loquitur*" (the matter speaks for itself), and that proof of the injury, under the circumstances stated, will justify a verdict, unless such prima facie case is met by proof showing that the company is not at fault.

Risk from Defective Car Run at Excessive Speed Not Assumed by Passenger.

Isbell v. Pittsfield Electric Street Railway Company, 82 Northeastern Reporter, 3.—The supreme judicial court of Massachusetts says that in this case there clearly was evidence warranting a finding that the car was out of repair and was run at an excessive rate of speed; in other words, of negligence on the part of the defendant. The principal contention of the defendant was that the plaintiff was not himself in the exercise of due care and assumed the risk of injury from the want of repair and the manner in which the car was operated, and that the presiding judge was in error in instructing the jury as he did "that, when a common carrier undertakes to carry a person, it undertakes to carry him safely, and he does not assume a risk by the fact that he knows that there is some defect which might cause an accident. By inviting a person to become a passenger the obligations arise on the part of the defendant company to carry out the duties of a common carrier."

The defendant contended that the plaintiff assumed the

risk because he continued to ride in the car after he discovered that it was out of repair and was run at a dangerous rate of speed, instead of getting off and taking another car. But there was evidence tending to show that the conductor assured him that the car was safe, and the jury could not therefore properly have been instructed, as the defendant in effect requested that they should be, that the plaintiff assumed the risk. Moreover, the defendant could not thus throw upon the plaintiff the burden of its own negligence, but was bound, as the presiding judge in substance instructed the jury, to exercise the highest degree of care consistent with the nature of its business to carry him safely.

The instruction that was excepted to and which is quoted above could not have been understood, the court thinks, as meaning that the defendant was held to the liability of an insurer in respect to the safety of its passengers, but only as stating generally the obligation of a common carrier to transport its passengers safely and that it was not excused from the performance of that duty by reason of the fact that the passenger knew of a defect which might cause an accident.

Right of Self-Defense of Conductor.

Dallas Consolidated Electric Street Railway Company v. Pettit, 105 Southwestern Reporter, 42.—The court of civil appeals of Texas says that the character of the employment in which a conductor was engaged did not deprive him of the right of self-defense. If he was assaulted, he had the right to repel the assault, and prevent injury to himself by the use of such means as were necessary under the circumstances. Self-defense, however, being a defensive and not an offensive act, must not exceed the bounds of defense and prevention. The right can be lawfully exercised only in a bona fide effort to preserve oneself from the impending danger. Again, it is not necessary to the right of self-defense that the danger should in fact exist. It may be only apparent and not real, but a party, in order to avail himself of such right of defense under such circumstances, must not only honestly believe himself in immediate danger, but have reasonable ground for such belief. Of course, it was the duty of the conductor to exercise that high degree of care to avoid injuring the passenger which a very cautious and prudent person would have exercised under the same circumstances.

Injury to Passenger on Funeral Car Run over Another Road—Authority of President and Superintendent.

Moss v. Lancaster & York Furnace Street Railway Company, 67 Atlantic Reporter, 869.—The supreme court of Pennsylvania says that, according to the testimony offered by the plaintiff, arrangements had been made with the president of the defendant company to carry a funeral party from Lancaster to Mt. Nebo for 55 cents for the round trip.

On this appeal, from a judgment against it for its negligence, the defendant contended that the running of its car over the tracks of the Lancaster & Southern Railway was beyond the scope of the power or authority of either its superintendent or president, and therefore, "even though the fact were found that the superintendent did run, and the president agreed to its running, over this road, such agreement and their action under it would not be binding upon the defendant." For this reason the court was asked to reverse the judgment. This, in effect, meant that, before the plaintiff trusted herself to the employes of the defendant in running its car over the tracks of the other company, she ought to have inquired whether the president and superintendent had been duly authorized by the board of directors to use the tracks of that company. But little consideration was given this by the superior court. The supreme court cannot give it more.

When the defendant received the plaintiff in its car at Millersville, she became its passenger under an express contract with its president to carry her not only to Martic Forge, but to Mt. Nebo. Upon reaching Martic Forge it did not trans-

fer her to a car of the Lancaster & Southern Railway Company, but, keeping her in its own car, switched the same over on to the tracks of the independent company for the purpose of being taken by its own superintendent, conductor and motorman to the place of the funeral, and the superintendent testified that the car was put upon the other tracks in pursuance of information from his superior officers. Under the circumstances, the plaintiff was as much the passenger of the defendant company when the car started over the tracks of the Lancaster & Southern Railway Company as she had been between Millersville and Martic Forge. The tracks of the Lancaster & Southern Railway Company were made the tracks of the defendant company pro hac vice (for this turn) by its president and superintendent, and for its negligence while running its car over them its responsibility was just what it would have been if the accident had occurred between Millersville and York Furnace.

Injury by Derailed Car to Passenger Sitting Near Track Waiting to Take Work Car—Admissibility of Evidence.

East St. Louis & Suburban Railway Company v. Zink, 82 Northeastern Reporter, 283.—The supreme court of Illinois says that the latter-named party, the plaintiff in the court below, testified that, having taken a night car, the conductor told him that the car did not go to Belleville, but stopped at the sheds, and that he could ride from there on the work car. When the car turned into the yards and stopped in front of a small shed, known as the "oil shed," the conductor told him to get off and wait there for the car which would take the employes to Belleville, and that he obeyed. He seated himself on the edge of the floor at the northeast corner of the shed, facing the shed track, with his feet on the ground outside the shed, the edge of the floor to the track below being a distance of four feet and nine inches. Several cars were turned in and passed him on the way to the car sheds. Then a car which had left the track several times during the earlier part of the night left the track, swung over toward the plaintiff and ran against him and the floor of the shed, crushing his right leg so badly that it was necessary to have it amputated.

The supreme court affirms a judgment of the appellate court affirming a judgment in the plaintiff's favor for \$6,000. It does not think that under the circumstances it could be said, as a matter of law, that he was guilty of contributory negligence.

It was contended by the company upon the trial that its conductors were without authority to permit passengers to ride upon the employes' car, which the plaintiff was awaiting, and that for this reason he could not be regarded as a passenger at the time he received his injury. The trial court permitted him to show that many conductors, at various times past, had directed passengers to leave the car upon which they were then riding and take this employes' car for Belleville, and that such passengers followed such directions and were carried on that car to Belleville without objection, upon payment of the ordinary fare. It was urged that this testimony was improperly admitted. This proof covered a lengthy period of time, and the supreme court thinks it was for the purpose of showing that the company had notice, or should have had notice, of the custom, and if it permitted the practice to continue after a time when it had, or should have had, notice thereof, it could not successfully contend that passengers were improperly permitted to ride upon the employes' car in question.

Evidence as to the car having left the track at different places on the same night, the court thinks, was proper for the purpose of showing that the company had knowledge of the alleged defective condition of the car, the condition of the track at the various places where the car left the track and the manner in which it was operated on the earlier occasions being shown.

News of the Week

Introduction of Accounting System Postponed in New York State.

It is understood that the New York public service commission, second district, has decided that it would not be advisable to promulgate any orders concerning the proposed new classifications of accounts until after information has been gathered in regard to the subjects by the interstate commerce commission. This will probably postpone the introduction of the accounting system on roads under the jurisdiction of the public service commission until July 1, 1908, the time when the interstate commerce commission will prescribe accounts for electric railways. The original intention was to promulgate the system by December 31.

The committee which remained in Washington after the conference of last week has finished the work of preparing tentative classifications and as soon as they are printed they will be mailed to all electric railways in the country, together with a letter from Prof. H. C. Adams, in charge of statistics and accounts, interstate commerce commission.

Accident Record in New York.

The New York public service commission for the first district on December 18 made public its tabulation of accidents due to the steam and electric railways in the city of New York for the month of November and for the preceding three months. The report shows that 45 persons were killed during November, two less than in October, and that 243 persons were seriously injured, an increase of 52 over October.

The list of tabulated accidents is as follows:

	Nov.	Aug.	Sept.	Oct.
Car collisions	160	145	218	221
Struck by cars and injured in collisions with vehicles..	977	465	652	791
Injured boarding	438	641	512	510
Injured alighting	465	1,263	931	593
Employes injured	150	641	672	603
Contact with electricity	27	.....	.....	.....
Other accidents	1,820	1,940	1,897	1,794
Totals	4,037	5,095	4,882	4,512

The decrease in the number of injuries in boarding and alighting from cars is credited to the change from open to closed surface cars.

Transportation Affairs in New York.

On December 21 the New York public service commission of the first district held a public hearing on a preliminary order to the New York City Railway to show cause why its cars should not be thoroughly overhauled at the rate of 10 a day. The only witness was A. W. McLimont, the commission's electrical engineer, who put in evidence a report of 500 pages covering his inspection of the company's car houses, power houses and 1,600 of the 1,900 cars. The report was detailed down to the smallest items and showed that the condition of the company's rolling stock and its methods of repairing were very far from what they should be. It was stated that the shop organization apparently aimed at simply patching up defects in the cars so as to keep them in service, rather than removing and replacing worn parts. Of the 1,600 cars inspected, Mr. McLimont found 401 with flat wheels, 786 that rattled, 1,006 with gear noises, 77 with brass noises, 192 with broken glass and 249 operated without headlights. In regard to the power houses and substations, the report stated that they were found in good repair, with up-to-date equipment, in charge of competent men. In conclusion the report says:

"My investigation of this property leads to the conclusion that the condition of the rolling stock equipment, the car house repair facilities, and the lack of an effective system of maintenance and repair departments are responsible for the undesirable service being given by the railway company, inasmuch as the rolling stock affects it."

The company was not represented at the hearing, but Adrian H. Joline and Douglas Robinson, the receivers of the Metropolitan system, submitted a statement in which they frankly confessed that the condition of the rolling stock was deplorable. They declared that they fully realized the need of improving the standard of the equipment, but that it would be impossible to put cars through the repair shops at the daily rate demanded by the commission until the shops at One Hundred and Forty-sixth street, which were burned down last April, had been repaired. They added that they had contracted for the rebuilding of the shops and that they would establish a policy of expediting repair work on the cars. Attention was

also drawn to the fact that nearly 400 cars were lost in the two fires this year and that if the commission insisted on sending as many as 10 cars a day to the repair shops so many cars would be taken out of service that it would be impossible to maintain the existing running schedules.

Two final orders for improvements in service and equipment directed to Brooklyn transportation companies were issued on December 20 by the public service commission. The first directs the Brooklyn Rapid Transit Company to operate during the non-rush hours trains of not less than four cars each on its Jamaica avenue lines. The second, directed to the Coney Island & Brooklyn Railroad, provides for a general renewal and repairing of defective equipment.

An order directed to the Interborough Rapid Transit Company asked that company to show why it should not be compelled to keep axes, saws and other tools in its cars for use in case of wrecks.

The Interborough Rapid Transit Company, the New York City Interborough Railway and the Union Railway have increased the fare from the City Hall north to Yonkers to 10 cents, to correspond with the southbound rate. Until recently the three companies have maintained a transfer system on the northbound trip by which passengers paid 8 cents for the ride, while on the southbound trip two 5-cent fares were charged. The increase was made because of recent complaints to the public service commission of the discrimination between the two trips. The officials of the companies stated that the 8-cent fare was really given at a loss and proceeded to remove the grounds for the complaint by raising the fare.

The Cleveland Negotiations.

Little definite progress has been made during the past week in the work of determining a valuation of the property of the Cleveland Electric Railway as a basis for a lease of the property to the Municipal Traction Company or a similar holding company representing the city. The committees appointed to fix the valuation for the different items have held several conferences, but none have made final reports except Presidents Andrews and du Pont, who compose the committee to appraise the power houses and electrical equipment. They have agreed on a figure of \$2,216,990 for the power houses, \$95,409 for the overhead wires and return circuits, and \$289,862 for storage batteries.

Engineers Clark and Hoffman, representing the company and the city respectively, reported figures of \$1,751 and \$1,113 per mile for the value of the track. As they were unable to agree a new committee was appointed, J. T. Ross of the Toledo Railways & Light Company, representing the Cleveland Electric, and Harry Bunning, engineer of the Forest City Railway, representing the city. These men were given a schedule and instructions by William Barclay Parsons. J. J. Stanley and W. T. Cook reported that they had agreed on the value of the rolling stock.

The principal opportunity for controversy is over the value of the unexpired franchises, as the company and the city are far apart in their claims as to the dates of expiration. Several conferences have been held by the attorneys, but with no tangible results.

Mayor Johnson has predicted that the entire property will be appraised at not far from \$13,000,000.

The mayor and Mr. Goff, who are in charge of the negotiations for the city and the company, have held several meetings to discuss the provisions of the security franchise which is to be given the Cleveland Electric Railway as a guarantee in case of a default of the holding company. Mr. Goff insists on a provision for six fares for 25 cents, while the mayor is holding out for a lower fare.

Strike Threatened in Philadelphia.

Active preparations are being made in anticipation of a strike of the motormen and conductors of the Philadelphia Rapid Transit Company. A local organization of the Amalgamated Association of Street and Electric Railway Employees' Association has been recently formed and at a meeting held on Saturday night, December 21, the members of the union voted to authorize the executive committee to declare a strike at its discretion, upon receiving the approval of the national officers of the union.

As previously reported, the men sent a communication to President J. B. Parsons of the Philadelphia Rapid Transit Company, on November 25, demanding an increase of wages from 21 to 25 cents an hour, a work day of 10 hours in 12 consecutive hours, the privilege of purchasing their uniforms in the open market, recognition of the union, and arbitration of grievances. President Parsons refused to deal with the union and complaints were made that men had been discharged for joining the organization. Mayor Reyburn and Director of Public Service Clay were asked to intercede for

the men and were told that the charges of discrimination were unfounded. A committee representing the union called upon President Parsons, but he refused to treat with them, saying that some of the officers of the union were not employees of the company and that he resented outside interference. The provisional vote to strike followed.

Strike talk had already been prevalent for several days and on Friday, December 20, 1,800 strikebreakers in the employ of James Farley were brought into Philadelphia and quartered at Willow Grove Park. The city officials have also made preparations for averting the disastrous consequences of a strike and special policemen were stationed at the various car houses for several days. On Tuesday of this week the executive committee of the union announced that no strike would be called until after Christmas, at any rate, and the special policemen were recalled to their regular duties.

The directors of the company met on Thursday of this week and framed a reply to the men in which they offered to treat with them as individuals.

Accident in Denver.—Seventeen persons are reported to have been injured in a collision between two cars of the Denver City Tramway at midnight on Thursday, December 26.

Northwestern Electrical Association.—The next annual convention of the Northwestern Electrical Association will be held on January 15 and 16, 1908, at the Hotel Pfister, Milwaukee. Roger N. Kimball, of Kenosha, Wis., is secretary and treasurer of the association.

Suit to Recover Car License Fees.—The village of East Springfield, Ill., has filed a suit against the Illinois Central Traction Company, a part of the Illinois Traction System, to recover \$730,000 for accrued penalties for violation of the ordinance requiring the company to pay a \$10 car license fee for each car operated through the village.

Electric Railway Men Confer with State Commission.—Representatives of the electric railways of Michigan held a conference on December 18 with the members of the state railroad commission at Lansing to discuss such subjects as rates, interchange of freight with steam roads, service, safety appliances, etc. The roads opposed any reduction of rates below two cents per mile.

Family Commutation Tickets.—T. K. Glenn, vice-president of the Atlanta Northern Railway, a subsidiary of the Georgia Railway & Electric Company, operating between Atlanta and Marietta, Ga., 20 miles, has announced that after January 1 the company will issue family commutation tickets to all stations. The tickets will be for 40 rides each and will be sold at a rate of slightly over 1 cent a mile. The company has heretofore sold, and will continue to sell, individual commutation tickets at a rate of slightly less than 1 cent a mile.

American Society of Mechanical Engineers.—The next monthly meeting of the American Society of Mechanical Engineers will be held on Tuesday, January 14, in the Engineering Societies Building, at 29 West Thirty-ninth street, New York. The subject will be "Car Lighting," the presentation being made by R. M. Dixon, president of the Safety Car Heating & Lighting Company, and will treat of the general subject of lighting trains, showing relative economies in the several systems, electric and gas. There will be in operation exhibits of different methods, such as the Pintsch mantle, the vapor mantle system, a new acetylene system, and several varieties of axle lighting by electricity with their regulating and governing mechanism.

Modification of the Pay-As-You-Enter Idea.—The Pittsburgh Railways Company, operating the street railway lines of Pittsburgh, Pa., on Tuesday of this week began to enforce a new rule of collecting fare from each passenger as he enters the car. It is believed to be the first time that such a thing has been attempted in any city, except where special cars are provided. The company will try the experiment on the ordinary cars. Each passenger is asked to enter the car by the rear platform, to leave by the front platform, and to have his fare ready when he boards the car. As he passes in he will hand the money to the conductor. The object of enforcing this new rule is to enable the conductor to remain on the rear platform at all times, where he will be in a better position to avoid accidents.

Chicago Union Traction Company Wins Sensational Damage Case.—A Chicago jury on December 21 decided in favor of the Chicago Union Traction Company, a personal injury case in which \$50,000 damages were claimed. The plaintiff, Miss May Day, demanded that amount for injuries alleged to have been received on account of the sudden starting of a car from which she was alighting. She was brought into court on a cot, and was in a very emaciated condition. She claimed that since the accident, on April 1, she had been in constant

agony, scarcely able to eat or sleep, and her weight had been reduced from 160 to less than 100 pounds. The case was vigorously fought by the attorneys for the traction company, who claimed that her condition was due to other causes. After being out 15 minutes the jury found that no damages should be awarded.

Not Required to Resume Service on Abandoned Line.—The Ohio railroad commission had decided in favor of the defendants in a complaint against the Steubenville & Wheeling Traction Company to compel the company to resume service on a line over the high summit known as Altamont, between Mingo and Steubenville, O. Testimony was introduced to show that persons had purchased lots on Altamont with the understanding that service would be given them. It was shown that the line over the summit had been replaced by a safer line along the river, and the commission held that the only relief of those who had bought property on the summit, with the understanding that traction service was to be furnished them, would lie in the courts and not with the commission. It was shown that the line on the summit was dangerous of operation and that the lower line provides for the general public.

Literature of the Inland Empire System.—The Spokane & Inland Empire Railroad, of Spokane, Wash., has recently issued some new attractive folders and timetables. The folder contains a large lithograph birdseye map of the Inland Empire system, and the territory tributary to it, and is well illustrated with halftone views of the company's passenger equipment and terminals. The timetable contains a large map and gives complete arriving and leaving times for all stations. On the Coeur d'Alene division nine trains a day are now operated each way between Spokane and Coeur d'Alene and four trains each way between Spokane and Hayden Lake. On the Spokane & Inland division nine trains a day leave and arrive at Spokane, of which three run to Freeman, three to Palouse and three to Colfax. The Colfax and Palouse branches diverge at Spring Valley junction so that points between that station and Spokane are given a service of six trains a day.

Pennsylvania Street Railway Association Organized.—Representatives of about 100 electric railway companies of Pennsylvania met at the Bellevue-Stratford hotel in Philadelphia on December 21, and organized the Pennsylvania Street Railway Association, using the charter of an association of the same name that has been out of existence for some time. The object of the association is said to be to secure co-operation on matters of public policy. The value of such an organization was demonstrated last spring, when the Temporary Street Railway Association was organized for the purpose of obtaining legislation authorizing the handling of freight by electric roads. The following officers were elected: President, F. B. Musser, president of the Central Pennsylvania Traction Company, Harrisburg; first vice-president, R. P. Stevens, president Lehigh Valley Transit Company, Allentown; second vice-president, Francis J. Torrance, Washington & Canonsburg Railway; secretary, Charles H. Smith, superintendent Lebanon Valley Street Railway, Lebanon.

Pittsburg Railways Company Contests Fare Reduction.—The Pittsburg Railways Company has filed its answer to a suit brought by the borough of Knoxville to compel the company to reduce its fare to all parts of the borough to 5 cents. The borough stated that the ordinance granted the Brownsville Street Railways Company, of which it is claimed the Pittsburg Railways Company is lessee, expressly stipulated that only a 5-cent fare was to be charged from its Pittsburg terminal to all parts of the borough. Despite this it was alleged a 10-cent fare was being charged in certain districts and a restraining order was asked. The railway company denies that it is the lessee of the Brownsville Street Railways Company and states that the latter company was absorbed by the Pittsburg & Birmingham Railway Company, which in turn was taken over by the United Traction Company. The Pittsburg Railways Company states that it operates the United Traction Company by agreement only. It also goes into the question of terminals, and states that the Pittsburg terminal of the Brownsville Street Railways Company at the time its ordinance was granted by the borough of Knoxville was at Carson street. In concluding its answer the company asserts that if it is the desire of the borough that the route or service be discontinued the Pittsburg Railways Company is willing to construct a line over the same route and will establish a uniform rate of 5 cents.

At the Annapolis Naval Academy, the government is installing an experimental plant for testing steam turbine performance under a pressure of 500 pounds and superheat of 300 degrees F. or a total temperature of 780 degrees. All fittings and valves are of cast steel.

Construction News

FRANCHISES.

Aurora, Ill.—The Aurora Railways Company has secured a franchise to operate its line in La Salle street, between Main and Benton streets. It is stated that the tracks will not be laid in the Main and La Salle street routes until the Chicago Burlington & Quincy tracks have been elevated. Fred A. Dolph, Tribune building, Chicago, is president.

Gary, Ind.—The superior court of Lake county, Indiana, has refused to grant a writ of mandamus asked by the United States Steel Corporation to compel a referendum vote on the franchise which was recently granted to Frank N. Gavitt for the Gary & Interurban Railroad. The franchise has been transferred to the Chicago-New York Electric Air Line Railroad.

Ithaca, N. Y.—The Ithaca Street Railway Company has been granted a 50-year franchise for a double-track line in State and North Tioga streets. The company will pay the city 1 per cent of its gross income exceeding \$25,000 per mile.

Pittsfield, Mass.—The Pittsfield Street Railway Company has been granted a 1-year extension of its West Pittsfield franchise, which expired on December 15.

Ventura, Cal.—A franchise for the construction of an electric railway from Ventura to the Ortega ranch has been granted to Julian P. Jones and F. M. Packard, Los Angeles, Cal.

Walla Walla, Wash.—A franchise has been granted to the Washington & Oregon Traction Company for the use of several of the streets in Walla Walla. The company agrees to have the street railway system completed and in operation within two years.

RECENT INCORPORATIONS.

Indianapolis & Cairo Traction Company.—Incorporated under the laws of Arizona to build an electric railway from Indianapolis, Ind., to Cairo, Ill., serving the Indiana and Illinois coal fields. Capital stock, \$10,000,000. Incorporators: A. L. Hassler, York, Pa., president; Charles McDermott, Indianapolis, secretary and treasurer. W. C. Buell and John T. Figg of Indianapolis, also are interested. It is stated that the company has taken over the Eel River Railroad Company, incorporated two years ago to build a steam road from Indianapolis into the Indiana coal fields. Surveys have been completed as far as Sullivan, Ind. It is stated that financial arrangements have been concluded and the bonds disposed of to Paris (France) capitalists.

TRACK AND ROADWAY.

Allen Street Railway, Bethlehem, Pa.—This company's new 4-mile electric line connecting Nazareth and Bath, Pa., has been completed and the first car was placed in operation on December 21. The new line will accommodate about 2,000 workmen employed in the cement mills situated along the route.

Anacortes Development Company, Anacortes, Wash.—Surveys have been completed and it is expected that construction work on the line between Anacortes and Sedro-Woolley, Wash., will be started on January 1. The road will be 22 miles long and was planned primarily for freight business, although considerable passenger traffic will be developed. The line will afford direct communication with the Northern Pacific, Canadian Pacific and Bellingham Bay & British Columbia Railways, as well as with the Great Northern, which heretofore has had the monopoly of the freight business in this section of Washington. The work will start from Anacortes this winter and from Sedro-Woolley in the spring, with the expectation of having the line completed within two years. The overhead trolley will be used and the track will be laid with 60-pound rails. B. J. Weeks is interested.

Arkona, Ont.—It is stated that plans for an electric railway which will connect Arkona and Sarina, Ont., are under consideration. Power for the operation of the road probably will be secured from the recently completed Rock Glen power plant on the Au Sable river.

Atlanta & Carolina Railway, Atlanta, Ga.—Matthew Mason, vice-president and general manager of this proposed interurban railway, is reported as saying that surveys have been completed from Augusta to Washington, Ga., and that surveys for the intermediate route between Athens and Washington will be finished by the first of the year. The contract

for the construction of the road has been let to Cook & Laurie, Montgomery, Ala., and grading will be started at an early date. The road is to be completed and in operation within two years' time. The most modern rolling stock equipment and methods of construction will be used and freight as well as passenger trains will be operated. Terminals will be located at Atlanta, Augusta and Athens.

Auburn & Northern Electric Railroad, Auburn, N. Y.—T. H. Mather, chief engineer, writes that eight miles of track have been laid this year, from Auburn to Port Byron, N. Y. No extensions are proposed at present.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y.—This company has relaid 1.5 miles of double track in the city of Auburn, N. Y., with 90-pound T-rails, replacing 6-inch 70-pound girder rails. T. H. Mather, chief engineer.

Berkshire Street Railway, Pittsfield, Mass.—This company has petitioned the Massachusetts railroad commissioners for an extension of time on the abolishment of the so-called Merrill grade crossing over the tracks of the North Adams branch of the Boston & Albany Railroad. Under an order issued September 6, 1906, the Berkshire company was allowed until January 1, 1908, to abolish the crossing. It now petitions for an extension of two years. It is reported that the city will favor granting the extension.

Boise & Interurban Railway, Boise, Idaho.—It is reported that this company is considering the construction of an extension from Caldwell, Idaho, to the Snake river, with the idea of establishing a ferry and excursion service on the river.

Bristol & Kingsport Railway, Bristol, Tenn.—We are advised by F. Powell, secretary and treasurer of this proposed railroad, that surveys are now being made with a view to starting construction work in the fall of 1908. The road will be 25 miles long and will be constructed either for steam or electric operation. It will connect the Norfolk & Western, Virginia & Southwestern and the Southern Railway at Bristol, Tenn., with the South & Western Railroad at Kingsport. John I. Cox, president; S. L. King, vice-president, Bristol, Tenn.; F. Powell, secretary and treasurer; J. B. Cox, general counsel, Johnson City, Tenn. F. H. Cothran, Bristol, Tenn., is chief engineer.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—It is announced that this company will extend its local line in Dunkirk, N. Y., from Woodland, the present terminus, to the northern limits of the city, in compliance with the directions of the city council.

Central Railway Company.—T. J. Wilcox, Clinton, Ia., is interested in the construction of a proposed 80-mile interurban line, which will connect Clinton and Dubuque, Ia., by way of Maquoketa. It will be a third-rail line, but the overhead trolley will be used in the cities and towns through which it passes. It will cost about \$2,500,000. The route has been surveyed from Clinton to Maquoketa and surveyors are now working from Maquoketa to Dubuque.

Denver & Interurban Railroad, Denver, Colo.—H. W. Cowan, chief engineer, Denver, writes that this company has laid 6¼ miles of track in Ft. Collins, Colo., since January 1, 1907, and that a 1-mile extension will be built in that city during the coming year. It will also build about two miles of electric road in Boulder and equip, for electrical operation, the Eldorado Springs (steam) Railway, which it has purchased. It is planned to have this finished by May, 1908. The company has completed the grading for an electric line on the right of way of the Colorado & Southern Railway from Denver to Louisville Junction, 16¼ miles, and expects to have the entire road completed some time in 1908.

Duluth, Minn.—S. F. Snively, C. P. Craig and John G. Williams are interested in the construction of an electric railway from Woodland avenue, Duluth, to Jean du Lach farm, about six miles.

Dunnville Wellandport & Beamsville Electric Railway, Wellandport, Ont.—It is announced that this company will start construction work on the 15-mile section between Dunnville and St. Ann, Ont., some time in the spring. James A. Ross, president, Wellandport, Ont.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—James Murdock, president, Lafayette, Ind., is quoted as saying that it is the intention to begin construction in the spring on the extension from Princeton to Vincennes, Ind. An extension from Evansville to Patoka is now under way.

Fredericksburg & Southern Railway, Fredericksburg, Va.—This company, as reported in last week's issue of the Electric Railway Review, has applied for a charter for an electric rail-

way 40 miles long from Fredericksburg southward to Doswell, Va. The stockholders of the Richmond & Chesapeake Bay Railway, which runs from Richmond to Ashland, Va., 15 miles, are interested in the new road and it is proposed to connect the lines by an extension later from Doswell to Ashland, about six miles. Frank J. Gould, president of the Richmond & Chesapeake Bay, is the principal promoter of the new road. W. C. Whitner of Rock Hill, S. C., is president.

Ft. Dodge Emmetsburg & Spirit Lake Railway, Ft. Dodge, Ia.—It is stated that construction work will be started on this interurban line north from Ft. Dodge early in the spring. The line when completed will be 116 miles long. It is stated that farmers along the proposed route already have subscribed \$300,000 of the \$1,500,000 necessary to build the road.

Gary & Interurban Railway, Gary, Ind.—We are advised by this company that one mile of track has been laid in Gary and that three miles of grading has been completed. The line will be 7½ miles long and will connect Gary, Whiting, Hammond and Tolleston, Ind. Surveys for the entire distance have been made. The machinery for the power house is being installed and substations are under construction. The Co-Operative Construction Company has the contract for this work. F. N. Gavitt, Whiting, Ind., is president.

Greenville Interurban Railway, Greenville, S. C.—This company has started the survey for its proposed interurban line from Greenville to Williamston, S. C., with a view to beginning construction work as soon as it is completed. Arrangements also are being made for the construction of a line from Greenville to Spartanburg. Lockwood, Green & Co., Boston, Mass., will do the surveying. John C. Carey is president; A. A. Gates, vice-president; C. C. Good, secretary and treasurer; H. H. Prince, general manager.

Hudson & Manhattan Railroad, New York City.—The New York public service commission has granted to this company an extension of time in which to complete the tunnel under the North river from Jersey City to New York City. Under the terms of the original franchise granted by the old rapid transit commission that portion of the tunnel between Hoboken, N. J., and the terminal at Greenwich and Christopher streets, was to be placed in operation by January 7, 1908. Mr. W. G. McAdoo, president of the company, states that while it is prepared to open the tunnel for traffic on the date stipulated he does not consider that the public would be benefited by the operation of the line between those points; whereas, if an extension of time was granted to March 7 next he could promise that trains would be operated as far as Sixth avenue and Fourteenth street on that date. It was with this understanding that the extension was granted.

Illinois & Indiana Electric Railroad.—Construction work was started on this proposed line on December 11 when the mayor of East St. Louis drove a silver spike at the corner of Tenth and Market streets. The eastern terminus of the road as now planned is Centralia, Ill., with its southern terminus at Columbia, Ill. It is stated that the construction work will be pushed south to Columbia, where connection is to be made with another interurban line under construction between Columbia and Waterloo, Ill. This branch will serve the towns of Falling Springs, Cahokia, Dupont, Bixby, East Carondelet and Phelps City. The other branch of the line will pass through Centerville Station east to Belleville and from there through St. Clair, Washington, Clinton, Randolph and Perry counties to Centralia. Some grading already has been done on the line between East St. Louis and Belleville. About a year ago the company asked for an extension of a year in which to complete its line, furnishing a bond of \$5,000 as a guarantee that the work would be done. At a recent meeting of the council a further extension of three years was secured and a bond of \$10,000 was deposited with the city of East St. Louis, Ill.

Illinois Traction System, Champaign, Ill.—An official is quoted as saying that it has been decided to connect with the Indiana electric lines by a line from Danville, Ill., to either Crawfordsville or Terre Haute, Ind.

Interborough Rapid Transit Company, New York.—This company has added 0.375 mile of new line during the past year on its subway division, from Two Hundred and Twenty-first street to Two Hundred and Thirtieth street, on Broadway. The company has under construction 3.51 miles, as follows: From Two Hundred and Thirtieth street on the Broadway division to Van Cortland park, one mile; from Bowling Green in the borough of Manhattan to Atlantic avenue in the borough of Brooklyn, 2.51 miles. The work is being done by the Rapid Transit Subway Construction Company.

Lincoln, Neb.—A meeting was held recently at the Commercial Club for the purpose of organizing a company to construct an interurban line from Lincoln to College View, Neb.,

as well as branch lines serving other towns in the vicinity, all to converge at Lincoln.

Los Angeles & Redondo Railway, Los Angeles, Cal.—This company has built 8.64 miles of new track during the past year, as follows: In Los Angeles, 1.74 miles of track, and a line from Los Angeles to Strawberry park, 6.9 miles.

Milwaukee & Fox River Valley Railroad.—John M. Sae-mann, president of this company, which was incorporated about a year ago to build an electric railway from Cedarburg to Appleton, Wis., by way of Plymouth, Fond du Lac and other Wisconsin towns, is quoted as saying that the section between Plymouth and Elkhart Lake would be completed and in operation during the coming summer.

Niagara St. Catharines & Toronto Railway, St. Catharines, Ont.—The railway commissioners have approved the location plans of the route for this company's proposed extension from Thorold to Brantford, Ont.

Nipissing Central Electric Railway.—This company intends to build an electric railway in and connecting Hailey-bury, Liskeard, Burke, Coleman, Cobalt and Lantford, Ont. Franchises have been secured in each of the towns named. Surveys have been made and construction will be started as early as possible. Those interested are: Frank Latchford, J. W. Fitzpatrick, Ottawa; T. Fitzpatrick, New Liskeard; W. J. O'Brien, Renfrow, Ont.; Judge C. M. Stone, Cleveland, O.

North Midland Railway, London, Ont.—A. E. Welch of London, Ont., has the contract for building this line from London to Stratford, Ont., via St. Mary's, Ballymote and Bryanston, Ont., 35 miles. Two large bridges are included. Surveys have not yet been made. Mr. Welch will probably let subcontracts.

Penn & Franklin Street Railway, Pittsburg, Pa.—This company has let the contract for the electrical equipment of its proposed line from Pittsburg to East Pittsburg to the Westinghouse Electric & Manufacturing Company.

Philadelphia Rapid Transit Company.—James P. McNichol of the Millard Construction Company, which is building the subway, is quoted as saying that the company has practically decided to accept the offer of the Rapid Transit Company for a bonus of \$76,000 for the completion of the subway by August 1, 1908, and that the work will be hastened to completion by that time.

Pueblo & Arkansas Valley Electric Railway, Pueblo, Colo.—This company, which was incorporated last week, is securing additional right of way for the construction of its proposed interurban line connecting Pueblo, Rocky Ford and other points in the Arkansas valley. N. Douthitt, Kansas City, Mo., is president; F. R. Stoller, secretary; F. B. Chapeze, treasurer; N. C. Vanatta, chief engineer.

Rochester Syracuse & Eastern Railroad, Syracuse, N. Y.—T. H. Mather, chief engineer, writes that eight miles of double track have been completed this year, from Lyons to Clyde, N. Y. An extension is in progress from Clyde to Port Byron, 15 miles. The section from Rochester to Lyons was completed last year. The Syracuse Railroad Construction Company is building the road.

San Bernardino Valley Interurban Railway, Riverside, Cal.—It is stated that construction work will be started within a few weeks on this proposed interurban railway, which will connect Riverside and Colton, Cal., about nine miles. The contract for the grading has been awarded to Garnsey & Pitzer, Los Angeles, Cal.

Spokane & Inland Empire Railroad, Spokane, Wash.—A. M. Lupfer, chief engineer, writes that his company has laid 50.55 miles of track during 1907, as follows: From Rosalia to Colfax, Wash., 30.16 miles; from Geary to Ladow, Wash., 18.18 miles; and from Liberty Lake Junction to Liberty Lake, 2.21 miles. An extension is now in progress from Palouse, Wash., to Moscow, Idaho, 15.5 miles, with 90 per cent of the grading completed.

Spring Valley, Minn.—An electric line which will connect Spring Valley, Minn., and Cresco, Ia., serving the towns of Cherry Grove and Granger along the proposed route, is an interurban project which was discussed at a meeting held in Spring Valley on December 13. Committees were appointed and subscriptions for stock will be received.

Syracuse Lake Shore & Northern Railroad, Syracuse, N. Y.—Thomas H. Mather, chief engineer, writes that the Syracuse Railroad Construction Company has completed for this road an extension five miles long, from Long Branch to Baldwinsville, N. Y. An extension is in progress from Baldwinsville to Fulton, 13 miles, which is expected to be in operation by October, 1908.

Terre Haute Indianapolis & Eastern Traction Company, Indianapolis, Ind.—It is reported that the grading and bridge

work on the line from Brazil to Greencastle, Ind., is now completed and it is expected that through service from Terre Haute to Indianapolis will be established by February 1. Track has been laid except on a short stretch near Eagles.

Terre Haute & Merom Traction Company, Terre Haute, Ind.—The contract for the construction of this proposed 10-mile electric line from Terre Haute to Merom, Ind., and Robinson, Ill., has been let to the Central States Construction Company of Chicago, Ill. It is stated that work will be started in about a month. L. Brown, president; J. Warren Brown, secretary, Terre Haute; H. L. Bartlett, St. Louis, Mo., treasurer.

Texas Traction Company, Dallas, Tex.—Fred A. Jones, chief engineer of this company, which is building the electric line from Sherman to Dallas, Tex., 62 miles, states that the grading is completed, most of the bridges finished and that many of the ties and rails have been delivered ready for laying the track. The rails will be laid first on the northern section of the line, from McKinney to Sherman. The road will include 14 street bridges, eight of which are of 100-foot span. Eighty-five thousand tons of 80-pound rails will be used, 800,000 pounds of copper wire and 35,000 cedar poles. Ties of white oak, post oak and heart pine will be used without treating. One hundred thousand ties of sap pine will be treated at Shreveport, La., half with chloride of zinc and dead oil of coal tar, and half by the carbolineum process. It is now expected to have the road completed by April 1. Theodore Stebbins, general manager, Dallas.

Toronto, Can.—It is stated that an English syndicate has been formed for the purpose of constructing electric railways in the rural districts of Quebec and Ontario, Can., and to further develop the properties of the Montreal Light Heat & Power Company, the Quebec Railway Light & Power Company, the Electric Development Company and the Toronto Street Railway. It is said that the syndicate is prepared to expend several million dollars in these developments and already has engineers engaged in making estimates for these projects.

Toronto, Can.—Estimates on the approximate cost of an underground electric railway system covering the three principal routes in the city of Toronto, have been prepared by the city engineer. It is stated that it would cost about \$1,500,000 a mile or a total of \$23,500,000 for the construction of such a system.

Toronto, Can.—A. T. Drummond, of Toronto, is said to be interested in the construction of a proposed electric line which will connect London and Toronto.

United Railroads of San Francisco.—General Manager Charles N. Black has applied to the board of public works for a permit to install poles and wires on Pacific avenue in order to operate the line by trolley, instead of by cable. The application has been referred to the board of supervisors, which has raised a question of the right of the company to convert any more lines under its trolley franchise.

United Traction Company, Albany, N. Y.—This company has secured an extension of time in which to complete and operate its proposed new lines in Upper Rensselaer, N. Y. It is stated that this work will be completed by December 31, 1908.

West Chester & Wilmington Railway.—This company will build an electric line from West Chester to the Delaware state line, where it will connect with the Delaware section of the road. This district heretofore has been served only by steam lines. The company is capitalized at \$54,000. Thomas E. O'Connell, president, West Chester, Pa.; others interested are: C. P. Faucett, Westtown; J. A. Kirkpatrick, Birmingham; Charles Gleason, Brandywine Summit; Willis Passmore, Brandywine; F. Harvey Day, Talleyville; M. A. O'Connell, West Chester.

Winston-Salem, N. C.—H. E. Fries, president, writes that the Fries Manufacturing & Power Company, which operates the former Winston-Salem Railway & Electric Company, has built an extension of the local street railway one mile in length.

POWER HOUSES AND SUBSTATIONS.

Ohio Electric Railway, Cincinnati, O.—It is reported that this company has begun excavations at Lewistown Reservoir, near Bellefontaine, O., for a large power house to supply power for the Lima-Bellefontaine line, which is now under construction.

Pittsburg Harmony Butler & New Castle Street Railway, Pittsburg, Pa.—It is stated that the power house at Eidenau, Pa., will be in operation about the first of the year. The plant will have a capacity of 25,000 horsepower.

Personal Mention

Mr. W. H. Owens has resigned as superintendent of the Illinois Traction system at Decatur, Ill., effective on January 1.

Mr. G. E. Tracy, for the past year master mechanic of the Cleveland Southwestern & Columbus Railway at Cleveland, O., has resigned.

Prof. J. P. Jackson, heretofore professor of electrical engineering at the Pennsylvania State College, has recently been appointed dean of the school of engineering at that institution.

Mr. Charles F. Turner, heretofore chief engineer of the Columbus Delaware & Marion Railway, Delaware, O., has been appointed superintendent of motive power with supervision over power houses, substations and all rolling stock; effective on January 1.

Mr. T. R. Gabel, general manager, and Mr. C. H. Ellison, chief engineer, of the Los Angeles Pacific Company, Los Angeles, Cal., have resigned. The duties of the office of general manager will hereafter be performed by Mr. R. P. Sherman, superintendent.

Mr. Arthur W. Jordan, formerly assistant general passenger and freight agent of the Indiana Columbus & Eastern Traction Company at Columbus, O., has been appointed traffic manager of the Chicago & Joliet Electric Railway, Joliet, Ill. The position includes the management of Dellwood Park.

Mr. Frank T. Sloane, for the past two years insurance engineer of the Brooklyn Rapid Transit Company, has resigned to become associated with the S. F. Bowser Company, Ft. Wayne, Ind. Mr. Sloane formerly was connected with the United States Steel Corporation as insurance inspector.

Mr. Lloyd Lyon has resigned as assistant manager and assistant treasurer of the San Juan Light & Transit Company, San Juan, Porto Rico, to become secretary and auditor of the Mobile Light & Railroad Company, Mobile, Ala., succeeding Mr. Z. E. Watson, resigned. The appointment was effective on December 1.

Mr. C. N. Ryan, who for the past year has been traveling operating auditor with J. G. White & Co., has been appointed assistant secretary and assistant treasurer of the Eastern Pennsylvania Railways Company and its controlled railway and lighting properties, with headquarters at Pottsville, Pa. Mr. Ryan was at one time auditor of the Michigan United Railways Company.

Mr. Walter P. Hall, Fitchburg, Mass., assistant attorney-general of Massachusetts, has been appointed chairman of the board of railroad commissioners, succeeding Hon. James F. Jackson, resigned. Mr. Hall was born about 40 years ago at Manchester, N. H., and was educated at Brown University and the Harvard Law School. He was appointed assistant attorney-general in January, 1906, and will assume his new duties about January 1, 1908.

Mr. H. W. Clapp of the railway engineering and construction department of the General Electric Company has resigned to become associated with the engineering department of the Southern Pacific Railroad at San Francisco, Cal. On December 14 Mr. Clapp was the guest of honor at an informal luncheon given by the members of the Engineers' Club of New York City. He formerly was for four years superintendent of motive power of the Brisbane (Australia) Tramways Company.

Mr. W. S. Menden, general superintendent and chief engineer of the Brooklyn Rapid Transit Company, has been appointed assistant general manager, effective on January 1. Mr. A. N. Dutton, assistant to the general manager, has been appointed superintendent of transportation. Mr. Menden was formerly general superintendent of the Metropolitan West Side Elevated Railway of Chicago, and was for two years chief engineer of the Brooklyn Rapid Transit Company. In July of this year he was appointed general superintendent also, to succeed Mr. Dow S. Smith, resigned.

Obituary.

John W. McNamara, formerly president of the United Traction Company of Albany, N. Y., died at his home in Albany on December 20, after a lingering illness. He was connected with the street railways of Albany from 1864 to January 1, 1906, at which time the United Traction Company was acquired by the Delaware & Hudson Company.

Financial News

Chicago Union Traction Company.—Orders were entered by Judge Grosscup of the United States circuit court on December 26 providing that all of the present Union Traction properties be put on the auction block and sold, under foreclosure, to the highest bidder, and that pending and in aid of this sale the receivers of the properties execute a lease of them to the Chicago Railways Company, turning the properties over to it. This will insure the acceptance of the Chicago Railways Company ordinance. Judge Grosscup made the following statement: "What the entry of these orders means is that 2,000,000 people, constituting the city of Chicago, at last have come to an understanding with some 20,000 people, constituting the creditors, bondholders and stockholders of the old Union Traction system, whereby, as nearly as human judgment can reach such results, the 2,000,000 get what is due them as a community; the twenty-odd thousand get what is due them as a body, and each of the 20,000 gets what is due to him as an individual. A settlement on so large a scale, involving so much feeling, is always difficult. It was the ordinance of February last that made such settlement possible. The extension ordinance of last September saved it from disaster. The agreement today practically closes it. And when we remember what just complaint the 2,000,000 had; when we remember that nearly every one of the twenty-odd thousand was himself the victim of the same wrong; when we remember that among these 20,000 there were more than a score of direct conflicting interests, each in itself a lawsuit involving millions; when we remember how easy and quickly done it might have looked to have wiped the slate of the whole difficulty by simply giving the new franchise to some outside people or to some syndicate of big men in the old companies—selling to them the tangible property of the old company at what it might bring at public sale—the dominant feeling that possesses today is one of thankfulness—sincere thankfulness—that held to sober second thought the American people can be trusted to deal with each other in an enlightened spirit of fair play. Mistakes have been made—I can put my finger on dozens of my own. But the central idea has been carried out."—Corporation Counsel Brundage takes the position that the various extensions of time for acceptance of the Chicago Railways Company ordinance do not modify the original terms for division of the net receipts with the city and he states that the city is entitled to its 55 per cent of the net receipts from February 1, 1907.

Metropolitan West Side Elevated Railway, Chicago.—Directors have postponed action on the quarterly dividend on the proposed stock. They passed the following resolution: "Whereas, the long-continued depression of the bond market has made it impossible for the company to reimburse its treasury by the sale of securities to pay for improvements and betterments already made and equipment supplied; and, whereas, these improvements and this equipment have been made necessary in order to meet requirements of the public and the increase of business; therefore, be it resolved, that in view of the foregoing and of the present condition of the money market, the prudent course for the directors to take at this time is to postpone action on the dividend." In a statement sent by Secretary P. D. Sexton to the stockholders it is announced that the company has earned $4\frac{1}{2}$ per cent on its preferred stock after the payment of fixed charges for the calendar year, and only $2\frac{1}{4}$ per cent has been declared in dividends.

Mt. Mansfield Electric Railroad, Stowe, Vt.—The property of this company has been sold at auction. A. H. Soden of Boston, president of the company, was the successful bidder. He acquired the property for \$20,000.

North American Company.—The Union Electric Light & Power Company of St. Louis, a subsidiary, has acquired control of the Laclede Power Company and the Edison Electric Illuminating Company of St. Louis from E. M. Clark & Co. of Philadelphia. It is reported that the North American Company, the Illinois Traction System and the Clark interests have reached an understanding providing that the three interests will not interfere with each other in St. Louis and tributary territory. According to the report the North American Company will confine its operations in that territory to St. Louis and the Illinois Traction System will acquire trackage rights from the United Railways of St. Louis. Under this arrangement the Clark interests would continue to operate the properties near St. Louis in Illinois.

Philadelphia Rapid Transit Company.—Meyer Goldsmith, the expert accountant of the committee appointed to determine an equitable amount to be paid annually to the city by

the company under its ordinance for the maintenance of streets occupied by the electric roads has made his report. Mr. Goldsmith says that "differences of opinion may readily exist as to the account maintenance or construction, to which certain items are properly chargeable. The company followed the plausible rule that in making extensions the cost of everything relating thereto should be regarded as construction. But when the company in 1903 charged \$58,000, spent in paving 'shoulders,' to its construction account the question for the board to consider was not whether this was correct as a matter of bookkeeping, but whether for the purposes of the present inquiry it should be included in the cost of paving repairs." When the company made trackage extensions and paved the entire street it charged such items to construction because it regarded the completed work as an asset. Other paving was regarded as repairs and found its place in the accounts covering "repairs." The figures submitted as the cost to the company for work included in the agreement were averaged for a period of five years and were as follows:

1902.....	\$139,549.19	1906.....	\$350,354.22
1903.....	305,691.43		
1904.....	292,255.12		\$1,454,725.91
1905.....	366,875.95		
Annual average, \$290,945.			

This average, plus the amount for licenses, \$110,000, and snow removal, \$15,000, made a total of \$415,945. In Mr. Goldsmith's report the following figures are taken as representing the expenditures of the company:

Last six mos., 1902.	\$77,359.11	1906.....	\$350,354.22
1903.....	305,691.43	First six mos., 1907.	98,456.06
1904.....	292,255.12		
1905.....	366,875.95		\$1,490,991.89

This makes an annual average of \$298,198.37, or a trifle more than \$7,000 in excess of the figures which were the basis upon which the agreement with the city was reached. If to this amount be added \$110,000 for car licenses and \$15,000 for snow removal, the grand total becomes \$423,198.37, or \$7,253 more than the total of the previous reckoning. On the other hand, Mr. Goldsmith brings the annual average for street paving up to \$303,561.05 by adding to the company's admitted expenditures for this work various items not placed to such account. In arriving at the total of \$500,000, which the company must pay the city annually, somewhat more than 17 per cent was added to cover the annual increasing cost of the various items. The revised figures then become:

Paving	\$365,000
Licenses	120,000
Snow removal	15,000
	\$500,000

The agreement with the city is to continue 50 years and \$50,000 is to be added every 10 years to the yearly payment of \$500,000.

Warren & Jamestown Street Railway, Warren, Pa.—The New York public service commission, second district, has approved the plan of this company for executing a second mortgage to secure an issue of \$100,000 bonds.

Washington Baltimore & Annapolis Electric Railway, Washington, D. C.—Managers of the underwriting syndicate have issued a call for the balance of 35 per cent, making a total payment of 75 per cent, the agreed price of the underwriter.

West End Street Railways, Boston.—Shareholders have approved the proposition to issue \$1,010,900 additional common stock, which will be sold at \$70 a share.

ELECTRIC RAILWAY EARNINGS.

Aurora Elgin & Chicago Railroad.

November—	1907.	1906.
Gross receipts	\$108,653.36	\$96,721.64
Operating expenses	63,191.99	56,817.42
Net earnings	45,461.37	39,904.22
Fixed charges	29,058.47	26,158.32
Surplus	16,402.90	13,745.90
July 1 to November 30—	1907.	1906.
Gross receipts	\$673,626.61	\$599,542.35
Operating expenses	351,452.73	306,887.95
Net earnings	322,173.88	292,654.40
Fixed charges	135,281.74	126,967.36
Surplus	186,892.14	165,687.04

Duluth Street Railway.

November—	1907.	1906.
Total earnings	\$72,812.91	\$65,392.66
Operating expenses	41,015.04	41,270.74
Net earnings	31,797.87	24,121.92
Deductions	17,912.49	17,851.08

Net income	13,885.38	6,270.84
January 1 to November 30—	1907.	1906.
Total earnings	\$772,992.71	\$702,284.80
Operating expenses	392,099.40	377,199.55
Net earnings	380,893.31	325,085.25
Deductions	195,639.19	194,345.19
Net income	185,254.12	130,740.06

Illinois Traction Company, Champaign, Ill.

	November, 1907.	Eleven months ending November 30, 1907.
Gross earnings	\$335,889.31	\$3,427,210.40
Expenses and taxes	195,595.55	1,928,521.33
Net earnings	140,293.76	1,498,689.07

Montreal Street Railway.

	November—1907.	1906.
Total earnings	\$296,184.47	\$263,260.41
Operating expenses	182,637.54	174,933.26
Net earnings	113,546.93	88,327.15
Total charges	41,655.14	39,276.38
Surplus	71,891.79	49,050.77
October 1 to November 30—	1907.	1906.
Total earnings	\$608,082.85	\$545,082.69
Operating expenses	347,212.68	331,173.78
Net earnings	260,870.17	213,908.91
Total charges	84,943.91	79,886.28
Surplus	175,926.26	134,022.63

Northern Ohio Traction & Light Company, Akron, O.

	November—1907.	1906.
Gross earnings	\$146,122.92	\$133,388.07
Operating expenses	88,180.30	79,340.98
Net earnings	57,942.62	54,047.09
Fixed charges	43,351.16	41,013.66
Surplus	14,591.46	15,033.43

Toledo Railways & Light Company.

	November—1907.	1906.
Earnings	\$220,019.09	\$218,201.29
Operating expenses	116,957.48	116,122.34
Net earnings	103,061.61	102,078.95
Miscellaneous income	735.97	834.89
Gross income	103,797.58	102,913.84
Deductions	67,925.19	59,680.16
Net income	35,872.39	43,233.68
January 1 to November 30—	1907.	1906.
Earnings	\$2,328,255.86	\$2,217,670.89
Operating expenses	1,331,495.86	1,125,134.41
Net earnings	996,760.00	1,092,536.48
Miscellaneous income	10,075.16	10,649.66
Gross income	1,006,835.16	1,103,186.14
Deductions	726,391.75	651,474.51
Net income	280,443.41	451,711.63

Dividends Declared.

American Cities Railway & Light Company, New York, N. Y., preferred, quarterly, 1½ per cent.
Cincinnati (O.) Street Railway, quarterly, 1½ per cent.
Columbus (Ga.) Electric Company, preferred, 3 per cent.
Consolidated Traction Company, Pittsburg, common, 1 per cent.
El Paso (Tex.) Electric Company, preferred, 3 per cent.
Johnstown (Pa.) Passenger Railway, quarterly, three-quarters of 1 per cent.
Knoxville (Tenn.) Railway & Light Company, common, 1 per cent; preferred 1½ per cent.
Little Rock (Ark.) Railway & Electric Company, common, 2 per cent; preferred, 3 per cent.
Manchester (N. H.) Traction, Light & Power Company, quarterly, 2 per cent.
Northern Ohio Traction & Light Company, Akron, O., quarterly, ½ of 1 per cent.
Puget Sound Electric Railway, Tacoma, Wash., preferred, 3 per cent.
Reading (Pa.) Traction Company, 1½ per cent.
St. Joseph (Mo.) Railway, Light & Power Company, preferred, quarterly, 1½ per cent.
Springfield (Ill.) Railway & Light Company, quarterly, 1 per cent.
Tri-City Railway & Light Company, Davenport, Ia., preferred, quarterly, 1½ per cent.
United Traction Company, Pittsburg, preferred, 2½ per cent.
Washington Water Power Company, Spokane, Wash., quarterly, 1¾ per cent.
West End Street Railway, Boston, preferred, 4 per cent.

Manufactures and Supplies

ROLLING STOCK.

Illinois Traction System, Champaign, Ill., will have five cabooses built by the Danville Car Company.

Newton Street Railway, Newtonville, Mass., advises that a little later it may purchase two pay-as-you-enter cars.

Nashville Interurban Railway, Nashville, Tenn., will be in the market for a number of cars in January or February.

Mankato Electric Traction Company, Mankato, Minn., has ordered three box cars from the Danville Car Company for delivery next year.

Gary & Interurban Railway, Gary, Ind., which was reported in the Electric Railway Review of December 7 to be in the market for a number of cars, has ordered two box cars from the Danville Car Company.

SHOPS AND BUILDINGS.

Chicago & Joliet Electric Railway, Joliet, Ill.—J. R. Blackhall, general manager, advises that the recent reports that this company was preparing plans for new shops at Joliet are erroneous, and that the company does not propose to build in the near future.

Indiana Union Traction Company, Anderson, Ind.—W. R. Hicks of Elwood, Ind., has been awarded the contract for the construction of new car houses at Tipton, Ind., to replace those destroyed by fire on October 31, as reported in the Electric Railway Review of November 9. The new buildings, which will be larger than the old ones, will cost \$90,000.

TRADE NOTES.

D. G. Ziegler & Co., National Loan and Exchange Bank building, Columbia, S. C., want prices on cars and steel trolley poles and brackets.

Sanford G. Scarritt, one of the founders and for many years president of the Scarritt-Comstock Furniture Company, St. Louis, Mo., died December 7.

Nashville Interurban Railway, Stahlman building, Nashville, Tenn., advises that it desires prices on 70-pound rails, both new and relaying, and second-hand bridges, with about 50-foot spans. H. H. Mayberry is president.

Allis-Chalmers Company, Milwaukee, Wis., has sold to the Virginia Passenger & Power Company of Richmond, Va., a 750-kilowatt Allis-Chalmers water wheel type alternator, wound for 2,300 volts, 60 cycles, three-phase, and designed to operate at 128 revolutions per minute. This unit will be ready for operation by April 1.

William Selfridge has been elected president of the William Wharton, Jr., & Co., Philadelphia, Pa., succeeding the late William Wharton, Jr., whose death was reported in the Electric Railway Review of November 30. Mr. Selfridge has been connected with the company for a number of years as director and assistant treasurer.

Lima Insulator Company is having installed at its plant at Lima, N. Y., where the well-known "Lima" high-tension and other insulators are manufactured, testing apparatus which will make available a pressure of 450,000 volts for testing and research work. The apparatus is being installed by the Central Laboratory Supply Company, Lafayette, Ind.

E. H. Symington, western manager of sales of the T. H. Symington Company at Chicago, returned on December 20 from a trip around the world, including visits to Japan, China, India and other oriental countries. It will be remembered that last May Mr. Symington sustained serious injuries from being thrown from his horse while riding in Lincoln park, and has for the last four months been touring the continent to regain his strength. After an extended visit in the east Mr. Symington will again resume his duties at Chicago.

W. R. Garton has resigned as president and treasurer of the W. R. Garton Company, 118 Jackson boulevard, Chicago, to become associated with the Lord Electric Company of New York. Mr. Garton has disposed of his stock in the Garton company to Ray P. Lee, who succeeds Mr. Garton as president and treasurer. A. F. Henderson succeeds Mr. Lee as secretary. The following statement has been issued by Mr. Garton: "In disposing of my interests in the W. R. Garton Company to Ray P. Lee, for 10 years my business associate and close personal friend, I desire to assure our many friends of my sincere interest in the continued welfare of this company."

which has had my best efforts for so many years past. I hope that my personal friends will remain as loyal to Mr. Lee as they have been to me, and in this connection I wish to express my gratitude to all for the favor you have accorded us. I hope, through my association with the Lord Electric Company of New York City, to continue these relations which have been so pleasant."

Charles E. Sargent, for the past seven years manager of the Sargent Engineering Company, Chicago, has resigned to accept the position of chief engineer and manager of the gas engine department of the Wisconsin Engine Company, Corliss, Wis., builder of high-grade Corliss engines, and which will hereafter build the Sargent complete expansion gas engine, the invention of Mr. Sargent. The Sargent Engineering Company's specialty has been the designing and testing of internal combustion engines and producers, and while engaged in this work Mr. Sargent saw the necessity of better testing apparatus and invented and put upon the market an automatic gas calorimeter, an integrating dynamometer, a dust determinator for dirty gas, a gas washer, the Sargent draft gauge, steam meter and anglemeter, besides the complete expansion gas engine. On account of Mr. Sargent's experience and the excellent equipment of the shops of the Wisconsin Engine Company for the building of large prime movers, a most efficient output is anticipated.

Westinghouse Electric & Manufacturing Company's receivers and a number of the important creditors held a meeting in New York on December 20, when a committee was appointed to act for the creditors of all classes in formulating and executing a plan for the readjustment of the company's debt and termination of the receivership. The committee is composed of Richard Delafield, president of the National Park Bank; James N. Jarvie, representing the National Bank of Commerce, and other financial institutions; Albert H. Wiggin, vice-president of the Chase National; F. H. Skelding, president of the First National Bank of Pittsburg; Charles A. Moore, of Manning, Maxwell & Moore, Inc., New York; and Neal Rantoul, of F. S. Mosely & Co., Boston. It is said that a seventh member, living in Chicago, will be appointed, but his name has not yet been announced. George Westinghouse, president of the company, is actively engaged on the plans for reorganization, and it is thought that these plans will be made public early next week. They will doubtless provide for the payment of the creditors in some kind of securities issued by the company, and the appointment of a committee of creditors to take over the management temporarily. Later an executive committee, composed of prominent financial men, will supersede the temporary organization, and take active charge of the financial side of the company's affairs. A report prepared for the receivers by Haskins & Sells, public accountants, on the assets and liabilities of the company shows the following figures:

Assets.	
Property and plant.....	\$21,548,403
Investments	30,104,453
Working assets	17,942,065
Quick assets	10,317,612
Other accounts and notes receivable	5,274,092
Contingent assets	2,296,883
Liabilities.	
Capital stock	\$27,938,100
Funded debt	21,319,000
Six per cent collateral notes due in August, 1910....	6,000,000
Five per cent collateral notes due October, 1917....	2,702,702
Current liabilities	13,961,352
Subscriptions	1,559,514
Reserve for possible shortage in inventories.....	211,955
Contingent liabilities	2,296,256
Profit and loss, surplus.....	11,494,002
Total	\$87,482,883

The report says that of the assets included under the head of property and plant the account of charters, franchises, etc., of patents, of real estate and buildings, of machinery, tools and fixtures the appraisalment is on the basis of cost to the company. The main buildings of the company's main plant at East Pittsburg, it is stated, were built in 1893 and 1894, when the cost of construction was materially less than at the present time. The investments in the stocks of subsidiary companies in the United States, which are on the balance sheet at \$4,824,726, represent the entire ownership of four companies. In the year ended March 31, 1907, these companies earned a net income, applicable to dividends, of 18 per cent. The holdings of the company in capital, stock and debentures of the foreign subsidiary companies is listed on the books at \$16,447,866. The accountants have not made an examination

of the accounts of any of these companies and are unable to give any information as to the value of their securities. The accountants state that in their opinion the receivers would be justified in taking over the working assets of the company at the valuation on the books, which is \$17,942,065.

ADVERTISING LITERATURE.

Goheen Manufacturing Company, Canton, O.—Zevy's engineers' contract book, a very useful and complete publication, is distributed with this company's compliments.

McConway & Torley Company, Pittsburg, Pa.—A newly issued catalogue sets forth the advantages of the Janney M. C. B. coupler with radial movement for interurban and other electric cars.

Joseph Dixon Crucible Company, Jersey City, N. J.—A neat booklet recently issued has for its subject air brake lubrication. It contains a description of the properties, uses and special advantages of Dixon's Ticonderoga graphite air brake and triple valve grease and Dixon's special graphite No. 635.

General Electric Company, Schenectady, N. Y.—Recent publications include Bulletin No. 4550, which describes a number of the company's well-known line of carbon break circuit-breakers. The bulletin also contains descriptions of auxiliary switches, automatic tripping devices, etc., to be used with the circuit-breakers, and gives complete data as to capacities, prices and dimensions of the devices shown. It contains 36 pages and is conveniently arranged for reference.—Bulletin No. 4531 illustrates and describes various types of Thompson horizontal edgewise instruments for switchboard service, including ammeters, voltmeters, single-phase wattmeters, poly-phase wattmeters, frequency indicators and power factor indicators.

TINNING THE SLOTS OF COMMUTATOR SEGMENTS.

The commutator segment slots in all the General Electric Company's railway motor commutators are tinned for the reception of the armature leads. This greatly facilitates the connection of the coil leads to the commutator without the use of soldering salts or acid flux, which otherwise might produce an injurious effect on the mica.

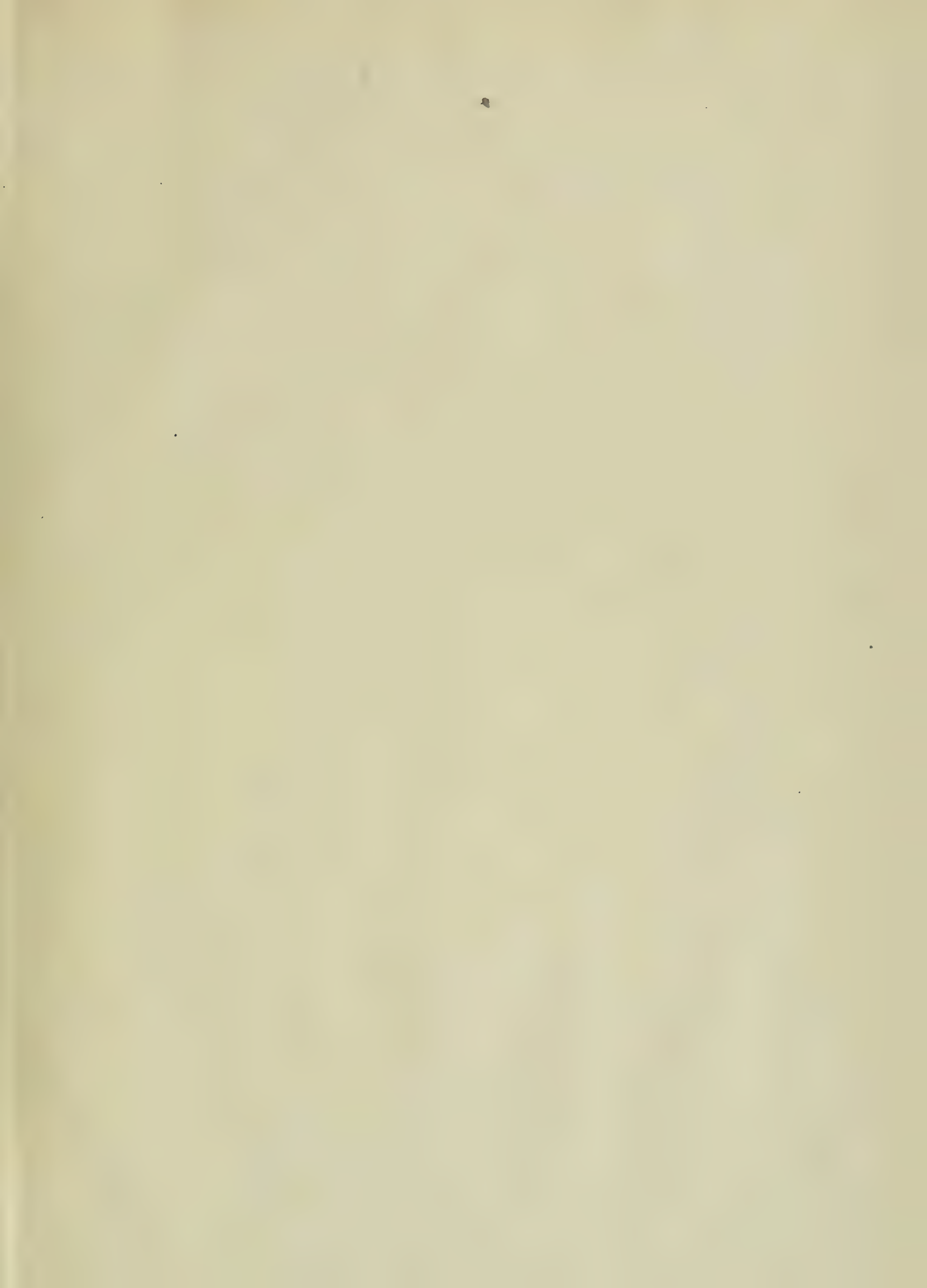
The operation of tinning is performed by dipping the



Assembled Commutator Segments After Tinning Operation.

segments, after they are assembled and turned and while they are still under the pressure of the shell, into a bath of molten tin, imposing a temperature test from $2\frac{1}{2}$ to 3 times more severe than is encountered in actual service. This operation is illustrated in the engraving presented herewith.

The commutator segments are submerged in the tin for approximately five minutes, which thoroughly bakes out any surplus mica binder which might otherwise try out in service and permits the commutator segments to loosen. So far as is known the General Electric Company is the only manufacturer of commutators which imposes so severe a temperature test of commutators.







CARNEGIE LIBRARY OF PITTSBURGH



3 1812 04298 4873